

General Psychiatry Non-suicidal self-injury in Shanghai inner bound middle school students

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ABSTRACT

Background Non-suicidal self-injury (NSSI) behaviour is very common among adolescents. Its prevalence and behavioural characteristics may vary according to regional and cultural differences. Investigation of NSSI locations and diagnosis of adolescents with NSSI are relatively lacking in China.

Aims The study objective was to determine the prevalence and features of NSSI among middle school students in Shanghai.

Methods The participants were from grade 6 to 8 selected from three junior schools in Jing'an District. Consenting students completed the Ottawa Self-Injury Inventory to determine the prevalence and characteristics of NSSI. Those who indicated NSSI within the past month were administered the Mini-International Neuropsychiatric Interview for Children and Adolescents to assess for emotional disorders.

Result The result shows 510 participants (21.7%; mean age 13.51 (0.97) years old; 56.7% female) reported at least one instance of NSSI during the previous 12 months. NSSI was significantly more common in girls than boys (24.9% vs 18.5%; $\chi^2=14.03$, $p=0.00$). Commonly reported reasons for NSSI were for internal and external emotion regulation (87.9%, 82.3%) and social influence (57.8%). Anxiety disorders were the most common (28.9%) disorder associated with NSSI.

Conclusion The rate of NSSI of middle school students in Shanghai inner bound is similar to those reported in North American and European youth. It is essential that school mental health professionals are aware of how to manage NSSI within the school setting.

INTRODUCTION

Non-suicidal self-injury (NSSI) is defined as the deliberate destruction of body tissue without suicidal intent.^{1 2} NSSI often starts in adolescence¹⁻³ and those with an earlier age of onset report greater frequency and methods of NSSI, NSSI-related hospital visits, and are more likely to have a suicide plan.⁴ The international lifetime prevalence rate of NSSI in adolescents is 17% (8.0–26.3),⁵ but most studies on rates and characteristics of adolescent NSSI are North American and European. Limited research mainly conducted in Hong Kong, and Taiwan and Guangdong reported a 12-month prevalence rate of NSSI in Chinese adolescents ranging

from 17.0% to 33.6%.⁶⁻⁸ We are unaware of any prevalence studies in Chinese middle school students from Shanghai.

Martin and colleagues¹ reported that self-injury in females peaked between 15 and 24 years of age and for males between 10 and 19 years of age. Gratz and colleagues⁹ extended research on the characteristics associated with NSSI by examining the ways in which gender, racial/ethnic background and school level interact. Their research found that the rates of NSSI varied as a function of gender, racial/ethnic background and school level, as well as their interactions with African-American boys reporting higher rates of NSSI behaviours than their peers with the difference more obvious in middle school.

In addition to rates of NSSI, researchers have also examined other characteristics of NSSI behaviour, such as type and location of self-injury. Numerous types of NSSI have been reported in studies including cutting, headbanging, hitting and biting.^{2 10} Beyond prevalence rates and methods, research on the body location of NSSI remains limited. A small number of studies have shown that the common injury locations involve the arms, legs and the head, with gender differences reported for type and location of injury among adolescents.^{3 10} For example, Hanania and colleagues³ investigated the characteristics of NSSI in a sample of 952 Jordanian adolescents (49.8% female) between the ages of 11 and 19 years and found that females were more likely than males to engage in cutting. Conversely, males were more likely than females to report self-punching; females were more likely to injure their arms and legs, whereas males were more likely to injure their jaw, face and genitals.

Surveying NSSI behaviour among middle school students in Shanghai can supplement the existing research on adolescents in China. Investigating self-injury in Shanghai students helps to further understand the characteristics of this behaviour in Chinese

adolescents, and also extends the research on this behaviour beyond North American and European countries. In addition to the attention paid to the prevalence of NSSI behaviour, the methods and location of self-injury, the function and motivation of self-injury are also very important issues.

