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Correlation Analysis of Non-Suicidal Self-Injury Behavior with Childhood Abuse, Peer Victimization, and Psychological Resilience in Adolescents with Depression

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Abstract

Background: In recent years, the number of adolescents with depression has been increasing annually, with individuals often exhibiting non-suicidal self-injury (NSSI) behavior. The purpose of this study is to investigate the family (childhood abuse), school (peer victimization), and individual (psychological resilience) factors of adolescents with depression with or without NSSI (the Chinese version of the Functional Assessment of Self-Mutilation [C-FASM] scale), and to analyze the correlation between the above psychological and social factors and the frequency of NSSI, to provide a basis for NSSI prevention and intervention in adolescents with depression.

Methods: We recruited 355 adolescents with depressive symptoms to participate in this study and divided them into Group NSSI ($N = 227$) and Group no-NSSI (n-NSSI) ($N = 128$) based on the C-FASM scale. The Short-Form Childhood Trauma Questionnaire (CTQ-SF), Multidimensional Peer Visualization Scale (MPVS), and Resilience Scale for Chinese Adolescents (RISC) scores were compared between two groups of adolescents. Pearson correlation coefficient was used to analyze the correlation between NSSI frequency and the above scores.

Results: Emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score in Group NSSI were significantly higher than those in Group n-NSSI (all $p < 0.001$). Physical victimiza-

tion, verbal victimization, social manipulation, attacks on property, and total MPVS score in Group NSSI were significantly higher than those in Group n-NSSI ($p < 0.001$, $p < 0.001$, $p = 0.009$, $p < 0.001$, $p < 0.001$). Goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total RISC score in Group NSSI were significantly lower than those in Group n-NSSI (all $p < 0.001$). The frequency of NSSI was significantly positively correlated with emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score ($r = 0.366$, $p < 0.001$; $r = 0.411$, $p < 0.001$; $r = 0.554$, $p < 0.001$; $r = 0.220$, $p = 0.001$; $r = 0.255$, $p < 0.001$; $r = 0.673$, $p < 0.001$). The frequency of NSSI was significantly positively correlated with physical victimization, verbal victimization, social manipulation, attacks on property, and total MPVS score ($r = 0.418$, $p < 0.001$; $r = 0.455$, $p < 0.001$; $r = 0.447$, $p < 0.001$; $r = 0.555$, $p = 0.001$; $r = 0.704$, $p < 0.001$). The frequency of NSSI was significantly negatively correlated with goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total RISC score ($r = -0.393$, $p < 0.001$; $r = -0.341$, $p < 0.001$; $r = -0.465$, $p < 0.001$; $r = -0.272$, $p = 0.001$; $r = -0.160$, $p = 0.016$; $r = -0.540$, $p < 0.001$).

Conclusions: Our findings highlight the importance of family (childhood abuse), school (peer victimization), and individual (psychological resilience) factors for NSSI in depressed adolescents, and these factors are closely related to NSSI frequency.

Implications for Practice: Maintaining a good family environment, solving the problem of peer victimization at school, and developing corresponding measures to improve psychological resilience are of great significance for improving the mental health of depressed adolescents and reducing the risk of NSSI.

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Keywords

adolescent; depression; non-suicidal self-injury behavior; childhood abuse; peer victimization; psychological resilience

Introduction

Depression, a clinical syndrome of self-denial, pain, and other emotions caused by social, genetic, and other factors, is mainly characterized by persistent symptoms. In addition, the disease is beginning to affect individuals at a younger age, and the number of adolescents with depression is gradually increasing [1,2]. Non-suicidal self-injury (NSSI) refers to a series of intentional, direct, and repeated suicidal actions that are scorned upon by society but will not lead to death without suicidal intention [3,4]. NSSI behavior is characterized by concealment and non-active reporting. If patients fail to take timely and effective control, NSSI may aggravate the behavior and threaten their safety. Individuals with depression and other mental diseases are prone to suicidal ideation and suicidal behavior. Millon *et al.* [5] showed that the proportion of NSSI thoughts and behaviors among hospitalized adolescents with acute mental illness in the past year was as high as 74% and 65%, respectively. Therefore, it is necessary to explore the influencing factors and to develop corresponding intervention measures. The occurrence of NSSI is affected by a combination of various factors. Wang *et al.* [6] conducted a meta-analysis on 25 relevant articles and found more than 80 risk factors for NSSI, which were summarized into seven categories: mental disorders, bullying, health literacy, problem behaviors, childhood abuse, physical symptoms, and gender female. However, there is currently limited research on the influencing factors of NSSI in adolescents with depression.

