Proceedings of the 2nd International Conference on Interdisciplinary Humanities and Communication Studies
DOI: 10.54254/2753-7048/35/20232104

Network Analysis of Depression Levels in Adolescents with Non-suicidal Self-injury

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Abstract: Adolescence is a critical developmental period characterized by a notable increase in the prevalence of depression and self-harming behaviors. Thus, understanding their interplay is crucial for intervention and prevention strategies. This study uses network analysis to investigate the characteristics of the depressive symptom network in non-suicidal self-injury among adolescents and identify potential intervention targets. Between June 2023 and October 2023, a total of 171 non-suicidal self-injury adolescents were recruited. The Chinese version of the Center for Epidemiologic Studies Depression Scale was used to assess depressive symptoms. Statistical analysis and visualization of the network were conducted using the R software. In order to make quantitative research on the depressive symptom network structure, indicators of "closeness," "strength," and "betweenness" were utilized to identify symptoms that play a central role in the net work. Network analysis unveiled a group of central nodes with significant influence, assuming pivotal roles in the network. The symptoms of "felt sad", "thought life as a failure", "could not get going", "felt that everything I did was an effort" were central to the network. Furthermore, this network exhibited good stability and accuracy of edge weights. The findings from this study not only advance people's comprehension of the connection between non-suicidal self-injury and depression in adolescents but also provide new insights for future intervention strategies. This research underscores the need for comprehensive approaches to address this intricate issue, offering guidance for precise interventions and clinical practices.

Keywords: adolescents, non-suicidal self-injury, depression, network analysis, mental health

1. Introduction

Non-Suicidal Self-Injury (NSSI) refers to the deliberate and direct self-harm of one's own body tissues, not with the intention of suicide and behavior not socially or culturally recognized [1]. Adolescents face a significant likelihood for conducting NSSI, with the first onset often occurring between the ages of 12-14, peaking at 15-16 [2]. Global large-sample meta-analyses indicate a lifetime prevalence rate of 22.1% for NSSI in adolescents [3].In China, the occurrence of NSSI among adolescents varies between 10% and 30%, with a gradual upward trend. [4]. NSSI in adolescents is a significant predictor of suicide, substantially increasing the risk of suicide [5]. According to the 2019 Global Burden of Disease data, NSSI ranks as the third highest contributor to Disability-Adjusted Life Years (DALYs) in the global population aged 10-24, resulting in a significant socioeconomic

DOI: 10.54254/2753-7048/35/20232104

burden [6]. It has become a pressing public health issue that requires attention and solutions.

Due to the similar underlying mechanisms in the development of depressive symptoms and non-suicidal self-injury (NSSI) in adolescents, including neurobiological factors and adverse stressors among other social and psychological factors, depression symptoms and NSSI often co-occur or recur.

According to the emotion regulation model, adolescents may resort to NSSI as a way to cope with issues or inhibit behaviors, thereby relieving negative emotions. The feeling of release may further escalate the severity of NSSI [7].

Longitudinal studies indicate that baseline depression symptoms can predict an increased risk of NSSI one year later. However, the mechanisms that explain the connection between symptoms of depression and NSSI in subsequent assessments remain unknown. [8].

Furthermore, although there are numerous reports on the association between depressive symptoms and NSSI in adolescents, there is still a lack of a clear understanding of the comorbidity patterns between depression symptoms and NSSI in adolescents. The exploration of core comorbid symptoms is currently lacking.

The latest research suggests that network analysis is a valuable method for exploring individual depression levels and identifying potential intervention targets [9]. This innovative statistical analysis method, driven by data, allows for the visualization and numerical analysis of relationships between multiple variables without the need for a priori assumptions about these relationships [10-11]. In reality, this approach offers a fresh outlook on conceptualizing psychological constructs, suggesting that these constructs are intricate systems that arise from the interplay among their individual elements [12-14]. In this instance, the components serve as active indicators that are integral to the development of the construct, rather than passive indicators that merely reflect it. Given the intricate nature of psychological resilience, it is both reasonable and viable to view it as a complex system resulting from interactions among various elements.

In contrast to simple correlation-based statistical methods, network analysis can also provide centrality and predictability metrics for each node in the network, allowing the assessment of the importance and controllability of each node in the network [15-16]. When nodes with high centrality are activated, the activation is likely to propagate throughout the network by way of edges connecting to other nodes, providing important potential targets for interventions [17].

2. Materials and methods

2.1. Setting and participants

This research was conducted in Zhengzhou, Henan Province, China, between June 2023 and October 2023. A total of 171 adolescent patients diagnosed with non-suicidal self-injury were invited to participate in the study using convenience sampling. Participants were recruited from the psychological outpatient department of a comprehensive hospital and the psychiatric ward of a mental health hospital. Inclusion criteria required participants to be outpatients or inpatients aged between 11 and 18 years old, diagnosed with non-suicidal self-injury according to the guidelines outlined in the “Diagnostic and Statistical Manual of Mental Disorders (DSM-5).” Exclusion criteria encompassed severe physical illnesses, developmental delays, pervasive developmental disorders, attention-deficit hyperactivity disorder, schizophrenia, mood disorders due to organic diseases, and substance use-related disorders. The research protocol received approval from the Ethics Committee at Zhengzhou University (Reference Number: ZZUIRB2023-116). Prior to participation in this study, all participants provided informed consent while ensuring their anonymity and confidentiality rights. They also had the option to withdraw from the study if necessary.

