

# Prevalence of Non-suicidal Self-injury (NSSI) in Chinese Psychiatric Patients diagnosed according to DSM-5: A Cross-Sectional Epidemiological Study

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## Article

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# Abstract

Background: NSSI is a common behavior among psychiatric patients that is easily overlooked and often brings serious consequences. The current literature is limited to certain groups of people and uses different diagnostic criteria, so the prevalence of this behavior is unknown. The aim of this study was to investigate the prevalence of NSSI in patients with mental disorders in China using DSM-5 diagnostic criteria. Methods: A two-week multi-center cross-sectional survey was conducted in 15 specialized psychiatric hospitals or general hospitals (including outpatients and inpatients) from 14 cities in 8 provinces of China. DSM-5 diagnostic criteria were used to investigate the presence of NSSI behavior in all patients with mental disorders who came to their psychiatry departments. Findings: A total of 3,298 patients with mental disorders were included in the study. The prevalence of NSSI was 6.8% in outpatients and 6.5% in inpatients. There were significant differences in the prevalence of NSSI among different age groups ( $\chi^2=187.461$ ,  $p<0.000$ ). The highest prevalence of NSSI behavior was found in adolescents aged 10-19 years (14.3%), followed by young adults aged 20-29 years (7.0%). The prevalence of NSSI behavior in females was significantly higher than in males ( $P=16.9\%$ ,  $\chi^2=31.322$ ,  $p<0.000$ ) ( $P=19.6\%$ ,  $\chi^2=11.723$ ,  $p=0.001$ ) ( $P=5.9\%$ ,  $\chi^2=6.094$ ,  $p=0.014$ ) ( $P=7.7\%$ ,  $\chi^2=14.472$ ,  $p<0.000$ ). The prevalence of NSSI behavior in patients with Personality disorders was significantly higher than in any other diagnostic group ( $P=46.7\%$ ,  $\chi^2=195.239$ ,  $p<0.000$ ). Interpretation: The prevalence of NSSI in patients with mental disorders is high, especially in adolescents. Therefore, it is necessary to inform patients and medical workers how to effectively treat and manage NSSI in order to reduce its occurrence.

## Introduction

Non-Suicidal Self-Injury (NSSI) is defined as repetitive, direct, and deliberate destruction of one's body tissue without an intention to die<sup>1</sup>. Despite being an obviously negative, harmful behavior, many people use this method to regulate their emotions<sup>2</sup>, influence others when less intense forms of communication fail<sup>3</sup>, or to deal with peer and family pressure. Although NSSI is self-injurious behavior without suicidal intent, according to DSM-5 diagnostic criteria, self-injury predicts stronger suicidal ideation<sup>4</sup>, and studies have reported a significant increase in the overall incidence of suicide-related deaths among outpatients and inpatients with a history of self-injury<sup>5</sup>. Further research into NSSI is needed to understand and address this behavior.

Several epidemiological NSSI studies have been conducted in other countries. In Sweden, 35.5% adolescents have self-injured at least once in the past year<sup>6</sup>. In the United States, NSSI lifetime prevalence in female veterans is 13.2%<sup>7</sup>. In Italy, 42% of adolescents engaged in self-injury<sup>8</sup>. In Belgium, the twelve-month NSSI prevalence rate was 0.8% for incoming Leuven college students<sup>9</sup>. Although prevalence in the above countries varies considerably due to differences in the definition of self-injury and the method of including participants, NSSI is a worldwide phenomenon and requires attention. NSSI was introduced in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) in 2013 as a distinct syndrome, so its diagnostic criteria should be used to obtain more accurate estimates

of NSSI prevalence<sup>10</sup>. Most of the existing studies performed in China have been conducted in a single province or municipality, and none have attempted to use the proposed DSM-5 criteria to determine the prevalence of NSSI nationwide.

Studies have reported that among adolescents with mental disorders, 60% have self-injured, and 50% have repeated self-injury behaviors<sup>12</sup>. NSSI behavior in adolescents is also a strong predictor of future suicide attempts<sup>11</sup>. As a result, most of the current literature in self-injury focuses on adolescents and ignores the occurrence of NSSI in other age groups. Children between the ages of 7-11 who are exposed to maternal criticism have a greater risk of lifelong self-injury, especially girls<sup>13</sup>. This goes to show that NSSI is an important clinical phenomenon across multiple age groups<sup>14,15</sup>. Among lifetime NSSI patients, 59.6% meet the criteria for at least one mental disorder<sup>16</sup>, and patients without a mental disorder are more likely to be diagnosed with one<sup>17</sup>. Studies have shown that 87.5% of people with borderline personality disorder will develop NSSI in their lifetime<sup>18</sup>. In bipolar disorder, the prevalence of NSSI in patients is 55.3%<sup>19</sup>, but there is no cross-disease study. Unfortunately, patients with mental disorders rarely report self-injury when they visit a doctor because they view it as a normal aspect of their disease. These patients have an increased mortality rate<sup>5</sup> therefore, mentally ill patients who self-injure need our attention.