According to existing research, emotion regulation is the most common motivation for NSSI,¹ followed by relationship influence and social control.¹⁰ Most research on the functions of NSSI was conducted on North American samples with few studies investigating Chinese adolescents. One exception is a study by You and colleagues¹¹ who investigated the functions of NSSI in high school students in Hong Kong. They found that within the social influence function, 'to feel more a part of a group' received the highest mean endorsement, contradicting to the previous studies in western adolescent samples which found that this function was among the least endorsed.^{12 13} The function 'to punish self' had a low score in You *et al's* study but was the second most important function after emotional regulation in many western samples.¹⁴ This led the authors to speculate that this inconsistency may be due to a cultural difference in attitude towards relationships and autonomy, such that western countries emphasise individualism while China emphasises collectivism.¹⁵ There is insufficient research evidence on the functions of NSSI in youth from mainland China.

Although it is well known that NSSI occurs in many patients with mental illness, there are few studies with middle school samples on the identification and evaluation of NSSI in youth using standard diagnostic tools. Understanding the function and mental health of students who engage in NSSI is necessary for prevention and early intervention efforts. The objective of this exploratory study was to determine the prevalence and features of NSSI among middle school students in Shanghai.

METHODS

Sample

The participants were from a previous research study: the assessment study on the mental health needs of children and adolescents aged 4–18 years in Shanghai.¹⁶ From the seven districts selected at that time, one district was randomly chosen, namely Jing'an District, and then three public schools were randomly selected from within. The sample was 2402 adolescents aged 12–16 years (female (n=1158, 49.3%); male (n=1193, 50.7%)). The sample was drawn from 68 classes and included students from grade 6 (n=783), grade 7 (n=800) and grade 8 (n=819).

Inclusion criteria: Junior high school students at school presently. Parents and children agreed to participate in the survey.

Exclusion criteria: Those who were unable to understand or complete questionnaires due to severe brain and body diseases and mental disorders.

Measures

Ottawa Self-Injury Inventory

The Ottawa Self-Injury Inventory (OSI)¹⁷ is a self-report questionnaire assessing NSSI in great detail including 1-month, 6-month and 12-month prevalences of occasional and repetitive NSSI as well as the context of NSSI, its functions, alternative coping strategies and potential addictive features. The prevalence of NSSI was determined by asking how often acts of NSSI were present within the time frame ('how often in the past month/in the past 6 months have you actually injured yourself without the intention to kill yourself?'). This questionnaire has been used in inpatients, outpatients^{18 19} and community samples.²⁰ In order to use the OSI with Chinese adolescents, minor changes were necessary. Preliminary findings indicate that the reliability and validity of the Chinese version are satisfactory.²¹

The Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) was used.²² Its widely used structured clinical diagnostic interview was designed to assess the presence of the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition and the International Classification of Diseases Tenth Revision psychiatric disorders in children and adolescents aged 6–17 years in a way that is comprehensive and concise. Research has shown that the MINI-KID generates reliable and valid psychiatric diagnoses.²² In 2011, Yuxin Liu and Wang²³ translated the tool into Chinese and the authors reported good test-retest reliability ($r=0.90$) and a high consistency between raters with kappa above 0.80.

Procedure

The study proceeded in two phases, that the first was an in-class group administration of the frequency of NSSI, and the second was a group administration of the OSI for students who reported NSSI and an individual administration of the MINI-KID for students who reported NSSI in the past month (figure 1).

The meaning and context of the research study was explained to students and their parents through classroom and parent meetings under the supervision of a teacher. Informed consent was obtained by both students and their parents. Standardised training was provided to study personnel (ie, clinical psychology or psychiatry postgraduate students, psychiatrists) who collected the in-class data, under the supervision of a teacher who was blinded to the students' answers.

The MINI-KID was used to interview students who reported NSSI in the past month. The clinical diagnostic interview was completed within 4 weeks of completion of the OSI by one of the followings: child and adolescent psychiatrists (n=7), undergraduate students who major in psychiatry or psychology (n=4) and a school counsellor (n=1). All of the interviewers had participated in 4 days of MINI-KID training, and their average reliability was kappa=0.60.