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2.2. Measurements

Using the Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D), as developed by William Li et al. in 2010, depressive symptoms among Chinese adolescents were assessed [18]. This questionnaire comprises 20 items, offering comprehensive coverage of depressive symptoms. Each item is scored on a 4-point scale, ranging from 0 to 3 points, with reverse scoring applied to items 4, 8, 12, and 16. Originally, Radloff established a threshold of 16 points as indicative of depression [19]. Subsequent research by Li and Hicks demonstrated that the 16-point threshold exhibits a sensitivity of 100% and specificity of 76% [18]. Similarly, Zhang, J., et al. suggested that 16 points serve as a suitable standard [20]. Additionally, following Radloff's recommendation, a score of 28 points is used as an indicator of depressive tendencies and high-risk factors within the adolescent population [21]. In this study, the Cronbach's α coefficient of this scale was 0.900, indicating good structural validity.

General information for the adolescents with non-suicidal self-injury included gender, grade, attend school normally, first-episode, comorbidity with other diseases, family history of mental illness, childhood raised by parents, type of family structure.

The network model was estimated using the GGM model. CESD1, felt bothered; CESD2, appetite was poor; CESD3, could not shake off the blues; CESD4, not as good as other people; CESD5, had trouble keeping mind; CESD6, felt depressed; CESD7, felt that everything I did was an effort; CESD8, felt hopeless about the future; CESD9, thought life as a failure; CESD10, felt fearful; CESD11, sleep was restless; CESD12, lack of happiness; CESD13, talked less than usual; CESD14, felt lonely; CESD15, people were unfriendly; CESD16, unable to enjoy life; CESD17, had crying spells; CESD18, felt sad; CESD19, felt disliked by people; CESD20, could not get going.

2.3. Data collection

The survey was conducted among adolescent patients who engage in non-suicidal self-injury, recruited from both the psychological outpatient department of a comprehensive hospital and the psychiatric ward of a mental health hospital. The researchers provided detailed explanations about the questionnaire's purpose, methods, significance, and content to the patients. Upon obtaining informed consent from each patient, the questionnaires were promptly distributed and collected on-site. Patients followed instructions given by the researchers to complete the questionnaires within a time frame of 10-15 minutes. Subsequently, the researchers carefully reviewed all collected questionnaires for any missing items or responses. In cases where information was found to be missing, additional inquiries were made with research subjects to ensure accurate data collection.

2.4. Analysis

First, descriptive statistics and network analysis were conducted using SPSS 20.0 and R-4.3.1. Subsequently, an analysis of the network was conducted and visualized utilizing the R software "qgraph" package [22]. Core symptoms were assessed using centrality indices, including betweenness, closeness, and strength. Higher centrality indices indicate greater centrality of symptoms within the network. Betweenness refers to the number of times a node (symptom in this case) appears in the shortest paths between any two nodes. Closeness is a measure of how close a node is to other nodes on average, and it can be calculated by taking the reciprocal of the sum of the shortest path distances from all other nodes to that specific node. On the other hand, strength centrality measures the total magnitude of connections between a node and other nodes [23]. For further information, please refer to the review study [24].

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Three methods were utilized to evaluate the precision and consistency of the network model and measure the resilience of the findings. Initially, we employed non-parametric bootstrap technique to calculate a 95% confidence interval (CI) in order to determine the accuracy of edge weights. A network with a narrower CI was found to provide more accurate predictions for projected edge weight compared to one with a wider CI [23]. Secondly, we adopted subset bootstrap approach along with correlation stability coefficient (CS-C) to assess the stability of centrality indices [25]. If there is minimal change in node centrality indices upon removal of any samples from the dataset, it can be assumed that the network topology remains stable. The CS-C value should be at least 0.25 and preferably higher than 0.5 for reliable results. Statistical significance was attributed only when zero was not included within the 1000-bootstrap 95% non-parametric CIs during bootstrapped difference tests used for evaluating variations in network characteristics [26]. To determine whether there existed a noticeable distinction between two edge weights or two node centrality indices, a test was conducted using 95% CIs.

3. Results

3.1. Sociodemographic characteristics of Participants

In this study, a total of 180 questionnaires were collected and 171 questionnaires were valid with a recovery rate of 95%. The survey participants comprised a balance of 55 males (32.1%) and 116 females (67.9%). The distribution of participants across different school grades, with the majority in senior grades (senior1, senior2, and senior3). 71.9% of participants reported attending school normally, while 28.1% were unable to do so.The study consisted of 49.1% first-episode participants and 50.9% with relapses. 14.0% of participants had comorbidities with other diseases, while 86.0% had no comorbidities. 10.5% had a family history of mental illness, while 89.5% did not. 72.5% of participants were raised by their parents during childhood, and 27.5% were not. The majority of participants came from nuclear families (52.6%), followed by main families, single-parent families, intergenerational families, and other types.

The sociodemographic attributes and other clinical characteristics of the participants are shown in Table 1.

Table 1: Sociodemographic and clinical characteristics of participants (N = 171).