Current clinical studies use small sample sizes and are limited to certain age groups, certain regions, or certain populations, which may not accurately reflect the prevalence of NSSI<sup>20</sup>. This study used a large, nationally representative sample of patients of all ages with mental disorders to investigate the prevalence of NSSI behavior in China according to the diagnostic criteria in DSM-5.

## **Research in context**

### **Evidence before this study**

We searched PubMed, Web Of Science, WanFang, and CNKI databases without language restrictions from Jan 1, 1970 to Oct 1, 2021 for original studies of the prevalence of people with non-suicidal self-injury behavior in China. For PubMed and Web Of Science, we used the search terms “Non-Suicidal Self-Injury”, “NSSI”, “self-injury”, “self injury”, “deliberate self-injury”, “deliberate self-harm”, “self-harm”, “self harm”, “mental disorder”, “mental disease”, “psychiatric”, “psychiatric patients”, “patients with mental disorder”, “outpatients with mental disorder”, “inpatients with mental disorder”, “prevalence”, “incidence”, “epidemiology”, “cross-sectional study”, “China”, “Chinese”, “survey”. Search terms for WanFang and CKNI are provided in the appendix. Although the prevalence of non-suicidal self-injury in patients with mental disorders is very scarce in China, since 2008, several regional surveys have been conducted to describe the epidemiology of self-injury in the adolescent population in China. However, due to different definitions of self-injury and different survey methods, the results are not comparable.

## **Added value of this study**

This is the first national multi-center survey of NSSI behavior among patients presenting with mental disorders using the DSM-5 recommended diagnostic criteria. This study was not limited to the investigation of patients in a specific age group and was conducted to explore the prevalence of NSSI behaviors at each age level.

## **Implications of all the available evidence**

This detailed profile of the prevalence of non-suicidal self-injury in patients with mental disorders will inform mental health policymaking, planning, and evaluation in China. In the clinic, it can provide effective suggestions for the prevention and targeted treatment of NSSI behavior. In China, more attention should be paid to NSSI behavior in patients with mental disorders.

# **Methods**

## **Study design**

A cross-sectional study was used to survey the epidemiology of NSSI behavior in patients with mental disorders in China. A successive sampling method was used to select respondents. A total of 15 general and psychiatric hospitals were selected to participate in the study. The hospitals were located across 15 cities in 8 provinces in China.

## **Sample**

Considering the number of participating hospitals as well as the number of outpatient visits and ward beds in each hospital, we decided to conduct a two-week survey at each hospital in order to collect enough samples for the survey.

## **Participants**

The participants were patients who met DSM-5 diagnostic criteria for one or more mental disorders and for NSSI<sup>21</sup>. Patients who failed to meet the diagnostic criteria for any mental disorder or who had physical disorders were not eligible and were excluded.

## **Quality control**

All the interviewers were psychiatrists who were uniformly trained in clinical and NSSI diagnosis before participating in the survey. They also received two hours of training on the objectives and procedures of the survey.

## **Ethical standards**

The survey was approved by the Ethical Committee of The Affiliated Brain Hospital of Nanjing Medical University (2019-KY043-01). Participants provided their written informed consent.

## **Procedures**

A face-to-face interview was used to obtain information about the patients (outpatient and inpatient) from the 15 hospitals participating in this study. Basic information was collected, including clinical diagnosis, gender, and age. After collecting the basic information, all patients were asked whether they self-injured. Patients who displayed NSSI behavior were further examined according to the DSM-5 to determine whether they met the criteria for an NSSI diagnosis.

Data were collected from July 1 to August 31, 2019. In the outpatient survey, patients who were discharged within the past 2 weeks were selected. In the inpatient survey, patients who had been admitted within the past 2 weeks were selected.

## **Statistical analysis**

Statistical analysis was performed using SPSS (Version 25.0). Descriptive statistics were examined for patient demographics. Differences in prevalence were analyzed between NSSI and non-NSSI via Chi-squared tests and the Wilcoxon rank sum test (Mann-Whitney U-test), respectively. The significance level was set at  $p$ -value threshold of 0.05.