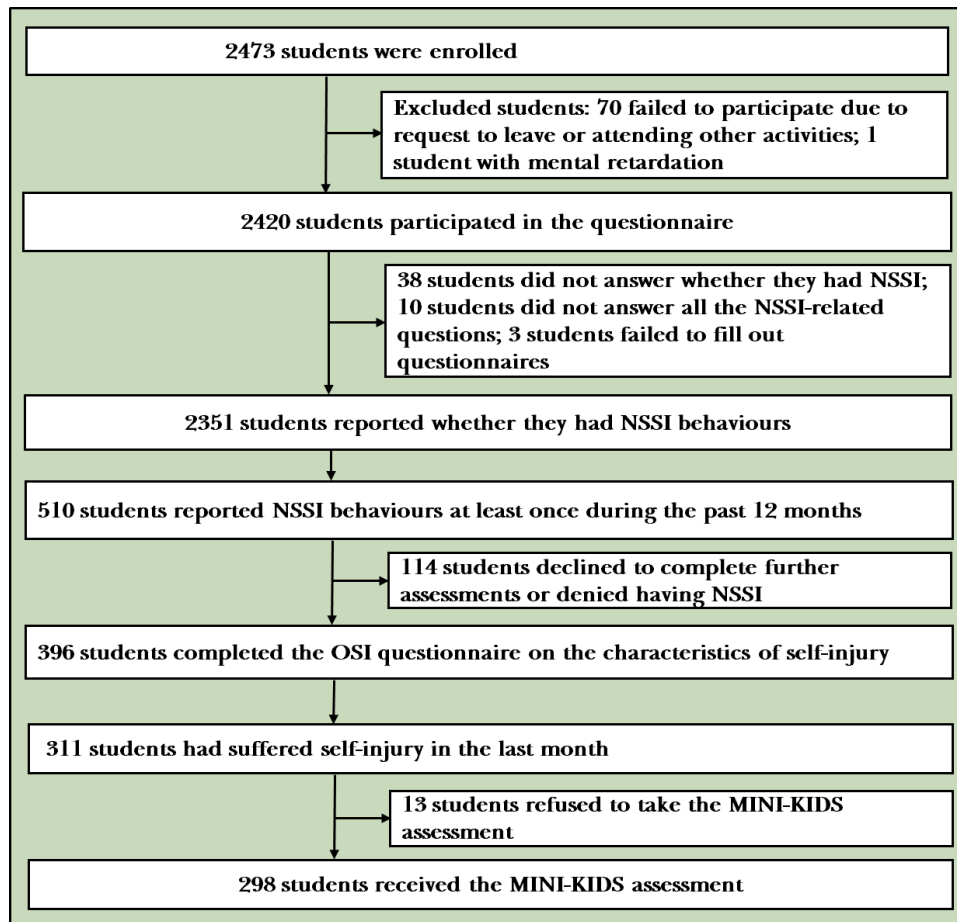


Figure 1 Flowchart of the study. MINI-KID, Mini-International Neuropsychiatric Interview for Children and Adolescents; NSSI, non-suicidal self-injury; OSI, Ottawa Self-Injury Inventory.

Statistical analysis

Descriptive statistics and Spearman correlation analyses were used to analyse the data. Sex differences were examined by the χ^2 or Fisher's exact tests and the Mann-Whitney U test for non-normally distributed variables. All tests were two tailed and a p value <0.05 was considered statistically significant.

The presence of NSSI was dichotomised into 0=no NSSI and 1=at least one incidence of NSSI in the past 12 months. Self-injury method and body location were also coded as 0=no and 1=yes. Twenty-two self-injury locations were recoded into seven categories (head and face, neck, chest and back, abdomen, genitals and buttocks, upper arms and legs) and 17 methods of self-injury were recoded into 11 categories (cutting and piercing, scratching, biting, excessive use of street drugs or alcohol, hitting, eating or drinking things that are not food, headbanging, burning, hair pulling, interfering with wound healing and trying to break bones).