Variables	*N*	*%*
Gender		
Male	55	32.2%
Female	116	67.8%
Grade		
primary 6	10	5.8%
junior1	26	15.2%
junior2	26	15.2%
junior3	21	12.3%
senior1	30	17.5%
senior2	14	8.2%
senior3	44	25.7%
Attend school normally		
attend school normally	123	71.9%
unable to attend school normally	48	28.1%
First-episode		

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Table 1: (continued).

first-episode	84	49.1%
relapse	87	50.9%
Comorbidity with other diseases		
comorbidity with other diseases	24	14.0%
No comorbidity with other diseases	147	86.0%
Family history of mental illness		
with family history of mental illness	18	10.5%
without family history of mental illness	153	89.5%
Childhood raised by parents		
childhood raised by parents	124	72.5%
childhood not raised by parents	47	27.5%
Type of family structure		
Nuclear family (parents and children living together)	90	52.6%
Main family (three generations living together)	32	18.7%
Joint family (reorganised family)	10	5.8%
Single parent family	18	10.5%
Intergenerational family (living with grandparents)	14	8.2%
Other types	7	4.1%

3.2. Results of network analysis

Table 2: Centrality of symptoms in a network of depressive symptoms in non-suicidal self-injured adolescents.

Items	Items context	Betweenness	Closeness	Strength
CESD1	I was bothered by things that usually don't bother me	4	0.003733560	0.8288653
CESD2	I did not feel like eating; my appetite was poor	1	0.002702724	0.4363738
CESD3	I felt that I could not shake off the blues even with help from my family or friends	7	0.003187488	0.6411987
CESD4*	I felt I was just as good as other people	2	0.003124077	0.5403625
CESD5	I had trouble keeping my mind on what I was doing	0	0.003324092	0.5922928
CESD6	I felt depressed	7	0.003984178	0.9270105
CESD7	I felt that everything I did was an effort	16	0.003867896	1.1199269
CESD8*	I felt hopeful about the future	0	0.002518661	0.4748112
CESD9	I thought my life had been a failure	31	0.004270332	1.2240164
CESD10	I felt fearful	4	0.003465036	0.6986321
CESD11	My sleep was restless	5	0.002913728	0.6237371
CESD12*	I was happy	18	0.003414040	0.8837483
CESD13	I talked less than usual	5	0.002889326	0.4857156
CESD14	I felt lonely	13	0.003771703	0.8344517
CESD15	People were unfriendly	1	0.003012954	0.6507451

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Table 2: (continued).

CESD16*	I enjoyed life	17	0.003440062	1.0257544
CESD17	I had crying spells	1	0.003455942	0.4193122
CESD18	I felt sad	23	0.003991941	1.3987140
CESD19	I felt that people dislike me	12	0.003324767	1.0107995
CESD20*	I could not get"going"	15	0.003754077	1.1537143

* Indicates reverse scoring

According to Table 2, the core depressive symptoms in adolescent non-suicidal self-injury patients include: CESD18 “I felt sad” (Betweenness = 23, Closeness = 0.00399, Strength = 1.399). CESD9 “I thought my life had been a failure” (Betweenness = 31, Closeness = 0.00427, Strength = 1.224). CESD20 “I could not get going” (Betweenness = 15, Closeness = 0.00375, Strength = 1.154). CESD7 “I felt that everything I did was an effort” (Betweenness = 16, Closeness = 0.00387, Strength = 1.120). CESD16 “I enjoyed life” (Betweenness = 17, Closeness = 0.00344, Strength = 1.026). CESD19 “I felt that people dislike me” (Betweenness = 12, Closeness = 0.00332, Strength = 1.011).

The results of the network analysis on depression levels in adolescents with non-suicidal self-injury are depicted in figure 1. The varying thickness of the edges represents the degree of association between two nodes, where thicker edges signify a more robust connection and thinner edges imply a less strong connection. The presence of cycles around nodes describes the extent of their predictability. For adolescents with non-suicidal NSSI, CESD15 and CESD19, CESD12 and CESD16, CESD7 and CESD5, CESD14 and CESD18 had strong connection strength**.**

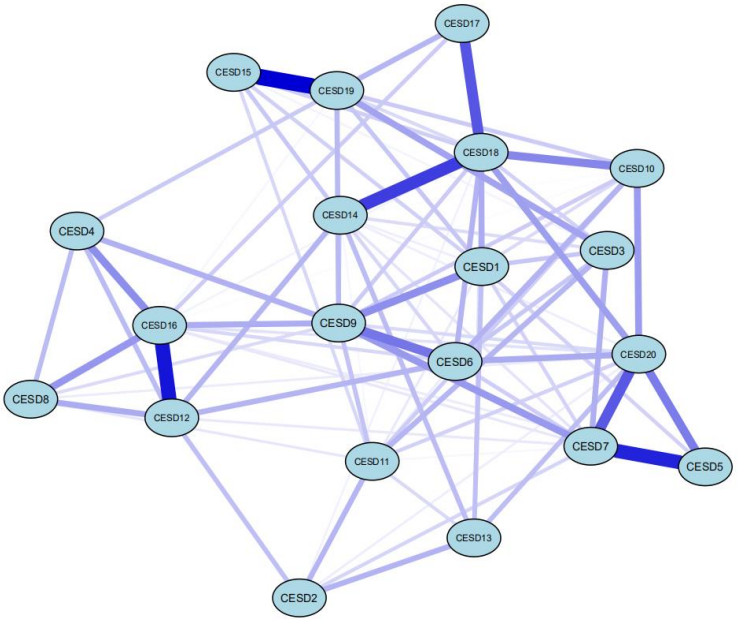

Figure 1: Estimated network plot for symptoms in the total sample.