## **Results**

Between July 1 to August 31, 2019, 3407 individuals were invited to participate in the survey. 109 patients were excluded because they were not officially diagnosed with a mental disorder. A total of 15 hospitals participated in this survey, including 11 outpatient psychiatry departments, 9 inpatient psychiatry departments, 5 outpatient child and adolescent psychiatry departments, and 4 inpatient child and adolescent psychiatry departments. Ultimately, 3,298 individuals were selected for the survey. Among them, 2380 were outpatients and 918 were inpatients. Among the 2380 outpatients, 982 (41.3%) were male and 1398 (58.7%) were female. Among the 918 inpatients, 423 (46.1%) were male and 495 (53.9%) were female (Table 1).

	Outpatients(N=2380)		Inpatients(N=918)
	Frequency, n (%)	Frequency, n (%)	
Gender			
male	982(41.3)		423(46.1)
female	1398(58.7)		495(53.9)
Age(years)			
0~9	78(3.3)		5(0.5)
10~19	868(36.5)		296(32.2)
20~29	331(13.9)		139(15.1)
30~39	235(9.9)		98(10.7)
40~49	288(12.1)		126(13.7)
50~59	278(11.7)		154(16.8)
60 and over	302(12.7)		100(10.9)

*Table 1: Demographics of the study population*

While all individuals were diagnosed with a mental disorder, 3135 had a definite diagnosis and 163 did not. The frequency of various mental disorders is shown in (Table 2).

Category	Frequency	%
Depressive disorders	1168	37.3
Schizophrenia spectrum and other psychotic disorders	602	19.2
Anxiety disorders	398	12.7
Bipolar and related disorders	338	10.8
Neurodevelopmental disorders	187	6.0
Obsessive-compulsive and related disorders	102	3.3
Sleep-wake disorders	89	2.8
Somatic symptoms and related disorders	85	2.7
Trauma-and stressor-related disorders	57	1.8
Personality disorders	45	1.4
Disruptive, impulse-control, and conduct disorders	26	0.8
Dissociative disorders	23	0.7
Substance-related and addictive disorders	12	0.4
Feeling and eating disorders	2	<0.1
Neurocognitive disorders	1	<0.1

*Table 2: Classification of mental disorders in individuals with definite diagnosis of mental disorder*

Category	Number of patients	Number of patients with NSSI behavior	Prevalence %	Number of patients with NSSI diagnosis	Prevalence %
All patients	3298	331	10.0	221	6.7
Outpatients	2380	212	8.9	161	6.8
Inpatients	918	119	13.0	60	6.5
Outpatients of child and adolescent psychiatry departments	767	90	11.7	82	10.7
Inpatients of child and adolescent psychiatry departments	206	32	15.5	25	12.2
Outpatients of adult psychiatry departments	1613	122	7.6	79	4.9
Inpatients of adult psychiatry departments	712	87	12.2	35	4.9

Table 3: Prevalence of NSSI in patients with mental disorders

Among the 3298 patients, 331 (10.0%) exhibited NSSI behavior and 221 (6.7%) had an NSSI diagnosis. Among the 2380 outpatients, 212 (8.9%) exhibited NSSI behavior and 161 (6.8%) had an NSSI diagnosis. Among the 767 outpatients from the child and adolescent psychiatry departments, 90 (11.7%) exhibited NSSI behavior and 82 (10.7%) had an NSSI diagnosis. Among the 1613 outpatients from the adult psychiatry departments, 122 (7.6%) exhibited NSSI behavior and 79 (4.9%) had an NSSI diagnosis. Among the 918 inpatients, 119 (13.0%) exhibited NSSI behavior and 60 (6.5%) had an NSSI diagnosis. Among the 206 inpatients from the child and adolescent psychiatry departments, 32 (15.5%) exhibited NSSI behavior and 25 (12.2%) had an NSSI diagnosis. Among the 712 inpatients of the adult psychiatry departments, 87 (12.2%) exhibited NSSI behavior and 35 (4.9%) had an NSSI diagnosis (Table 3).

Category	Frequency	%
Depressive disorders	115	59.0
Bipolar and related disorders	36	18.5
Personality disorders	21	10.8
Obsessive-compulsive and related disorders	7	3.6
Schizophrenia spectrum and other psychotic disorders	7	3.6
Trauma-and stressor-related disorders	3	1.5
Disruptive, impulse-control, and conduct disorders	2	1.0
Anxiety disorders	2	1.0
Somatic symptoms and related disorders	1	0.5
Substance-related and addictive disorders	1	0.5

Table 4: Classification of mental disorders in patients with definite diagnosis of mental disorder and NSSI (n=195)

Among the 221 patients with an NSSI diagnosis, 195 had a definite diagnosis of a mental disorder and 26 did not. 115 (59.0%) were diagnosed with a Depressive disorder, 36 (18.5%) were diagnosed with Bipolar and related disorders, 21 (10.8%) were diagnosed with Personality disorders, 7 (3.6%) were diagnosed with Obsessive-compulsive and related disorders, 7 (3.6%) were diagnosed with Schizophrenia spectrum and other psychotic disorders, 3 (1.5%) were diagnosed with Trauma-and stressor-related disorders, 2 (1.0%) were diagnosed with Disruptive, impulse-control, and conduct disorders, 2 (1.03%) were diagnosed with Anxiety disorders, 1 (0.51%) was diagnosed with a Somatic symptom and related disorder, and 1 (0.5%) was diagnosed with a Substance-related and addictive disorder (Table 4).