Childhood abuse and peer victimization are both major public health issues worldwide, with interpersonal victimization occurring in the two most important external environments for the growth of children and adolescents, namely family and school, respectively. Childhood abuse refers to an important traumatic experience in the early life cycle (under 18 years of age), which refers to the behavior of those who have the obligation to raise, supervise, or manipulate the child, threatening the child's survival, growth, and development, or causing actual or potential harm to the child's dignity, such as sexual abuse, physical abuse, physical neglect, emotional abuse, and emotional neglect [7]. Li *et al.* [8] pointed out that childhood emotional abuse is significantly positively correlated with adolescent depression. Kothapalli *et al.* [9] investigated 461 people aged 18 to 25 years and found that those who had experienced childhood

abuse had a higher incidence of depression and anxiety. Gu *et al.* [10] conducted a questionnaire survey on 949 Chinese adolescents and found that childhood emotional abuse was positively correlated with NSSI. The above studies suggest that childhood abuse is strongly associated with adolescent depression or NSSI. Peer victimization refers to an act among students in which one party intentionally or maliciously oppresses or insults the other party through physical, verbal, and social media means, thereby causing personal injury, property loss, or spiritual injury to the other party [11,12]. Peer victimization is very common in children and adolescents. According to the general stress theory, adolescents are in a stage of unbalanced physical and psychological development. When exposed to peer victimization, individuals will experience negative self-cognition and internalize it, which can lead to anxiety, depression, anger, and other negative emotional experiences. Sharpe *et al.* [13] found that peer victimization at any point in time is associated with poor mental health, and long-term victimization can have an adverse impact on mental health. Long *et al.* [14] used Chinese middle school students as study subjects and found that peer victimization could be used to directly predict the occurrence of NSSI. Wang *et al.* [15] pointed out that peer victimization of migrant children was significantly correlated with NSSI. Collectively, these studies confirm that childhood abuse and peer victimization are closely related to depression and/or NSSI.

Psychological resilience is a type of personality trait and ability that can help an individual positively adapt to adversity and easily cope with pressure. As one of the protective factors of mental health, it can enhance an individual's self-confidence to cope with environmental challenges, help individuals to cope better with various pressures, improve mental health, and reduce the negative impact of perceived pressures [16,17]. Studies have confirmed that psychological resilience, as a protective factor, cannot only weaken the adverse impact of negative events on individuals, but also improve individual adaptability. In the adolescent population, psychological resilience can significantly reduce the risk of depression, anxiety, and other emotional problems [18]. Mei *et al.* [19] used diabetic patients as study subjects and pointed out that psychological resilience was negatively correlated with stigma, drug burden, and depression. Li *et al.* [20] found that improving psychological resilience is conducive to reducing the depression level of widowed older individuals. In addition, the improvement of psychological resilience can significantly reduce the tendency to commit suicide. Zhang *et al.* [21] investigated adolescent patients with depression and pointed out that psychological resilience is a protective factor for the occurrence of NSSI.

In recent years, teenagers have been reported to be the victims of self-injury and school bullying, which has been discussed among many individuals—from parents and teachers to physicians and political leaders. Previous studies of the causal relationship between family (childhood abuse), school (peer victimization), individual (psychological resilience), and NSSI among depressed adolescents in China have not offered much information. Here, the correlation between NSSI frequency and the above indexes was further discussed to provide a basis for the scientific prevention and intervention of NSSI in depressed adolescents.

Materials and Methods

Study Participants

The study subjects included 371 adolescents with depression. The survey questionnaire used in this study was easy to complete. After culling the invalidated questionnaires and deleting the participants with missing values, the final sample of 355 adolescents with depression was obtained, resulting in a response rate of 95.69%. They were divided into Group NSSI ($N = 227$) and Group no-NSSI (n-NSSI) ($N = 128$) according to whether the values were accompanied by NSSI [the Chinese version of the Functional Assessment of Self-Mutilation (C-FASM) [22] scale] in the past one year.

The inclusion criteria were as follows:

- a. meet the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) (1st edition, 2013) [23] for diagnosis of depressive disorder, see AMA Manual of Style, 11th edition, page 541.
- b. age 12–18 years (both inclusive).
- c. be able to read, understand, and complete the questionnaire survey.
- d. have no intellectual impairment, no impact on the questionnaire score.

The exclusion criteria were as follows:

- a. history of abuse of psychoactive substances.
- b. history of major physical disease.
- c. history of other psychiatric disorders.
- d. secondary depression caused by drugs.

Method of Measurement

For investigator training, before the formal implementation of the survey, the physicians were trained to master the methods of standard questionnaire surveys, along with effective communication with the survey subjects and relevant precautions, so as to reduce information errors. Trained physicians explained the purpose and the use of the study to the subjects, obtained their comprehension and cooperation, and emphasized that participation was voluntary, stressed the principles of confidentiality and anonymity, and answered all questions posed by the participants. The participants filled in the questionnaires carefully based on their circumstances, carefully checked their responses, and eliminated invalid questionnaires. For data entry, to ensure the accuracy of data entry and to reduce the error caused by input errors, data entry was carried out in duplicate by two independent investigators.