Figure 2 shows the degrees of centrality of each item. The figure shows the centrality measures (i.e., strength, betweenness, and closeness) of all factors within the network. CESD18(I felt sad) has the highest strength and also the highest expected influence, followed by CESD9(I thought my life had been a failure).

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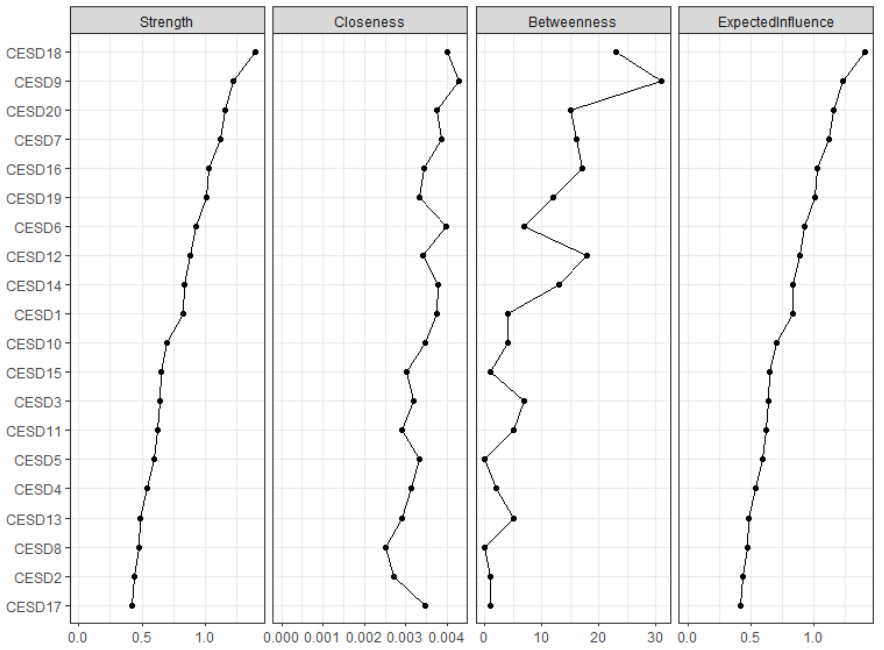

Figure 2: Centrality measures of all symptoms within the network.

3.3. Stability and accuracy of the network

The CS-coefficient, known as the centrality stability coefficient, quantifies the proportion of participants that need to be excluded in order to achieve a correlation of 0.7 between the original and re-evaluated centrality measures. An acceptable level of stability is indicated by a CS coefficient exceeding 0.25, while a value above 0.50 suggests relatively strong stability. Figure 3 demonstrates that the CS stands at 54%, indicating a robust correlation between centrality measures even after removing certain participants. This finding implies reliable and consistent centrality measures which effectively elucidate symptom importance within the network. The high degree of stability further suggests that even with participant exclusion, the obtained centrality information remains highly consistent and accurately reflects network characteristics.

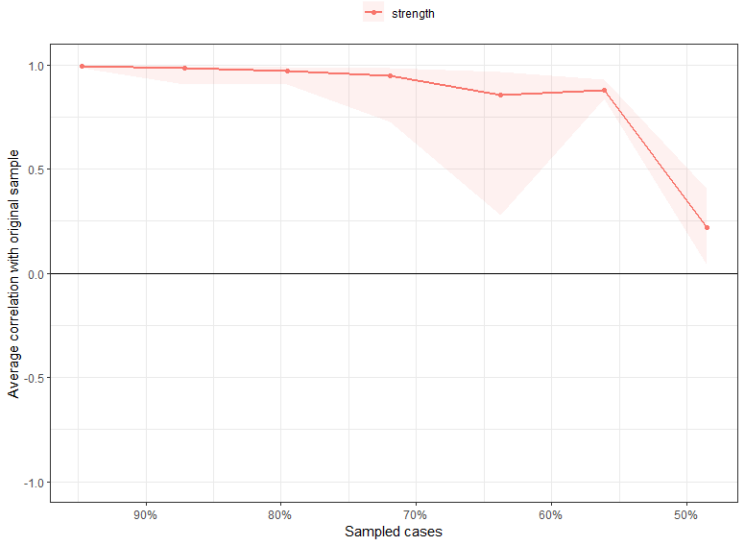

Figure 3: Correlation stability plot measuring the stability of strength.

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Bootstrapped difference tests between-node strength of factors. Gray boxes represent cases where there is no statistically significant difference in expected effects between two corresponding nodes. Black boxes represent statistically significant differences in expected effects between two corresponding nodes ($P < 0.05$).White boxes show the values of node strength. The diagram depicted in Figure 4 indicates that there is negligible disparity observed in the strength centrality of certain symptoms within the network estimation. However, two symptoms, CESD18 (I felt sad) and CESD9 (I thought my life had been a failure), exhibit the highest strength centrality, and the difference from other symptoms is most significant.