Category	Number of patients without NSSI diagnosis (%)	Number of patients with NSSI diagnosis (%)	$\chi^2$	p-value
<b>Mental disorder</b>				
Depressive disorders	1053(90.2)	115(9.8)	195.239	0.000
Bipolar and related disorders	302(89.3)	36(10.7)		
Personality disorders	24(53.3)	21(46.7)		
Obsessive-compulsive and related disorders	95(93.1)	7(6.9)		
Schizophrenia spectrum and other psychotic disorders	595(98.8)	7(1.2)		
Trauma-and stressor-related disorders	54(94.7)	3(5.3)		
Disruptive, impulse-control, and conduct disorders	24(92.3)	2(7.7)		
Anxiety disorders	396(99.5)	2(0.5)		
Somatic symptoms and related disorders	84(98.8)	1(1.2)		
Substance-related and addictive disorders	11(91.7)	1(8.3)		

Table 5: Prevalence of NSSI in mental disorders

The distribution of NSSI diagnoses across mental disorders is as follows: Personality disorders (46.7%), Bipolar and related disorders (10.7%), Depressive disorders (9.8%), Substance-related and addictive disorders (8.3%), Disruptive, impulse-control, and conduct disorders (7.7%), Obsessive-compulsive and related disorders (6.9%), Trauma-and stressor-related disorders (5.3%), Schizophrenia spectrum and other psychotic disorders (1.2%), Somatic symptoms and related disorders (1.2%), and Anxiety disorders (0.5%). The prevalence of an NSSI diagnosis varied greatly ( $\chi^2=195.239$ ,  $p<0.000$ ), with patients who had

Personality disorders demonstrating a significantly higher prevalence than any other mental disorder (Table 5).

The prevalence of an NSSI diagnosis differed according to age ( $\chi^2=187.461$ ,  $p<0.000$ ). Among the 221 patients with an NSSI diagnosis, the youngest was 12 years old and the oldest was 56. NSSI was detected most frequently in 16-year-olds, and not at all in patients 60 and older (Figure 1). The prevalence of an NSSI diagnosis was 166 (14.3%) between the ages of 10 to 19 years old, 33 (7.0%) between the ages of 20 to 29 years old, 11 (3.3%) between the ages of 30 to 39 years old, 8 (1.9%) between the ages of 40 to 49 years old, 3 (0.7%) between the ages of 50 to 59 years old, and 0 for patients 60 and older. Patients 10 to 19 years old and 20 to 29 years old had the highest prevalence of NSSI (Table 6).

Category	Number of patients without NSSI diagnosis (%)	Number of patients with NSSI diagnosis (%)	$\chi^2$	p-value
<b>Age(years)</b>				
0-9	83(100.0)	0(0)	187.461	0.000
10-19	998(85.7)	166(14.3)		
20-29	437(93.0)	33(7.0)		
30-39	322(96.7)	11(3.3)		
40-49	406(98.1)	8(1.9)		
50-59	429(99.3)	3(0.7)		
60 and over	402(100.0)	0(0)		

Table 6: Prevalence of NSSI diagnosis by age

Category	Number of patients without NSSI diagnosis (%)	Number of patients with NSSI diagnosis (%)	$\chi^2$	p-value
<b>Outpatients of child and adolescent psychiatry departments</b>				
Male	366(95.6)	17(4.4)	31.322	0.000
female	319(83.1)	65(16.9)		
<b>Inpatients of child and adolescent psychiatry departments</b>				
Male	95(96.0)	4(4.0)	11.723	0.001
female	86(80.4)	21(19.6)		
<b>Outpatients of adult psychiatry departments</b>				
male	580(96.8)	19(3.2)	6.094	0.014
female	954(94.1)	60(5.9)		
<b>Inpatients of adult psychiatry departments</b>				
male	319(98.5)	5(1.5)	14.472	0.000
female	358(92.3)	30(7.7)		

Table 7: Prevalence of NSSI in outpatient or inpatient psychiatry departments and child and adolescent psychiatry departments by gender

The prevalence of an NSSI diagnosis across all psychiatry departments showed clear gender differences. Females displayed significantly higher rates than males in outpatients of child and adolescent psychiatry departments ( $\chi^2=31.322$ ,  $p<0.000$ ), inpatients of child and adolescent psychiatry departments ( $\chi^2=11.723$ ,  $p=0.001$ ), outpatients of adult psychiatry departments ( $\chi^2=6.094$ ,  $p=0.014$ ), and inpatients of adult psychiatry departments ( $\chi^2=14.472$ ,  $p<0.000$ ) (Table 7).