RESULTS

Frequencies and characteristics of NSSI

A total of 2351 students (the return rate of the questionnaire was 97.9%) answered whether they had any NSSI behaviour and 396 out of 510 (77.6%) students reported

more characteristics in the second phase. NSSI behaviour occurring at least once during the past 12 months was reported in 21.7% of students ($n=510$; 18.5% male, 24.9% female ($\chi_1^2=14.034$, $p<0.001$)). Of these, 13.2% ($n=311$) reported NSSI within the past month (table 1). The mean age of onset was 9.7 years ($SD=2.7$; min=3, max=14) and the average age of onset was significantly younger for males (9.09 years, $SD=2.85$) than females (10.1 years, $SD=2.4$; $t=3.472$, $df=362$, $p=0.01$).

Reported methods of engaging in NSSI were as follows: scratching (40.9%), biting (31.6%), hitting (24.7%), interfering with wound healing (23.0%), hair pulling (23.0%), nail-biting/injuries (22.0%) and cutting (18.4%). More than one method of NSSI was reported by 75.4% of students and 21% of students reported they used more than four. Spearman correlation analysis showed that the frequency of NSSI within 12 months and the number of self-injury methods were positively correlated ($r=0.143$, $p<0.011$). The Mann-Whitney U test showed that female students reported more methods of NSSI than male students ($Z=-3.133$, $p<0.002$). A χ^2 analysis was also conducted to further examine sex differences in the methods of NSSI. The result revealed that females were more likely than males to engage in biting, cutting, piercing body parts, nail-biting/injuries and interfering

Table 1 Frequencies of reported NSSI for total sample and by sex

	Total n=510 (%)	Males n=221 (%)	Females n=289 (%)
In the past month			
At least once	256 (50.2)	114 (51.6)	142 (49.1)
Weekly	36 (7.1)	15 (6.8)	21 (7.3)
Daily	19 (3.71)	8 (3.6)	11 (3.8)
In the past 6 months			
1–5 times	314 (61.6)	146 (66.1)	168 (58.1)
Monthly	29 (5.7)	11 (5.0)	18 (6.2)
Weekly	31 (6.1)	13 (5.9)	18 (6.2)
Daily	16 (3.1)	8 (3.6)	8 (2.8)
In the past 12 months			
1–5 times	333 (65.3)	138 (62.4)	195 (67.5)
Monthly	80 (15.7)	39 (17.6)	41 (14.2)
Weekly	27 (5.3)	10 (4.5)	17 (5.9)
Daily	15 (2.9)	6 (2.7)	9 (3.1)

NSSI, non-suicidal self-injury.

with wound healing. Conversely, males were more likely than females to report hitting. No significant sex differences were found for other methods (table 2).

Students reported the most common sites of injury were hands (73.0%), followed by scalp (26.3%) and lips

(17.2%). Two-thirds of students who engaged in NSSI (67.0%; n=152) reported injuring more than 1 body part, 19.4% (n=44) reported injuring more than 4 body parts and 1.8% (n=4) of students reported 10 injury locations. There was a significant positive relationship with the frequency of NSSI and the number of self-injury locations ($r=0.167, p<0.003$). χ^2 analyses were conducted to further examine sex differences in the location of NSSI. The result revealed that males were more likely than females to injure their buttocks and females were more likely than males to injure their lips and hands/fingers. There were no sex differences in any other injury location or in the total number of sites injured ($Z=-1.107, p=0.268$) (table 3).

Functions/motivations of NSSI

The reasons for NSSI most frequently reported by students were for internal emotion regulation (87.9%), social influence (57.8%), external emotion regulation (82.3%) and sensation seeking (28.3%). Table 4 lists the reported functions of NSSI by sex.