According to Figure 5, blue color represents a positive correlation, with deeper shades indicating larger coefficients, while lighter shades represent a negative correlation. The edges with strong connections (such as CESD15-CESD19, CESD12-CESD16, CESD5-CESD7, CESD14-CESD18, CESD17-CESD18) exhibit a significant difference from most of the other edges in the network structure, while the remaining edges with lower edge weights exhibit negligible disparities among them.

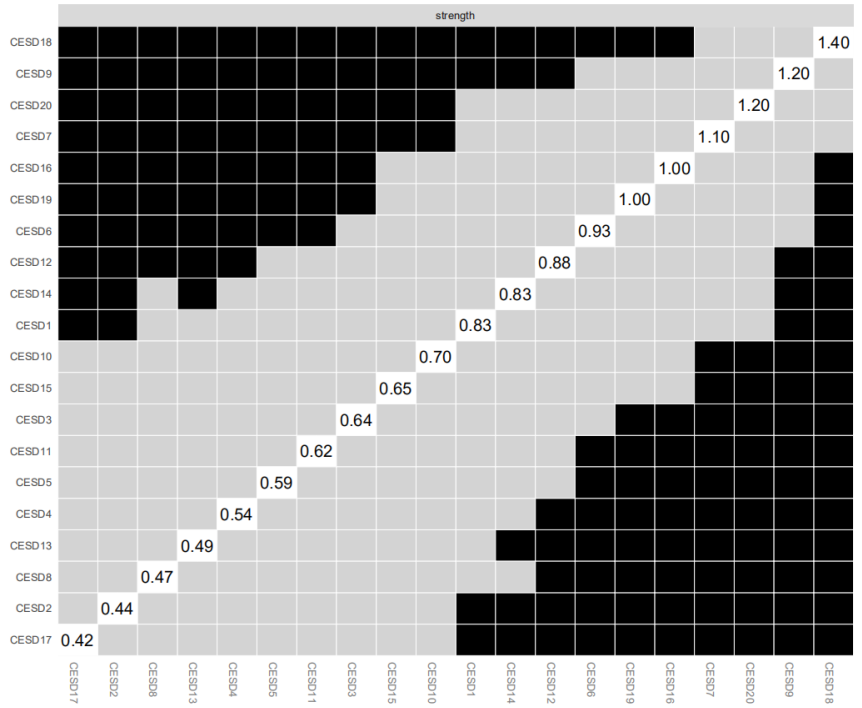

Figure 4: Estimation of node strength difference by bootstrapped difference test.

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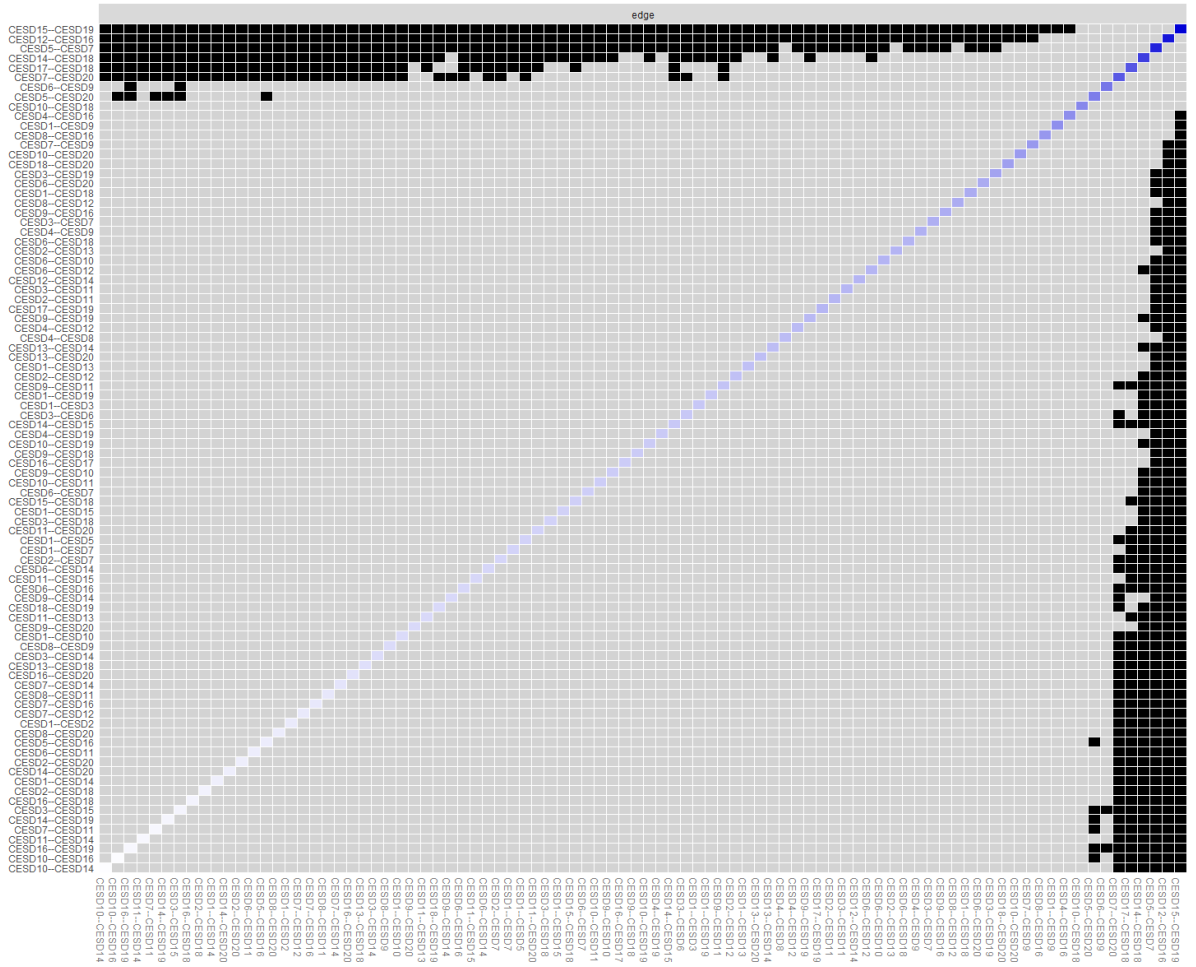