## Discussion

The results of this study showed that the prevalence of NSSI in outpatients and inpatients was 6.8% and 6.5%, respectively. Among outpatients, it was 4.9% in outpatients of adult psychiatric departments and 10.7% in outpatients from child and adolescent psychiatry departments. Among inpatients, it was 4.9% in outpatients from adult psychiatric departments and 12.2% in inpatients from child and adolescent psychiatry departments. The outpatient prevalence we report is similar to the findings of Ose (2021) et al. who found a prevalence of 8.1% in a national study of NSSI prevalence among adult psychiatric outpatients in Norway<sup>22</sup>. In terms of inpatient prevalence, Groschwitz (2015) et al., detected an NSSI prevalence of 37.0% in patients aged 12 to 19 years old hospitalized for a psychiatric disorder in Germany<sup>23</sup>, which is considerably higher than the rate we report. Perhaps this is attributable to the fact that they did not perform a cross-sectional epidemiological study and the sample they used was small (N=111) and from a specific group. In this study, DSM-5 diagnostic criteria for NSSI were strictly used, and only patients who met the six diagnostic criteria were diagnosed with NSSI. In addition, the participants in this study were patients of all ages from psychiatric departments including children, adolescents, and adults. Among adults aged 40 to 60, NSSI was detected only sporadically, while no patients over 60 were diagnosed with NSSI. Because we surveyed patients with mental disorders at all ages and used strict diagnostic criteria, the overall prevalence of NSSI in this study may be lower than that of similar studies.

The results showed that the prevalence of NSSI in adolescents aged 10-19 years old was 14.3%, and the prevalence in young adults aged 20-29 years old was 7.0%, significantly higher than in any other age group. This trend is consistent with previous research. For example, Ose (2021) et al. also found that the prevalence of NSSI was highest between the ages of 18-23 years old and decreased with age<sup>22</sup>. Swannell (2014) found the same pattern in their community population, with an NSSI prevalence of 17.2% in adolescents, 13.4% in young adults, and 5.5% in adults<sup>24</sup>. The incidence of NSSI behavior is consistent among adolescents and young adults, both in clinical samples and community samples hence, mental health in these two groups requires more attention.

In terms of gender differences, the results showed that the prevalence of NSSI in females was significantly higher than in males. This was true for the various outpatient and inpatient categories and the total population overall. However, there is no consistent conclusion about differences in prevalence according to gender. Most studies tend to point to a significantly higher prevalence in women<sup>23-26</sup> while other studies report a significantly higher prevalence in men<sup>29</sup>. Some studies reported no gender

differences at all<sup>27</sup> and the DSM-5 seems to agree<sup>28</sup>. Be that as it may, most of the patients who exhibited NSSI behavior in this study were suffering from some type of depressive disorder. It is widely known that women and female adolescents are more likely to suffer from depression than their male counterparts<sup>30</sup>. Moreover, we found that adolescents had the highest prevalence of NSSI out of any age group. Adolescent females with mental disorders may be more likely to experience negative emotions and have a greater need for emotional regulation<sup>31</sup>. Therefore, more attention should be paid to NSSI in female patients with mental disorders in clinics.

The results showed that among all mental disorders, the prevalence of NSSI was highest in patients with Personality disorders. Borderline personality disorder often presents with comorbid NSSI<sup>32</sup>. In fact, in the DSM-5, NSSI is one of the diagnostic criteria for borderline personality disorder<sup>33</sup>. Among other major mental disorders, the prevalence of NSSI ranged from 0.5% to 46.7%, which is consistent with previous studies.