Addictive features and relief following NSSI

Among those students who reported NSSI in the past 12 months, 400 reported their addictive features, and 387 reported feelings of relief after NSSI. Addictive feature scores were between 0 and 22 ($M=2.05; SD=1.55$). Higher addictive feature scores were related to more frequent NSSI ($r=0.421, p=0.000$) and with feelings of relief

Table 2 Reported method of NSSI for total sample and by sex

Method of self-injury (n)	n	Males		Females		χ^2	P value
		n=171	%	n=225	%		
Scratching	162	65	38.0	97	43.1	0.465	0.470
Biting	125	40	23.4	85	37.8	8.500	0.004
Hitting	98	51	29.8	47	20.9	4.800	0.033
Interfering with wound healing	91	23	13.5	68	30.2	14.400	0.000
Hair pulling	91	35	20.5	56	24.9	0.834	0.400
Severe nail-biting and/or nail injuries	87	28	16.4	59	26.2	4.990	0.027
Cutting	73	21	12.3	52	23.1	7.050	0.009
Piercing skin with sharp pointy object	66	18	10.5	48	21.3	7.650	0.006
Trying to break bones	59	27	15.8	32	14.2	0.286	0.670
Piercing of body parts	22	7	4.1	15	6.7	1.109	0.380
Excessive use of alcohol	22	12	7.0	10	4.4	1.362	0.270
Trying to break bones	14	4	2.3	10	4.4	1.193	0.410
Eating or drinking things that are not food	7	3	1.8	4	1.8	–	1.000
Burning	7	4	2.3	3	1.3	–	0.470
Taking too little medication	4	1	0.6	3	1.3	–	0.640
Taking too much medication	2	1	0.6	1	0.4	–	1.000
Excessive use of street drugs	2	1	0.6	1	0.4	–	1.000

Symbol (–) indicates that Fisher’s exact test was computed.

NSSI, non-suicidal self-injury.

Table 3 Reported body area injured for total sample and by sex

Body location	n=396	Males		Females		χ^2	P value
		n=171	%	n=225	%		
Hands/fingers	289	115	67.3	174	77.3	5.282	0.026
Scalp	104	51	29.8	53	23.6	1.980	0.167
Lips	68	19	11.1	49	21.8	7.807	0.007
Lower arm/wrist	63	21	12.3	42	18.7	2.975	0.960
Thigh/knee	59	27	15.8	32	14.2	0.193	0.671
Face	55	25	14.6	30	13.3	0.134	0.770
Upper arm/elbow	46	21	12.3	25	11.1	0.129	0.753
Inside mouth	34	9	5.3	25	11.1	4.243	0.046
Lower leg/ankle	34	11	6.4	23	10.2	1.783	0.208
Neck/throat	25	7	4.1	18	8.0	2.512	0.144
Foot/toes	24	11	6.4	13	5.8	0.730	0.833
Shoulder(s)	24	9	5.3	15	6.7	0.337	0.672
Nose	23	11	6.4	12	5.3	0.214	0.669
Back	21	5	2.9	16	7.1	3.397	0.730
Ear(s)	17	6	3.5	11	4.9	0.451	0.620
Eye(s)	16	6	3.5	10	4.4	0.220	0.798
Abdomen	13	6	3.5	7	3.1	0.048	1.000
Hips/buttock	9	8	4.7	1	0.4	7.843	0.006
Genitals	3	2	1.2	1	0.4	–	0.580
Chest	2	1	0.6	1	0.4	–	1.000
Breast(s)	1	1	0.6	0	0.0	–	0.432
Rectum	1	1	0.6	0	0.0	–	0.432

Symbol (–) indicates that Fisher’s exact test was computed.

following NSSI ($r=0.372$, $p=0.000$). Participants who indicated an instance of past suicide reported higher scores on the addictive features scale ($M_{\text{addictive}}=3.80$, $SD=5.20$) and feeling relief following NSSI ($M=7.49$, $SD=5.96$) than those who did not ($M_{\text{addictive}}=1.53$, $SD=3.08$, $t_{(109,245)}=-3.960$, $p=0.000$; $M_{\text{relief}}=5.50$, $SD=5.26$, $t_{(374)}=0.003$). Compared with students who had NSSI urges but did not take immediate action ($M_{\text{addictive}}=1.20$, $SD=2.28$; $M_{\text{relief}}=5.10$, $SD=4.98$), those who engaged in NSSI immediately following the urge ($M_{\text{addictive}}=3.97$, $SD=5.49$; $M_{\text{relief}}=7.97$, $SD=6.02$) had higher addictive features and feelings of relief ($t_{\text{addictive}}(135.859)=-5.323$, $p=0.000$; $t_{\text{relief}}(191.694)=-4.500$, $p=0.000$).

