

## Preplanned Studies

# Associations among Distress Rumination, Somatic Anxiety, and Suicidal Ideation in Chinese College Students — Shandong Province, China, 2019–2020

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## Summary

### What is already known about this topic?

The literature has consistently demonstrated that distress rumination following a traumatic event has significant implications for mental health. However, the potential association between distress rumination and suicidality, as well as the underlying mechanisms driving this relationship, remains to be elucidated.

### What is added by this report?

The current study demonstrated a significant, positive correlation between distress rumination and suicidal ideation in college students who have encountered traumatic events. The findings indicate that somatic anxiety serves as a mediator between distress rumination and suicidal ideation.

### What are the implications for public health practice?

Interventions aimed at reducing somatic anxiety may contribute to a decrease in suicidal ideation. Assessing and addressing somatic anxiety symptoms in college students experiencing distressful rumination following traumatic events could potentially lower the risk of suicide.

Traumatic events have been linked to negative psychological outcomes, such as experiencing psychological distress and engaging in distress rumination. This study aimed to examine the association between distress rumination following a traumatic event and suicidal ideation, while also assessing the mediating role of somatic anxiety in this relationship. A cross-sectional survey was conducted with 1,798 Chinese college students, and data from 379 (21.08%) participants who reported at least one traumatic event were analyzed. Participants completed self-report measures assessing distress rumination after traumatic events, suicidal ideation, and somatic anxiety.

Results indicated that distress rumination following

a traumatic event was significantly and positively associated with both somatic anxiety ( $r_s=0.340$ ,  $P<0.001$ ) and suicidal ideation ( $r_s=0.243$ ,  $P<0.001$ ). Specifically, somatic anxiety fully mediated the relationship between distress rumination and suicidal ideation [indirect effect=0.267, 95% confidence interval (CI): 0.182–0.351]. These findings suggest that evaluating and addressing somatic anxiety symptoms among Chinese college students who exhibit distress rumination after traumatic events may help reduce the risk of suicidal ideation.

This study was conducted between September 2019 and January 2020. The participants included 1,854 college students from five campuses of Shandong University, which is a comprehensive institution that encompasses a variety of disciplines such as Arts, Science, Engineering, and Medicine. This diverse student body was given access to an electronic questionnaire via a link printed on paper and distributed across the campuses. Students could scan the link and access the questionnaire using their smartphones.

A total of 56 participants were excluded from the analysis due to insufficient data, such as not being college students or not answering the questions as required. Additionally, 1,419 students who had not experienced a traumatic event were excluded from the study. The final sample size for analysis consisted of 379 students.

This research was approved by the Ethics Committee of the School of Public Health at Shandong University (approval No. 20190912), and all participants voluntarily agreed to take part.

The demographic data collected in this study consisted of individual-level information including age, gender, educational level, marital status, ethnicity, and economic status, and household-level variables encompassing factors such as the participant's status as an only child, rural or urban residence, marital condition, and parents' educational attainment.

Distress rumination was evaluated using the Life After Trauma Event Inventory-24 (LATI-24; unpublished manual by Osman), a measure developed to assess individuals' responses to traumatic events. Participants were asked to describe their thoughts, feelings, and behaviors in the past month (e.g., I have found it hard to take my mind off what happened), following a stressful, frightening, or distressing event, such as a natural disaster, sexual/physical assault, terrorist incident, serious accident, life-threatening illness, or combat exposure. The distress rumination dimension of the LATI-24 was employed. It consists of eight items rated on a six-point Likert scale, with higher scores indicating greater distress rumination. In this study, the Cronbach's  $\alpha$  coefficient and McDonald's  $\omega$  coefficient for the scale scores were 0.862 (95% *CI*: 0.840–0.882) and 0.866 (95% *CI*: 0.845–0.886), respectively.

Somatic anxiety was measured using the somatic anxiety dimension of the Anxiety Depression Distress Inventory-27 (ADDI-27), a condensed version of the Mood and Anxiety Symptom Questionnaire-90 (MASQ-90). The ADDI-27 is a self-report instrument consisting of 9 items rated on a 5-point Likert scale, which assesses the intensity of feelings, sensations, problems, and experiences (e.g., "Heart was racing or pounding") within the past 2 weeks. Previous researches have demonstrated the reliability and validity of these instruments (1–2). In the present study, the Cronbach's  $\alpha$  coefficient and McDonald's  $\omega$  coefficient for the somatic anxiety score were 0.912 (95% *CI*: 0.894–0.921) and 0.909 (95% *CI*: 0.896–0.923), respectively.

Suicidal ideation was assessed using the suicidal ideation dimension of the Multidimensional Suicide Inventory-28 (MSI-28; 3), which was developed as a multidimensional self-report measure to assess suicidal ideation. This dimension comprises 7 items rated on a 5-point Likert scale, representing a collection of common thoughts, feelings, and beliefs about suicide. Previous research has demonstrated the instrument's reliability and validity (3). In the current study, the Cronbach's  $\alpha$  coefficient and McDonald's  $\omega$  coefficient for the suicidal ideation score were 0.913 (95% *CI*: 0.906–0.931) and 0.920 (95% *CI*: 0.908–0.932), respectively.