Ose (2021) et al., showed how widespread NSSI is in other mental disorders. For example, the prevalence in bipolar disorder, major depressive disorder, anxiety disorder, schizophrenia, schizoaffective disorder, adjustment disorder, eating disorder, substance use disorder, personality disorder, and other mental disorders ranged from 7.0% to 14.4%<sup>22</sup>. The highest prevalence of NSSI in their study was for personality disorders (14.4%), albeit all types of personality disorders were grouped together. Ose (2021) et al. also proposed that the majority of subjects with personality disorders who exhibited NSSI behaviors in their study actually had borderline personality disorder<sup>22</sup>. In this study, the proportion of patients with borderline personality disorder out of personality disorders reached 91.1% (41/45). Notably, the prevalence for NSSI was around 10% for both depressive disorders and bipolar and related disorders, and these two diagnoses were also the most common among all NSSI patients. This is also consistent with the study by Ose (2021) et al., which showed that while the prevalence of NSSI was highest in patients with borderline personality disorder, the number of patients with an affective disorder who exhibited NSSI was highest<sup>22</sup>. This suggests that it would be unwise to focus only on NSSI in patients with borderline personality disorder in the clinic. We should pay attention to patients with other mental disorders as well, especially depressive disorders and bipolar and related disorders.

## Conclusions

The results of this study show that NSSI is more common among adolescents and women in psychiatric departments. Also, NSSI occurs frequently in patients with personality disorders and in patients with other psychiatric disorders such as depressive disorders and bipolar and related disorders. Clinicians should be made aware of the prevalence of NSSI in these groups for prevention and early intervention.

## Innovations

This is the first national multi-center survey of NSSI in patients with mental disorders using the diagnostic criteria recommended by DSM-5 in China. In addition, this study was not limited to the investigation of patients in a specific age group, as it was conducted to explore the prevalence of NSSI at each age level.

## Limitations

The limitations of this study are mainly reflected in the following aspects. First, this study is a cross-sectional study, and recall bias and response bias may have had a certain influence on the results. Second, the subjects in this study were all patients with mental disorders who came to a hospital seeking treatment. Since not all patients with mental disorders seek treatment at a hospital, selection bias is inevitable.

## Future research Prospects

Future studies should investigate NSSI based on large-scale surveys of mental disorders in order to obtain more objective results. Behavioral characteristics and causes and factors of behavior can be explored, which may produce effective suggestions for the prevention and targeted treatment of NSSI. Understanding the motivation of NSSI and related influencing factors can play a role in prevention, and enable clinicians to intervene early. At the same time, prevention and treatment for NSSI requires the joint efforts of society, family, and medical institutions.

The results of this study reflect the occurrence of NSSI in patients with mental disorders in China. They can be used to inform mental health policymaking, planning, and evaluation of NSSI in China.

## Declarations

**Contributors:** Pei Zhang: Data Curation, Formal analysis. Lichen Ouyang: Writing - Original Draft. Minlu Liang, Yun Wu, Chenxi Bao, Kun Yang, Yuan Liu, Jing Long, Xianglan Wang, Guangya Liu, Xiaomei Jiang, Yan Sun, Hua Lv, Xianliang Wu, Suhong Wang, Guangyao Li, Bei Zhao, Yang Liu, Jianbo Hu: data collection. Chun Wang: Writing - Review & Editing, critically revised the manuscript. All authors read and approved the final manuscript.

**Declaration of interests:** We declare no competing interests.

**Data sharing:** The data analysed during the current study are available from the corresponding author on reasonable request.

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## References

1. Nock MK, Joiner TE, Jr., Gordon KH, Lloyd-Richardson E, Prinstein MJ. Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. *Psychiatry Res* 2006; **144**(1): 65-72.
2. Klonsky ED. The functions of deliberate self-injury: a review of the evidence. *Clinical psychology review* 2007; **27**(2): 226-39.
3. Hilt LM, Cha CB, Nolen-Hoeksema S. Nonsuicidal self-injury in young adolescent girls: moderators of the distress-function relationship. *Journal of consulting and clinical psychology* 2008; **76**(1): 63-71.
4. Brausch AM, Muehlenkamp JJ. Perceived effectiveness of NSSI in achieving functions on severity and suicide risk. *Psychiatry research* 2018; **265**: 144-50.
5. Geulayov G, Casey D, Bale L, et al. Suicide following presentation to hospital for non-fatal self-harm in the Multicentre Study of Self-harm: a long-term follow-up study. *The lancet Psychiatry* 2019; **6**(12): 1021-30.
6. Zetterqvist M, Lundh LG, Dahlström O, Svedin CG. Prevalence and function of non-suicidal self-injury (NSSI) in a community sample of adolescents, using suggested DSM-5 criteria for a potential NSSI disorder. *Journal of abnormal child psychology* 2013; **41**(5): 759-73.
7. Monteith LL, Holliday R, Miller C, et al. Suicidal ideation, suicide attempt, and non-suicidal self-injury among female veterans: Prevalence, timing, and onset. *Journal of affective disorders* 2020; **273**: 350-7.
8. Cerutti R, Manca M, Presaghi F, Gratz KL. Prevalence and clinical correlates of deliberate self-harm among a community sample of Italian adolescents. *Journal of adolescence* 2011; **34**(2): 337-47.
9. Kiekens G, Hasking P, Claes L, et al. The DSM-5 nonsuicidal self-injury disorder among incoming college students: Prevalence and associations with 12-month mental disorders and suicidal thoughts and behaviors. *Depression and anxiety* 2018; **35**(7): 629-37.