Scales Used in the Study

Chinese Version of the Functional Assessment of Self-Mutilation (C-FASM) Scale

The C-FASM scale [22] was compiled by Lloyd *et al.* [24] in 1997 and revised into Chinese by Qu *et al.* [22]. It contains 10 items (intentional cuts or scratches to the skin, intentionally hitting yourself, pulling your hair on purpose, deliberately stabbing/carving words or patterns on the body with sharp objects, deliberately irritating a wound to prevent healing, intentionally stabbing objects into your skin or nails, biting yourself on purpose, intentionally scratching yourself so that you bleed, intentionally scratching your own skin, hitting yourself with your fist or your head against a hard object). All entries are graded at 4 levels, namely never, rarely, sometime, and often corresponding to 0, 1, 2, and 3 points, respectively, and the total score is the sum of the scores of the 10 items. Patients with a score of 0 were included in Group n-NSSI, while all other patients were included in Group NSSI. The higher the score, the higher the frequency of NSSI. The C-FASM scale used in this study was the revised version by Qu *et al.* [22], and it has been tested in Chinese adolescents with good reliability and validity, and its Cronbach's α is 0.81.

Short-Form Childhood Trauma Questionnaire (CTQ-SF)

The CTQ-SF scale [25] was compiled by Bernstein DP *et al.* [26] in 2003 and revised into Chinese by Zhao *et al.* [25]. The scale contains 28 items covering 5 dimensions: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect, all of which are

scored at 5 levels, from “never” to “always” corresponding to 1 to 5 points, respectively. The total score is the sum of the scores in each dimension, and the higher the score, the more childhood abuse an individual has experienced. Study has shown that CTQ-SF has good reliability and validity in Chinese college students and depressed individuals, with a Cronbach’s α of 0.81 [27].

Multidimensional Peer Victimization Scale (MPVS)

This MPVS scale [28] was developed by Mynard and Joseph in 2000. The scale contains 16 items in four dimensions: physical assault, verbal assault, property assault and relationship assault. All entries are graded on a 3-point scale, from “never” to “more than 3 times” corresponding to 0 to 2 points, respectively. The total score is the sum of the scores in each dimension, and the higher the score, the more serious the degree of peer victimization. The MPVS is the main self-reported peer victimization questionnaire used worldwide. It has good reliability and validity among Chinese college students, with a Cronbach’s α of 0.84 [29].

Resilience Scale for Chinese Adolescents (RISC)

The RISC scale [30] was compiled by Hu and Gan in 2008. The scale contains 27 items in 5 dimensions: goal focus, emotional control, positive cognition, family support and interpersonal assistance, among which items 1, 2, 5, 6, 8, 9, 12, 15, 16, 17, 21, 26, and 27 are scored as negative numbers, and the remaining items are scored as positive numbers. All items are scored at 5 levels. The values from “completely inconsistent” to “completely consistent” correspond to 1 to 5 points, respectively. The total score is the sum of the scores of each dimension, and the higher the score, the better the level of individual mental toughness. This scale is used to assess the mental resilience of different groups, including adolescents and individuals 65 and older with mental illness. This scale has good reliability and validity in Chinese college students, and its Cronbach’s α is 0.96 [31].

Statistical Analysis

After completion of the study, the results were compiled and entered in Excel worksheet (Microsoft Corporation, Redmond, WA, USA). Data were tested for normal distribution using Kolmogorov–Smirnov test. If the data are consistent with a normal distribution, continuous variables were presented as mean \pm SD, and the quantitative variables between Group NSSI and Group n-NSSI were compared using the independent samples t tests. If data

were not consistent with the normal distribution, continuous variables were presented as median (min-max), and the comparison between groups was performed using Mann–Whitney test. The categorical variables were presented as percentages and compared using Chi-squared test. The interrelationships between the frequency of NSSI and the CTQ-SF, MPVS, and RISC scales were performed using Pearson correlation coefficient. p -values less than 0.05 were considered statistically significant. Data were analyzed using SPSS 27.0 software (IBM, Armonk, NY, USA).

Results

The Demographic Details between Group NSSI and Group n-NSSI

Participants comprised 115 males and 240 females, with age ranging from 12 to 18 years. The mean age [\bar{x}] was 14.98, with standard deviation [SD] of 2.06 years. No significant difference in demographic parameters was observed between the two groups ($p > 0.05$).

The Mean \pm SD Deviation for the CTQ-SF Scores between Group NSSI and Group n-NSSI

The emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score in Group NSSI were significantly higher than those in Group n-NSSI (all $p < 0.001$).

The Median (Min-Max) Deviation for the MPVS Scores between Group NSSI and Group n-NSSI

Physical victimization, verbal victimization, social manipulation, attacks on property, and total MPVS score in Group NSSI were significantly higher than those in Group n-NSSI ($p < 0.001$, $p < 0.001$, $p = 0.009$, $p < 0.001$, $p < 0.001$).

The Mean \pm SD Deviation for the RISC Scores between Group NSSI and Group n-NSSI

Goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total RISC score in Group NSSI were significantly lower than those in Group n-NSSI (all $p < 0.001$).