NSSI and psychiatric disorders

A total of 298 students completed the MINI-KID interview. Thirteen students did not receive the interview because they refused, were ill or had other reasons. The findings showed that NSSI coexisted with a number of psychiatric disorders in several students (43.9%). Anxiety disorders were the most common (28.9%), followed by hypomania or mania (13.1%), attention deficit hyperactivity disorder or behavioural disorders (9.7%), depression or dysthymia (5.7%), obsessive-compulsive disorder (4.4%) and other disorders (3.7%).

DISCUSSION

Main findings

The present study assessed the prevalence and characteristics of NSSI in a community sample of Shanghai adolescents, showing it to be a widespread behaviour. Almost a quarter of the adolescents reported that they had intentionally harmed themselves at least once during the past 12 months. This is consistent with results from earlier studies of adolescents in other countries,^{3,9} but lower than findings from other Chinese cities.^{8,24}

In this study, we found that there were significant sex differences in the prevalence and onset of NSSI, methods used and injury locations. Consistent with previous research,^{9,11} our study also found that girls are more likely than boys to engage in NSSI during the adolescent period. Since girls are more likely than boys to experience negative emotions,²⁵ this may explain this finding. As reported by others, our findings show that negative emotions were significantly associated with NSSI among adolescents.²⁶

Similar to previous studies, more than half of adolescents with NSSI use more than one method to injure themselves.² Others have also reported that females were more likely to engage in biting, cutting and piercing

Table 4 Reported functions of NSSI for the total sample and by sex

Functions of self-injury	n	Males	Females	χ^2	P value
		n (%)	n (%)		
Internal emotion regulation	348	149 (37.9)	199 (50.64)	0.565	0.515
To relieve feelings of sadness or feeling 'down'	252	98 (24.9)	154 (39.19)	6.106	0.015
To punish myself	225	89 (22.7)	136 (34.61)	3.351	0.080
To distract me from unpleasant memories	199	84 (21.4)	115 (29.26)	0.265	0.612
To stop feeling alone and empty	162	65 (16.5)	97 (24.68)	1.287	0.301
To experience physical pain in one area, when the other pain I feel is unbearable	146	56 (14.3)	90 (22.9)	2.512	0.116
To produce a sense of being real when I feel numb and 'unreal'	84	31 (7.9)	53 (13.49)	1.897	0.175
To stop me from thinking about ideas of killing myself	82	32 (8.1)	50 (12.72)	0.849	0.383
To stop me from acting out ideas of killing myself	79	33 (8.4)	46 (11.7)	0.122	0.800
Social influence	229	101 (25.7)	128 (32.57)	0.079	0.837
To get out of doing something that I don't want to do	122	51 (13.0)	71 (18.07)	0.210	0.662
To avoid getting in trouble for something I did	100	45 (11.5)	55 (13.99)	0.121	0.728
To get care and attention from other people	96	43 (10.9)	53 (13.49)	0.085	0.813
To stop my parents from being angry at me	90	40 (10.2)	50 (12.72)	0.041	0.904
To show others how hurt or damaged I am	86	38 (9.7)	48 (12.21)	0.020	0.903
To stop people from expecting so much from me	84	36 (9.2)	48 (12.21)	0.019	0.902
To belong to a group	42	16 (4.1)	26 (6.62)	0.561	0.512
To change my body image and/or appearance	41	21 (5.3)	20 (5.09)	1.107	0.320
External emotion regulation	326	130 (33.1)	196 (49.87)	10.275	0.002
To release unbearable tension	297	118 (30.0)	179 (45.55)	7.071	0.009
To release anger	260	103 (26.2)	157 (39.95)	4.745	0.032
To release frustration	197	73 (18.6)	124 (31.55)	6.698	0.011
Sensation seeking	112	49 (12.5)	63 (16.03)	0.004	1.000
To prove to myself how much I can take	72	31 (7.9)	41 (10.43)	0.007	1.000
To experience a 'high' that feels like a drug high	59	28 (7.1)	31 (7.89)	0.440	0.569
To provide a sense of excitement that feels exhilarating	51	24 (6.1)	27 (6.87)	0.300	0.650