10. Buelens T, Luyckx K, Kiekens G, Gandhi A, Muehlenkamp JJ, Claes L. Investigating the DSM-5 criteria for non-suicidal self-injury disorder in a community sample of adolescents. *Journal of affective disorders* 2020; **260**: 314-22.
11. Geulayov G, Casey D, McDonald KC, et al. Incidence of suicide, hospital-presenting non-fatal self-harm, and community-occurring non-fatal self-harm in adolescents in England (the iceberg model of self-harm): a retrospective study. *The Lancet Psychiatry* 2018; **5**(2): 167-74.
12. Kaess M, Parzer P, Mattern M, et al. Adverse childhood experiences and their impact on frequency, severity, and the individual function of nonsuicidal self-injury in youth. *Psychiatry research* 2013; **206**(2-3): 265-72.
13. James KM, Gibb BE. Maternal criticism and non-suicidal self-injury in school-aged children. *Psychiatry research* 2019; **273**: 89-93.
14. Bragazzi NL, Parigi D, Pezzoni F, Del Puente G. A Content Analysis of Italian NSSI Web-sites. *Procedia - Social and Behavioral Sciences* 2013; **103**: 19-27.
15. Cassels M, Wilkinson P. Non-suicidal self-injury in adolescence. *Paediatrics and Child Health* 2016; **26**(12): 554-8.
16. Kiekens G, Hasking P, Bruffaerts R, et al. Non-suicidal self-injury among first-year college students and its association with mental disorders: results from the World Mental Health International College Student (WMH-ICS) initiative. *Psychological medicine* 2021: 1-12.
17. Wilkinson PO, Qiu T, Neufeld S, Jones PB, Goodyer IM. Sporadic and recurrent non-suicidal self-injury before age 14 and incident onset of psychiatric disorders by 17 years: prospective cohort study. *The British journal of psychiatry : the journal of mental science* 2018; **212**(4): 222-6.
18. Perez S, Lorca F, Marco JH. "Dissociation, posttraumatic stress symptoms, emotional dysregulation, and invalidating environments as correlates of NSSI in borderline personality disorder patients". *Journal of trauma & dissociation : the official journal of the International Society for the Study of Dissociation (ISSD)* 2020; **21**(5): 520-35.
19. Khoubaeva D, Dimick M, Timmins VH, et al. Clinical correlates of suicidality and self-injurious behaviour among Canadian adolescents with bipolar disorder. *European child & adolescent psychiatry* 2021.
20. Huang YH, Liu HC, Tsai FJ, et al. Correlation of impulsivity with self-harm and suicidal attempt: a community study of adolescents in Taiwan. *BMJ open* 2017; **7**(12): e017949.
21. Zetterqvist M, Lundh L-G, Dahlström Ö, Svedin CG. Prevalence and Function of Non-Suicidal Self-Injury (NSSI) in a Community Sample of Adolescents, Using Suggested DSM-5 Criteria for a Potential NSSI Disorder. *Journal of Abnormal Child Psychology* 2013; **41**(5): 759-73.