Pearson Correlation Coefficient

As shown in Fig. 1, the frequency of NSSI was significantly positively correlated with emotional abuse, physical

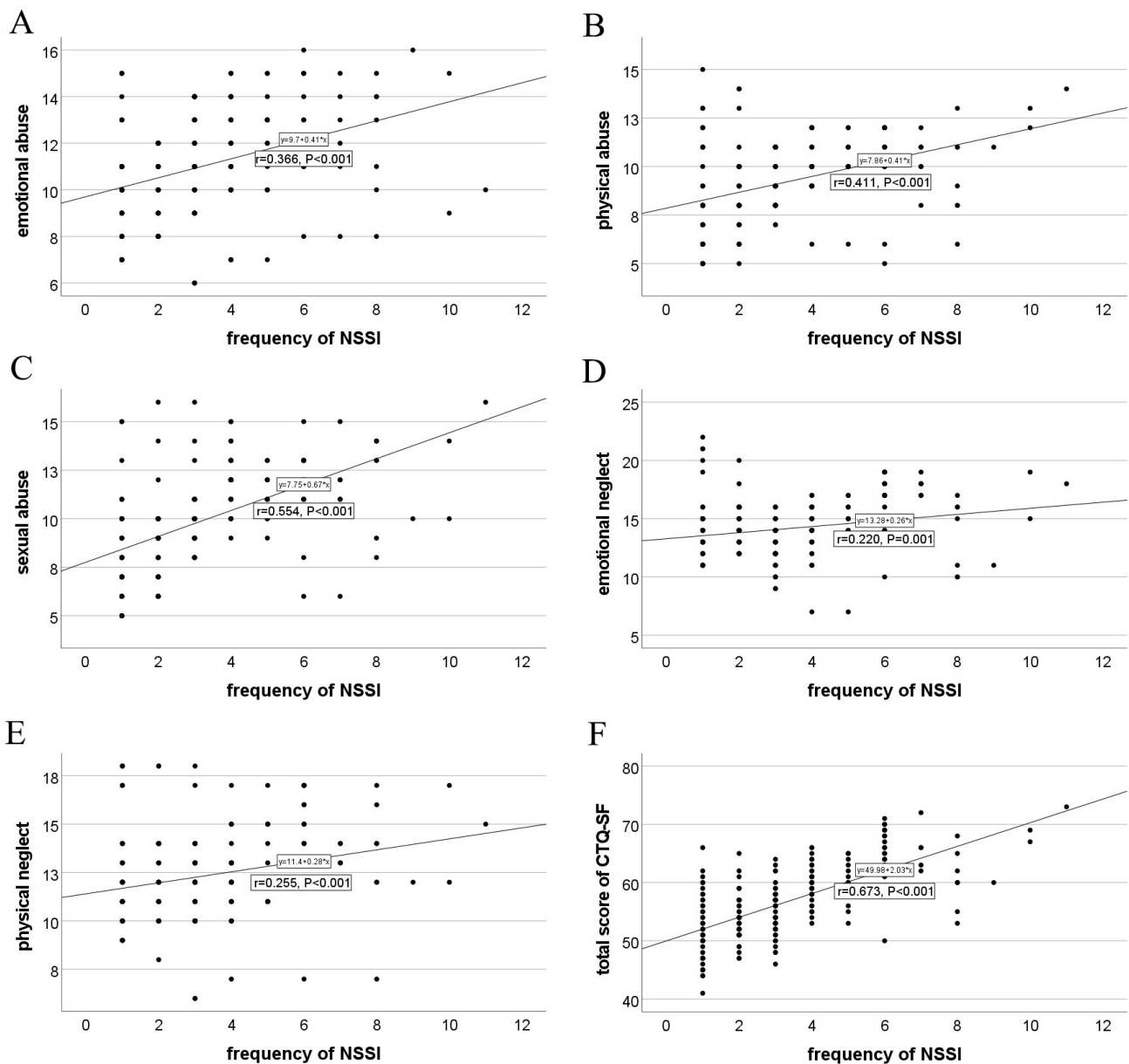


Fig. 1. Correlation coefficients between the CTQ-SF scale and the frequency of NSSI. (A–F) Correlations between emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score and the NSSI frequency.

abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score ($r = 0.366, p < 0.001$; $r = 0.411, p < 0.001$; $r = 0.554, p < 0.001$; $r = 0.220, p = 0.001$; $r = 0.255, p < 0.001$; $r = 0.673, p < 0.001$).

As shown in Fig. 2, the frequency of NSSI was significantly positively correlated with physical victimization, verbal victimization, social manipulation attacks on property, and total MPVS score ($r = 0.418, p < 0.001$; $r = 0.455, p < 0.001$; $r = 0.447, p < 0.001$; $r = 0.555, p = 0.001$; $r = 0.704, p < 0.001$).

As shown in Fig. 3, the frequency of NSSI was significantly negatively correlated with goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total score of RISC ($r = -0.393, p < 0.001$; $r = -0.341, p < 0.001$; $r = -0.465, p < 0.001$; $r = -0.272, p = 0.001$; $r = -0.160, p = 0.016$; $r = -0.540, p < 0.001$).