Figure 5: Bootstrapped difference test for edge weights.

According to figure 6, the accuracy of edge weights in this study was indicated by the narrow 95% confidence intervals (95% CI) for these edge weights, suggesting that the assessment of edge weights is accurate and that the edges estimated by the entire network were stable. The black line represents the average edge weights assessed using a bootstrap method. The red line represents the edge weights of the sample used in this study, and the gray area represents the 95% confidence intervals (95% CI) obtained through the bootstrap method.

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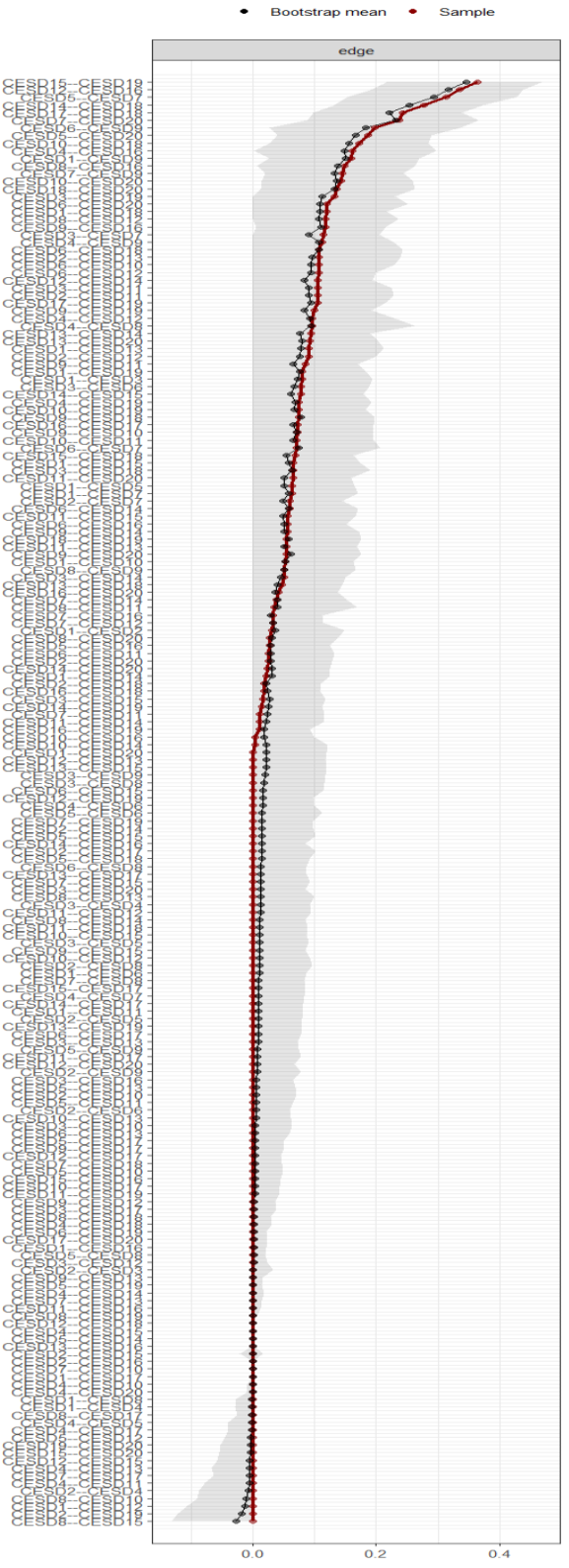

Figure 6: Edge accuracy plot depicting 95% confidence obtained from 2,500 bootstrap samples.