22. Ose SO, Tveit T, Mehlum L. Non-suicidal self-injury (NSSI) in adult psychiatric outpatients - A nationwide study. *Journal of psychiatric research* 2021; **133**: 1-9.
23. Groschwitz RC, Kaess M, Fischer G, et al. The association of non-suicidal self-injury and suicidal behavior according to DSM-5 in adolescent psychiatric inpatients. *Psychiatry Res* 2015; **228**(3): 454-61.
24. Swannell SV, Martin GE, Page A, Hasking P, St John NJ. Prevalence of nonsuicidal self-injury in nonclinical samples: systematic review, meta-analysis and meta-regression. *Suicide Life Threat Behav* 2014; **44**(3): 273-303.
25. Tang J, Li G, Chen B, et al. Prevalence of and risk factors for non-suicidal self-injury in rural China: Results from a nationwide survey in China. *Journal of Affective Disorders* 2018; **226**: 188-95.
26. Liang S, Yan J, Zhang T, et al. Differences between non-suicidal self injury and suicide attempt in Chinese adolescents. *Asian Journal of Psychiatry* 2014; **8**: 76-83.
27. Andover MS. Non-suicidal self-injury disorder in a community sample of adults. *Psychiatry Res* 2014; **219**(2): 305-10.
28. Hata Y, Miura M, Nakao S, Kawahara S, Kita T, Ishibashi T. Antiangiogenic properties of fasudil, a potent Rho-Kinase inhibitor. *Jpn J Ophthalmol* 2008; **52**(1): 16-23.
29. Yang SJ, Jo H, Kim J-G, Jung SH. Baicalin Attenuates Laser-Induced Choroidal Neovascularization. *Current Eye Research* 2014; **39**(7): 745-51.
30. Salk RH, Hyde JS, Abramson LY. Gender differences in depression in representative national samples: Meta-analyses of diagnoses and symptoms. *Psychol Bull* 2017; **143**(8): 783-822.
31. Victor SE, Muehlenkamp JJ, Hayes NA, Lengel GJ, Styer DM, Washburn JJ. Characterizing gender differences in nonsuicidal self-injury: Evidence from a large clinical sample of adolescents and adults. *Comprehensive Psychiatry* 2018; **82**: 53-60.
32. Buelens T, Costantini G, Luyckx K, Claes L. Comorbidity Between Non-suicidal Self-Injury Disorder and Borderline Personality Disorder in Adolescents: A Graphical Network Approach. *Frontiers in psychiatry* 2020; **11**: 580922.
33. Yadav UC, Srivastava SK, Ramana KV. Prevention of VEGF-induced growth and tube formation in human retinal endothelial cells by aldose reductase inhibition. *J Diabetes Complications* 2012; **26**(5): 369-77.

## Figures

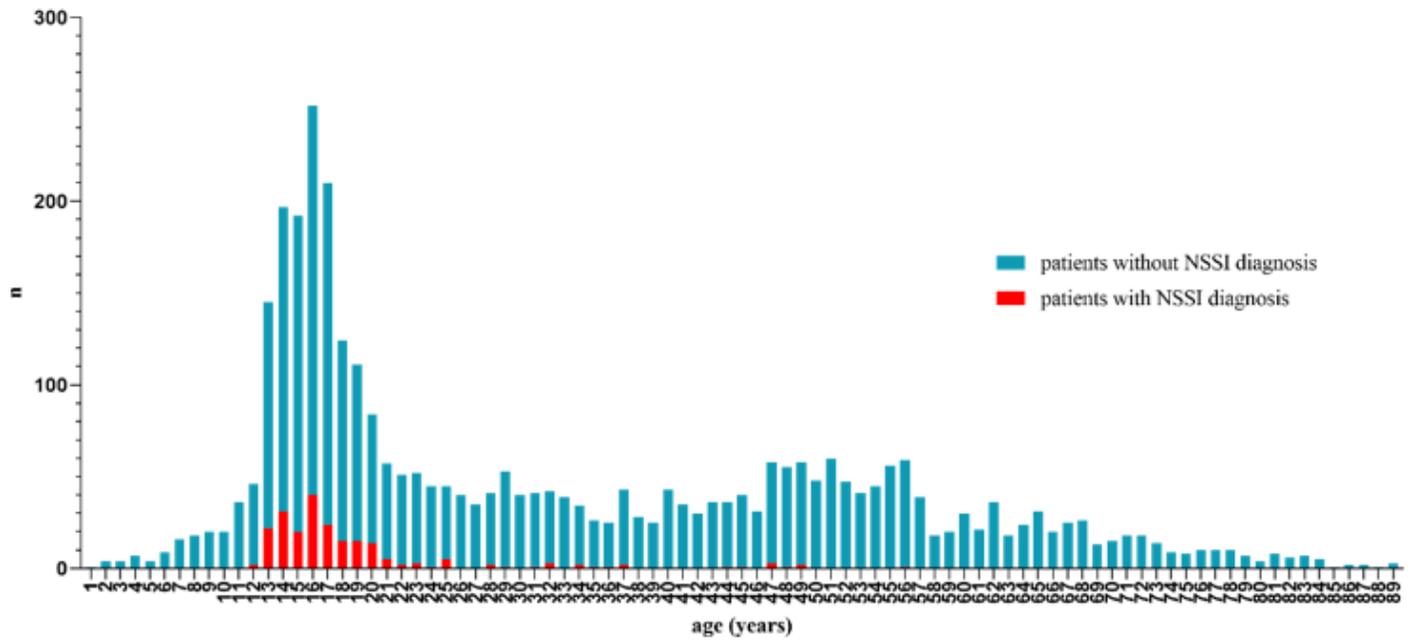


Figure 1

Distribution of patients with and without NSSI diagnosis in total population

NSSI= Non-Suicidal Self-Injury. The vertical axis is the number of people, the horizontal axis is age. The height of the bars indicates the total number at the given age.