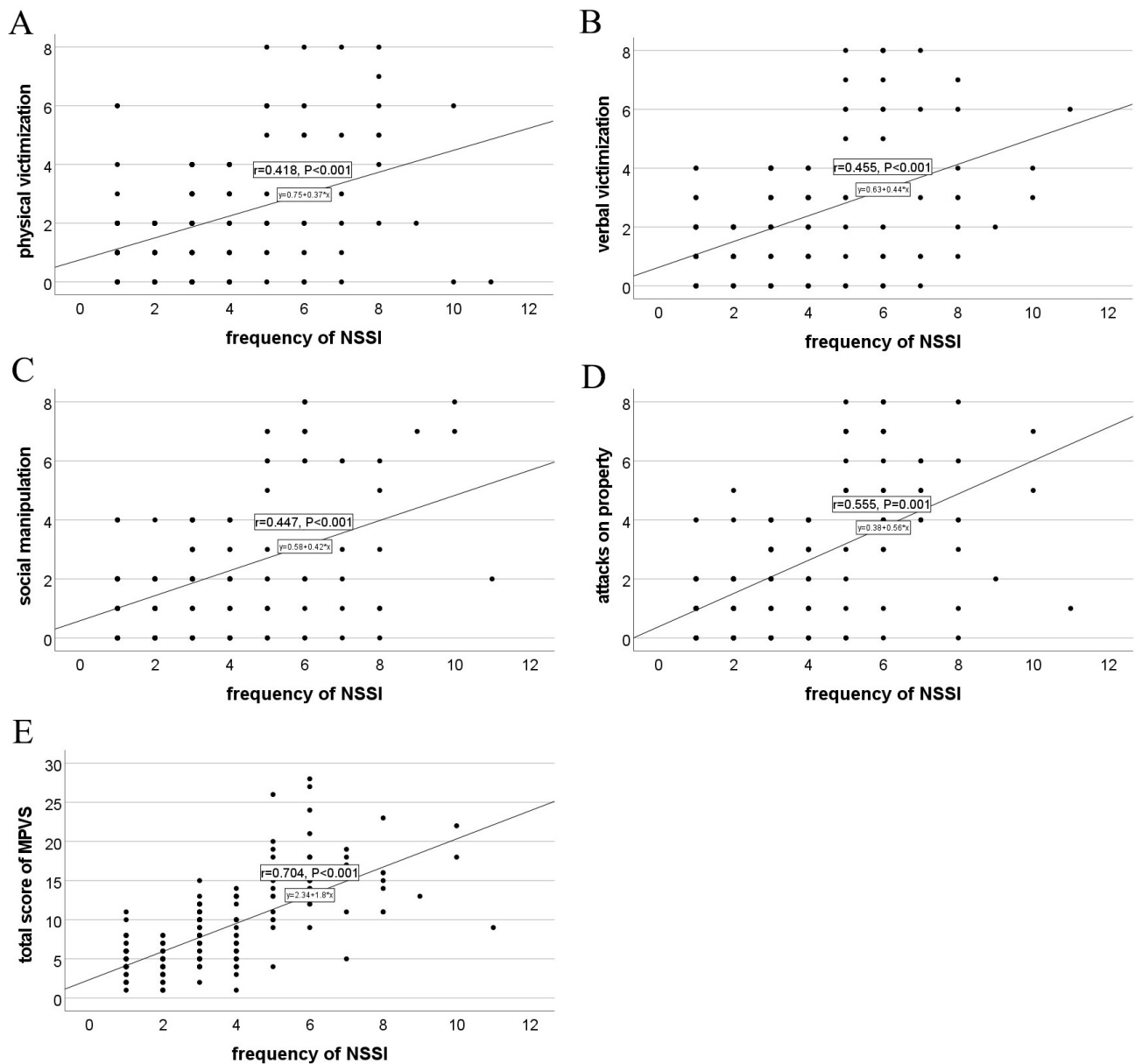


Fig. 2. Correlation coefficients between the MPVS scale and the frequency of NSSI. (A–E) Correlations between physical victimization, verbal victimization, social manipulation, attacks on property, and total score of MPVS and the NSSI frequency.

Discussion

From 2001 to December 2020, the incidence of depressive disorder among adolescents has risen sharply [32]. Among the 355 depressed adolescents included in this study, 240 were female, accounting for 67.61% of the total sample (Table 1), suggesting that females have a higher risk of depression, which may be related to the poor emotional regulation styles and weak adjustment strategies of adolescents of different genders. Women experience greater loneliness, less flexible emotional regulation, and more internalized mental illness symptoms. NSSI is widely present in

adolescents with depressive symptoms. Zhang *et al.* [21] found that 1782 of 2343 depressed adolescents presented with NSSI, with a detection rate of 76.06%. Zhang *et al.* [33] used patients with major depression as study subjects and found that the detection rate of NSSI was 46.51%. Additionally, Taş Torun Y *et al.* [34] pointed out that the incidence of NSSI in adolescents with depression was 64.1% (43/67). Chen *et al.* [35] used drug-naïve adolescents with depression as study subjects and found that the incidence of NSSI was 41.07% (23/56). The NSSI detection rate of depressed adolescents reported in the above studies ranged from 40% to 80%. Among the 355 adolescents in this study,