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4. Discussions

It is obvious that item 18 is the most central symptom. That is to say, sadness is a core component of depression. Depression is often accompanied by profound feelings of sadness, as well as a loss of interest and enjoyment in life. Prolonged feelings of sadness can be a precursor to the development of depression, especially if they are prolonged or severe. Here to help figure out the most possible contributing factor to define depression among adolescents, inasmuch as students from primary school to senior high school, the notion of rumination should be bring about. Rumination is typically defined as the process of repeatedly thinking about negative events and their underlying meanings, causes, and consequences [27]. It represents a cognitive emotion regulation strategy employed by individuals when facing negative life events, often characterized by ongoing thinking in the hope of finding solutions to problems. However, rumination is essentially an automated and maladaptive abstract thinking process that not only hinders problem-solving but can also have adverse consequences on an individual's mental health, including reduced attention and cognitive functioning, increased stress, impaired social relationships, and emotional regulation [28-29]. Based on the specific negative emotions involved, rumination is widely categorized into sadness rumination and anger rumination. Sadness rumination refers to the repetitive thinking that individuals engage in about sadness and the associated mood. In the model of sadness rumination, adolescents may repeatedly ruminate on feelings of sadness and the associated emotional atmosphere, immersing themselves in the emotions of sadness, adopting negative coping strategies, which can subsequently lead to the development of depressive moods.

Meanwhile, self-injury is often closely associated with feelings of sadness. Individuals may resort to self-injury to cope with or alleviate inner sadness, despair, or emotional pain. The emotional cascade model suggests that rumination (repeatedly thinking about negative events and their meanings, causes, and consequences) increases negative emotions, and in turn, negative emotions reinforce rumination, creating a vicious cycle known as “emotional cascades”. According to this model, when individuals engage in non-suicidal self-injury, their attention is diverted away from negative events and emotions, interrupting the emotional cascade process [30]. As a result, individuals often resort to non-suicidal self-injury as a means to alleviate their negative emotions. Self-injury can be seen to some extent as an emotion-regulation strategy, so it may be more prevalent when feelings of sadness are high. Non-suicidal self-injury (NSSI) behaviors in individuals with different depression levels include a range of actions such as biting, cutting (using sharp objects), choking, scratching, stabbing (using needles or pins to pierce the skin), head-banging (hitting a hard object or punching the head), burning (using matches, lighters, cigarette ends, corrosive substances), friction on the skin leading to bleeding, and preventing wound healing, among others. These behaviors are typically used by individuals to cope with emotional distress and pain, but they are not intended to cause self-injury with suicidal intent.

Besides, item 9, which indicates that the feeling of life as a failure is the second contributor in NSSI also cope with former researches. The social rank theory suggests that depression is related to social competition, and perceived defeat is considered a central pathogenic factor in depression [31]. Russell and colleagues, drawing from the integrated-will-motivation model regarding suicide, propose that perceived defeat can predict NSSI [32]. Individuals with lower levels of psychological well-being are more likely to experience perceived defeat, which can trigger a sense of entrapment. Engaging in NSSI may serve as a coping mechanism to combat this entrapment. On the other hand, individuals with higher levels of psychological well-being have lower perceptions of perceived defeat and can more effectively overcome thoughts of engaging in NSSI. The more pronounced negative emotional experiences are, the higher the likelihood of engaging in self-injury, often driven by the self-reinforcement function (internal emotional regulation, external emotional regulation, seeking

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stimulation). Research has shown that individuals who engage in NSSI may have weaker responses to positive emotions, experiencing lower intensity and shorter durations of positive emotions, while negative emotions tend to increase the likelihood of NSSI occurrence [33]. This reminds people that in clinical treatment, it may be essential to focus on improving patients' negative cognition and emotions, enhancing their responsiveness to and experience of positive emotions.

It is noteworthy that item 20 and item 7 bear a similar element as anhedonia. Anhedonia is one of the primary symptoms of major depressive disorder (MDD). Depressive disorders are primarily characterized by an enduring and disproportionate low mood and a loss of interest and motivation in activities that were previously enjoyable or beneficial to the individual, often resulting in symptoms of "laziness". However, laziness typically refers to an unwillingness or lack of motivation to engage in tasks or activities, without the emotional or physiological factors associated with mental health issues such as depression. Laziness may be a habit or attitude rather than a symptom of a mental illness. Depression, on the other hand, is often accompanied by emotional issues such as low mood, helplessness, and inner pain, which are usually the underlying causes of low energy. Laziness typically does not involve these emotional problems. Therefore, there lies necessity to distinguish these two symptom in order to avoid tragedy. The discrepancies should be diversified as below:

a. Duration and Frequency: Laziness is usually temporary, while symptoms of depression last longer, typically for weeks or even months. Symptoms of depression occur frequently, whereas laziness may occur only occasionally.

b. Emotional State: Depression is typically accompanied by emotional issues such as persistent sadness, helplessness, and inner distress. Laziness usually does not involve these emotional problems.

c. Daily Functioning: Depression significantly affects daily functioning, including work, social interactions, and family life. Individuals with depression may lose interest, feel helpless, and experience disruptions in their responsibilities and obligations. Laziness usually doesn't lead to such severe functional impairments.

d. Physical Symptoms: Depression can lead to physical symptoms like sleep disturbances, appetite changes, fatigue, and weight fluctuations. Laziness usually does not come with these physical symptoms.

e. Self-perception: Individuals with depression often hold negative self-assessments, feeling worthless. Lazy individuals might not have such self-perception issues.

While there are also possibilities on why people with depression feel tasks tougher than normal. For instance, reduced attention and concentration can both affect the efficiency of task execution. Individuals with depression may have negative thinking patterns, believing that they cannot complete tasks or that tasks will end in failure, which can exacerbate their feelings of task difficulty. Depression can cause physiological changes in the body, such as sleep problems, appetite changes, and decreased physical energy, which can also contribute to tasks feeling more challenging.