NSSI, non-suicidal self-injury.

methods and males were more likely to use more violent methods like hitting and burning. For example, in a large sample of junior and senior high school students in multiple Chinese cities, Zhang and colleagues²⁴ found that females were more likely to engage in scratching, biting and cutting, and males were more likely to engage in pulling hair, headbanging, burning and poisoning. Similarly, Sornberger and colleagues²⁷ investigated 1774 adolescents with NSSI and found girls were more likely to report cutting and scratching, and boys were more likely to burn or hit. Our study findings were similar with female students being more likely than males to engage in biting, cutting, piercing body parts, nail-biting/injuries and interfering with wound healing, and male students reported more hitting.

Consistent with our results, a number of studies have found that regulating negative emotions and physiological states^{12 14} and interpersonal influence^{12 28} are the

most common reasons reported for NSSI. The evidence for emotion regulation deficits of adolescents with NSSI also comes from functional MRI research where those who engaged in NSSI showed significantly more arousal in the limbic structures like the amygdala, hippocampus and anterior cingulate cortex than those with no NSSI. This provides support for the idea that adolescents with NSSI have greater impulsivity and lower distress control, and the connection between emotions and bad memories is enhanced.²⁹

Social influence is another common function of NSSI in adolescents. It may be that adolescents with NSSI behaviour are not able to connect with others through regular communication and social skills. Claes and colleagues²⁸ found adolescents with NSSI reported more skill deficits compared with their peers. Similarly, Nock and Prinstein¹² also found that those who engage in NSSI lacked the ability to solve social problems. The lack of

interpersonal skills can lead to difficulties in maintaining meaningful social relationships, thus reducing the level of social support. Many studies have supported the view that adolescents with NSSI behaviour significantly reduced their social support. For example, investigators conducted in-depth interviews with 40 individuals who self-injure and found that those who engage in NSSI feel more aloneness.³⁰

Unlike the study of You *et al.*,¹¹ our study shows that emotional regulation is still the primary reason for NSSI in adolescents rather than belonging to a group. There may be two reasons for this difference. One is that peer pressure is related to age, with adolescent peer pressure showing an inverted U-shaped age pattern³¹ and will significantly increase from grade 6 to 8.³² The sample from You *et al.*'s study is 8th grade, while our sample is from 6th to 8th grades, so the peer pressure is different between the two samples. Second, it may be due to the influence of social media on the values of Chinese teenagers, which is different from 5 to 6 years ago. Today's teenagers are more individualised and independent.³³

Limitations

A limitation of the study is that we used self-report to evaluate NSSI which may be subject to recall bias. Future studies may wish to use ecological momentary assessment to mitigate this bias.²⁶ Additionally, the study measures used were translations from the English versions and further validity studies using these translated measures should be undertaken.

Implications

The study is one of the first to evaluate the characteristics of NSSI among middle school students in China. In addition to contributing to the knowledge on NSSI in adolescents, it provides important information for teachers, clinicians and researchers highlighting the association between NSSI and emotional regulation and social interaction. The findings can provide direction for the prevention and intervention of NSSI. Specifically, attention should be given to students or patients who have difficulty in emotional regulation or lack of social skills, such as those with social anxiety, autism or intellectual developmental disorder. Given the prevalence of the behaviour, school mental health professionals must be aware of how to manage NSSI within the school setting.

Authors' contributions FZ completed the data collection and analysis, classification and draw of the full text. PFC polished the full text. HY was responsible for organising surveys. WL assisted in data analysis. WC guided each part of the research and the publication of this paper. ZX gave some suggestions on research design and article writing.

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Competing interests None declared.

Patient consent for publication Not required.

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Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

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