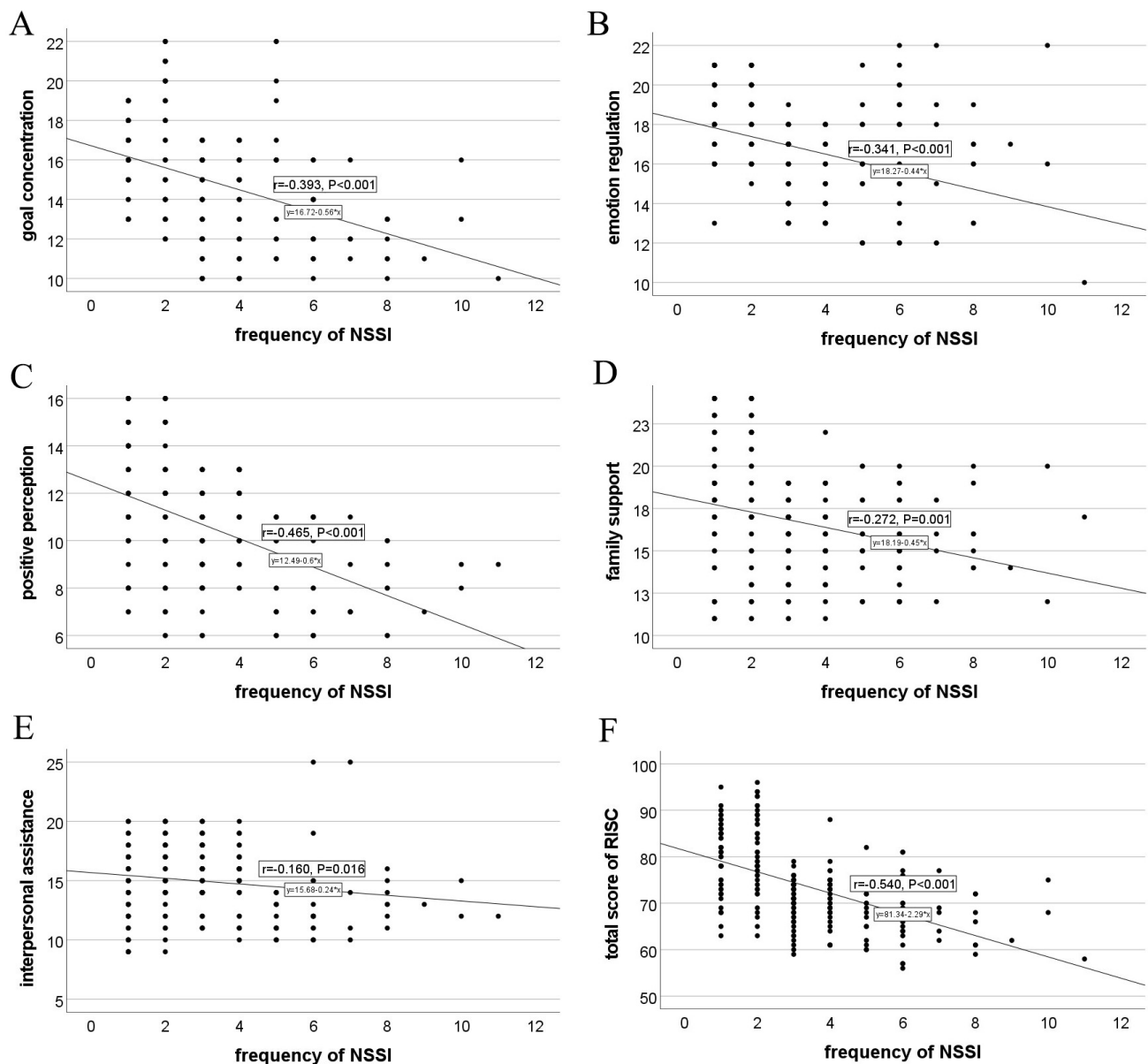


Fig. 3. Correlation coefficients between the RISC scale and the frequency of NSSI. (A–F) Correlations between goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total score of RISC, and the NSSI frequency.

227 reported NSSI behaviors in the past year, accounting for 63.94% of the total sample (Table 1), which falls within the above range and compares to these studies.

In the context of traditional Chinese culture, there is a saying about “stick education” which many Chinese parents regard as a good parenting method. In this context, many Chinese families overlook childhood abuse. Presently, childhood abuse, as a public health problem, has been widely discussed by medical professionals. Numerous studies have shown that childhood abuse is an important risk factor for the development and recurrence of depression [36]. Moreover, childhood abuse was not only

associated with an increased risk of depression, but also with the timing, frequency, duration, and effectiveness of treatment (psychotherapy, medication, or a combination of the two). In this study, emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score in Group NSSI were significantly higher than those in Group n-NSSI, and the frequency of NSSI was significantly positively correlated with emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and total CTQ-SF score (Table 2). Tatnell *et al.* [37] conducted a questionnaire survey on 2637 adolescents aged 12–15 and found that childhood abuse was associated with NSSI. Shao *et al.* [38] pointed out that CTQ-SF

Table 1. Comparison of demographic parameters between Group NSSI and Group n-NSSI.