Moreover, it was observed in this investigation that a greater proportion of female adolescents partook in non-suicidal self-injury compared to their male counterparts. This implies that the prevalence of non-suicidal self-injury is higher among female adolescents than male adolescents. Previous studies have also discovered that females exhibit a greater inclination towards engaging in self-harming behaviors as opposed to males [34-35]. This could potentially be attributed to females being more susceptible to experiencing heightened negative consequences and possessing lower abilities for emotional regulation and impulse control [36]. Additionally, certain research has indicated a potential association between menstrual irregularities, dysmenorrhea, and an elevated risk of NSSI [37].

This study is subject to certain limitations. Firstly, the utilization of cross-sectional data for constructing the network structure of depressive symptoms among patients does not allow for a comprehensive understanding of how these symptoms develop over time or establish causal

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relationships between them. In future research, it would be beneficial to conduct longitudinal follow-up studies in order to investigate the causal connections between these symptoms. Secondly, it should be noted that the network structure examined in this study pertains specifically to adolescent non-suicidal self-injury patients residing in Henan province, China. Given that symptom networks can be influenced by diverse social and cultural backgrounds, caution must be exercised when generalizing the findings of this study to encompass the entire population of adolescent non-suicidal self-injury patients across the country.

5. Conclusion

This study focused on adolescent non-suicidal self-injury patients and employed network analysis to examine the network of their depressive symptoms. The results indicated that CESD18, CESD9, CESD20, and CESD7 are the most central items. By targeting these symptoms and considering the interactions between them during interventions, it may be possible to more effectively improve the levels of depression in adolescent patients and help them reduce the severity of non-suicidal self-injury, ultimately enhancing the overall mental health of this adolescent population.

The exploration of NSSI behavior among Chinese adolescents is still in its preliminary phase. Currently, most studies are cross-sectional in design and primarily explore the impact of single factors or correlations between two factors on adolescent NSSI behavior. The determinants of self-harm behavior in teenagers are intricate, and future research could benefit from longitudinal study designs involving large samples for tracking and follow-up surveys. This approach would help gain insights into how various risk factors influence NSSI behavior in adolescents. Additionally, there has been limited exploration of protective factors related to NSSI behavior among adolescents. Future research should focus on identifying protective factors and developing targeted intervention measures and programs. In recent years, there has been a national emphasis on shifting the focus to early intervention for mental health issues, including screening, diagnosis, and interventions for children and adolescents. Hence, comprehending the elements linked to non-suicidal self-injury (NSSI) can aid in formulating screening instruments, risk evaluations, and focused therapeutic interventions. Presently, there is a gradual rise in the occurrence of NSSI conduct among teenagers with emotional disorders. Some patients may transition from adolescent emotional disorders into adulthood, eventually developing into more severe mental health issues. In some cases, it could even pose a threat to their lives and significantly impact their daily lives and education. Therefore, parents, schools, and society as a whole should actively cooperate to cultivate a positive and optimistic attitude in patients, teach them how to regulate their negative emotions, identify their strengths, boost their confidence, and provide extensive education to enhance their ability to cope with setbacks and negative emotions. This can help reduce unnecessary stress and the development of emotional disorders. Creating a supportive environment and implementing systematic monitoring for NSSI behavior is also essential to detect and prevent NSSI in a timely manner. It is important to note that NSSI behavior has characteristics such as secrecy, “contagiousness”, lack of voluntary reporting, and reluctance to seek treatment. Without timely intervention and guidance, the condition may worsen, and the frequency of NSSI behavior may increase, potentially leading to suicidal tendencies.

During adolescence, individuals often experience heightened idealism and set very high expectations for their ideal selves, making it challenging to achieve those ideals. This can lead to feelings of frustration and disappointment due to the significant gap between their ideal self and reality. The emergence of NSSI behavior can temporarily alleviate these negative emotions. Rumination, the presence of repetitive and irrational thoughts, impairs the individual's ability for rational self-reflection and self-regulation, disrupting their problem-solving abilities and leading them into a state of prolonged psychological distress. When adolescents face failures resulting from the gap between their ideal and real selves, they may experience disappointment and other negative

DOI: 10.54254/2753-7048/35/20232104

emotions. However, not all individuals resort to NSSI behavior in response. But, when an individual repeatedly engages in rumination over an extended period due to their failures, they are more likely to resort to NSSI behavior as a means to interrupt the influence of rumination and relieve negative emotions. When their emotional regulation abilities are limited, adolescents tend to use direct methods to cope with negative emotions and alleviate stress, such as NSSI. This helps them divert their attention from their negative emotions, which ultimately leads to further increases in NSSI behavior. Over time, this creates an internal negative reinforcement, further increasing NSSI behavior.

It is essential for various sectors, including society, schools, and families, to work together to assist adolescents in developing a healthy self-awareness and teach them how to acknowledge the differences between their ideal and real selves. This can help reduce rumination. Additionally, using teaching methods like sandplay and others to enhance adolescents' psychological resilience is crucial. It helps adolescents to positively confront negative events and emotions, ultimately preventing the occurrence of non-suicidal self-injury (NSSI) behaviors among them.

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