Parameter	Group NSSI* (N = 227)	Group n-NSSI† (N = 128)	<i>t</i> / χ^2	<i>p</i> -value
Age (years)	15.01 ± 2.02	14.92 ± 2.14	0.394	0.694
Gender (male:female)	75:152	40:88	0.120	0.729
Only child (yes:no)	105:122	59:69	0.001	0.977
Residential area (city:rural area)	183:44	97:31	1.148	0.284
Stay experience (yes:no)	84:143	42:86	0.628	0.428

*Group NSSI (non-suicidal self-injury), †Group n-NSSI (no-NSSI).

Table 2. Comparison of CTQ-SF scores between Group NSSI and Group n-NSSI.

CTQ-SF‡	Group NSSI* (N = 227)	Group n-NSSI† (N = 128)	<i>t</i> -value	<i>p</i> -value
Emotional abuse	11.04 ± 2.29	8.52 ± 2.27	9.975	<0.001
Physical abuse	9.20 ± 2.04	7.97 ± 1.92	5.566	<0.001
Sexual abuse	9.94 ± 2.47	8.03 ± 2.07	7.407	<0.001
Emotional neglect	14.14 ± 2.44	10.30 ± 2.20	14.752	<0.001
Physical neglect	12.33 ± 2.28	8.80 ± 1.87	14.887	<0.001
Total score	56.65 ± 6.19	43.63 ± 4.58	20.798	<0.001

*Group NSSI (non-suicidal self-injury), †Group n-NSSI (no-NSSI), ‡CTQ-SF (Short-Form Childhood Trauma Questionnaire).

Table 3. Comparison of MPVS scores between Group NSSI and Group n-NSSI.

MPVS‡	Group NSSI* (N = 227)	Group n-NSSI† (N = 128)	<i>Z</i> -value	<i>p</i> -value
Physical victimization	1.98 (0–8)	1.13 (0–4)	−4.471	<0.001
Verbal victimization	2.07 (0–8)	1.12 (0–5)	−4.222	<0.001
Social manipulation	1.98 (0–8)	1.28 (0–5)	−2.599	0.009
Attacks on property	2.23 (0–8)	0.83 (0–4)	−6.694	<0.001
Total score	8.25 (1–28)	4.35 (0–10)	−7.728	<0.001

*Group NSSI (non-suicidal self-injury), †Group n-NSSI (no-NSSI), ‡MPVS (Multidimensional Peer Victimization Scale).

scores of adolescents in the NSSI group were significantly higher than those in the non-NSSI group, and after adjusting age and gender, it was found that emotional abuse and emotional neglect scores in the CTQ-SF scale were independent influencing factors for NSSI in adolescents. Andersson *et al.* [39] noted that emotional disorders associated with childhood abuse may increase the risk of NSSI in adolescents. These investigators believe that the family should take care of and support young people, and parents should pay attention to family education and recognize the long-term negative effects of childhood abuse such as “stick education” or verbal violence. In addition, parents should reinforce proper educational concepts through continuous learning, improve the educational ability, educate and guide their children with proven methods, strengthen parent–child communication, create a “open” family environment where children can speak with parents when they have problems and create a safe family environment to reduce children’s adverse emotions and NSSI risk.

Ecosystem theory points out that human development is affected by a combination of multiple environmental sys-

tem factors such as family, school, and peer group. Good peer relationships, namely peer acceptance, are conducive to adolescents’ mental health, but negative peer relationships, namely peer victimization, have negative impacts. Peer victimization causes individuals to experience negative self-cognition, resulting in continuous internalization, thereby increasing the risk of depression. In this study, physical victimization, verbal victimization, social manipulation, attacks on property, and total MPVS score in Group NSSI were significantly higher than those in Group n-NSSI (Table 3), and the frequency of NSSI was significantly positively correlated with physical victimization, verbal victimization, social manipulation, attacks on property, and total MPVS score (all $p < 0.05$). Because adolescents lack strategies and methods to cope with peer victimization, we speculate that NSSI may be used to alleviate the anxiety and fear caused by aggression. Macalli *et al.* [40] believe that peer victimization, although it is common, can be completely avoided, it suggests that schools, teachers, health services, and public policies can work together to address this widespread problem. Oncioiu *et al.* [41] proposed that solving the persistent problem of peer victimization is con-

Table 4. Comparison of RISC scores between Group NSSI and Group n-NSSI.

RISC [‡]	Group NSSI* (N = 227)	Group n-NSSI [†] (N = 128)	t-value	p-value
Goal concentration	14.89 ± 2.91	17.51 ± 3.15	-7.908	<0.001
Emotion regulation	16.81 ± 2.67	20.38 ± 3.49	-10.771	<0.001
Positive perception	10.52 ± 2.65	14.10 ± 2.64	-12.244	<0.001
Family support	16.71 ± 3.39	21.51 ± 3.64	-12.455	<0.001
Interpersonal assistance	14.89 ± 3.07	20.08 ± 3.86	-13.910	<0.001
Total score	73.82 ± 8.70	93.57 ± 7.61	-21.473	<0.001

*Group NSSI (non-suicidal self-injury), [†]Group n-NSSI (no-NSSI), [‡]RISC (Resilience Scale for Chinese Adolescents).

ducive to improving the mental health of adolescents. Gu *et al.* [10] emphasized that improving school climate is conducive to reducing the risk of NSSI in adolescents. Wang *et al.* [15] used left-behind children who had experienced peer victimization as study subjects and proposed strengthening social support intervention. The investigators believe that good peer relationships enable adolescents to form positive emotional connections, and thus, enhance their internal psychological strength. Therefore, all sectors of society should pay more attention to adolescent peer relationships. For example, media can provide psychological health education and popular science topics for adolescents. Schools can invite experts or psychological teachers to speak about mental health, and schools and family members should focus on improving students' ability to cope with such incidents, so as to reduce the risk of NSSI.

More individuals are beginning to realize that teenagers not only need to work diligently for excellent academic performance, but also need to have good mental health. Psychological resilience is a kind of cognitive response of the subject to the object, which not only represents the positive adaptation of the individual in the dangerous situation, but also reflects the ability or quality of the individual to cope with negative events. Resilience in Chinese culture is interpreted as indomitable and perseverance, which is similar to willpower. Current research typically regards psychological resilience as the ability or quality of an individual to adapt well in the face of difficulties. As an important positive psychological quality, psychological resilience can act as a "regulator" between negative events and adverse consequences. Karaşar *et al.* [42] investigated 518 respondents on social media in Turkey during the coronavirus disease 2019 (COVID-19) epidemic and found that their psychological resilience was negatively correlated with depression. Sun *et al.* [43] used acquired immunodeficiency syndrome (AIDS) patients as study subjects and found that depression was negatively correlated with psychological resilience. Wu *et al.* [44] conducted a one-year survey on 386 left-behind children in China and found that the prevalence of depression at baseline and one year later

was 12.7% and 8.5%, respectively, and psychological resilience was negatively correlated with depressive symptoms. Zheng *et al.* [45] pointed out that improving psychological resilience through relevant clinical interventions is conducive to improving depressive symptoms. In this study, goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total RISC score in Group NSSI were significantly lower than those in Group n-NSSI (Table 4), and the frequency of NSSI was significantly negatively correlated with goal concentration, emotion regulation, positive perception, family support, interpersonal assistance, and total RISC score (all $p < 0.05$). Weng *et al.* [46] used patients with major depression as study subjects and pointed out that their psychological resilience was significantly negatively correlated with the incidence of NSSI, consistent with the results of this study. These findings highlight the importance of taking effective measures to strengthen the psychological resilience of adolescents.

Therefore, we put forward the following suggestions for this study: First, from the individual point of view, teenagers should learn to communicate correctly, actively participate in various activities, and overcome fear and inferiority. Secondly, in terms of family, parents should establish a scientific viewpoint of children and education, improve their self-cultivation, coping styles and communication skills, and create a good family environment. Finally, in terms of school, teachers should be trained to understand the characteristics of students' physical and mental development, set up relevant thematic exchange activities, and provide rich social support to help them form healthy personalities.

There are still some limitations in this study. First, the subjects of this study were all from a single-center, and the representativeness of the sample was limited. Second, this study did not consider the effects of confounding factors, such as gender and grade, on NSSI in depressed adolescents. In addition, only 10 judgment items of NSSI behavior were used in this study, while other NSSI behaviors may occur in real-life circumstances. Finally, the C-FASM,

CTQ-SF, RISC, and MPVS used in this study were all retrospective questionnaires, which were based on trauma at the level of consciousness and affected by subjective factors, so recall bias may have been present in the questionnaire process.

Conclusions

This study found that childhood abuse, peer victimization, and psychological resilience were closely related to non-suicidal self-injury behaviors in depressed adolescents. Equally important, this study analyzed for the first time that three factors, family, school, and individual, all play a crucial role in the occurrence of NSSI. Therefore, our study can help us to understand better the influencing factors of NSSI, thus improving the mental health of depressed adolescents and reducing the risk of NSSI.

Availability of Data and Materials

The data used to support the findings of this study are included within the article, and during the present study are available from the corresponding author on reasonable request.

Author Contributions

CY and MP designed the research study. CY, MP and YC participated in the questionnaire survey and sorting. CY and YC analyzed the data. All authors contributed to the drafting or important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The data of the subjects in this study came from the People's Hospital of Xinchang, after approval by the Institutional Ethical Committee of the People's Hospital of Xinchang (2023-K-052-01). All questionnaires were completed after written informed consent of the subjects was obtained. All procedures were conducted in strict accordance with the principles of confidentiality and anonymity, in line with the provisions of the Declaration of Helsinki.

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Conflict of Interest

The authors declare no conflict of interest.

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