We utilized the Trauma-related Suicide Potential Index-5 [TSPI-5, unpublished manual (1)] to screen college students who had experienced traumatic events. Within this scale, a traumatic event is defined as an occurrence in which 1) the participant believed that

someone might be killed, seriously injured, or have their physical integrity threatened during the event, 2) the participant experienced intense fear, helplessness, or other strong negative emotions during or shortly after the event. The scale, a brief self-report instrument developed by Osman and colleagues, assesses individuals' trauma and suicide-related responses (4). For our study, we utilized the first response of the five scale items (never experienced a traumatic event) to exclude college students who had not encountered a traumatic event. In the present study, the Cronbach's  $\alpha$  and McDonald's  $\omega$  coefficients of the scale scores were 0.860 (95% *CI*: 0.836–0.881) and 0.860 (95% *CI*: 0.838–0.882), respectively.

SPSS for Windows (version 22.0; IBM Corporation, Armonk, New York, USA) was employed for data analysis. All tests conducted were two-sided, adopting a significance level of 0.05. This study implemented the Hayes' PROCESS macro (5) for mediation analysis. PROCESS V3.3 was applied to verify the indirect and direct effects and to estimate bias-corrected *CI*s based on 5,000 bootstrap samples.

Table 1 presents the demographic data of the participants. The sample consists of 379 college students with a mean age of 20.19 years (*SD*=1.87). Among these participants, 214 (56.5%) were male, 53.0% were from urban areas, and 214 (56.5%) came from one-child families.

The results of Spearman's correlation analysis showed that distress rumination [Median=3.375, interquartile range (*IQR*)=2.750] was positively correlated with somatic anxiety (Median=2.667, *IQR*=1.667,  $r_s=0.340$ ,  $P<0.001$ ) and suicidal ideation (Median=2.429, *IQR*=1.143,  $r_s=0.243$ ,  $P<0.001$ ), significantly. Somatic anxiety was positively correlated with suicidal ideation ( $r_s=0.710$ ,  $P<0.001$ ).

A mediation analysis, based on 5,000 bootstrapping samples, was conducted to estimate the indirect effect of distress rumination on suicidal ideation through somatic anxiety. The results of the mediation analysis are presented in Table 2, while the mediation pathway is illustrated in Figure 1. Findings indicated that the total effect of distress rumination on suicidal ideation was 0.300 (95% *CI*: 0.204–0.395), with indirect effects of somatic anxiety being approximately 0.267 (95% *CI*: 0.182–0.351). However, the direct effect of distress rumination on suicidal ideation was found to be non-significant (95% *CI*: –0.044–0.110). These results demonstrated that somatic anxiety acts as a complete mediator between distress rumination and suicidal ideation.

TABLE 1. Description of demographic characteristics.

Demographic variables	Categories	Total, n (%)
Gender	Male	214 (56.5)
	Female	165 (43.5)
Grade	Freshmen	104 (27.4)
	Sophomores	119 (31.4)
	Juniors	105 (27.7)
	Seniors	51 (13.5)
Ethnicity	Han	377 (99.5)
	Minorities	2 (0.5)
Marital status	Unmarried	374 (98.7)
	Married	5 (1.3)
Residence	Urban	201 (53.0)
	Rural	178 (47.0)
Only child or not	Yes	214 (56.5)
	No	165 (43.5)
Economic conditions	Very bad	15 (4.0)
	Bad	80 (21.1)
	General	198 (52.2)
	Good	65 (17.2)
	Very good	21 (5.5)
Education level of father	Primary school and lower	47 (12.4)
	Junior high school	113 (29.8)
	High school	90 (23.7)
	Junior college	65 (17.2)
	University	53 (14.0)
	Master's degree	11 (2.9)
Education level of mother	Primary school and lower	70 (18.5)
	Junior high school	99 (26.1)
	High school	75 (19.8)
	Junior college	67 (17.7)
	University	57 (15.0)
	Master's degree	11 (2.9)
Marital status of parents	Very harmonious	101 (26.6)
	Harmonious	93 (24.5)
	Sometimes have conflicts	121 (31.9)
	Often have conflicts	31 (8.2)
	Separated	7 (1.8)
	Divorced	15 (4.0)
	One has passed away	11 (2.9)

## DISCUSSION

In the present study, the researchers investigated the cross-sectional associations among distress rumination

following traumatic events, somatic anxiety, and suicidal ideation in college students. The findings revealed that: 1) there was a significant relationship between distress rumination after traumatic events and

TABLE 2. Outcomes of the multiple regression analysis.

Regression models		Goodness-of-fit indices			Regression coefficients and significance	
Outcome variables	Predictor variables	R	R <sup>2</sup>	F	$\beta$	P
Suicidal ideation	Rumination distress	0.398	0.158	5.701	0.300	<0.001
Somatic anxiety	Rumination distress	0.452	0.204	7.787	0.386	<0.001
Suicidal ideation	Rumination distress	0.734	0.539	32.635	0.033	0.401
	Somatic anxiety				0.692	<0.001

Note: Demographic variables were controlled to ensure accuracy in the results. These variables include age, gender, grade, marital status, ethnicity, economic status, presence of siblings (i.e., whether the participant was the only child), residence location (rural vs. urban areas), marriage status of participants, and the educational level of parents.

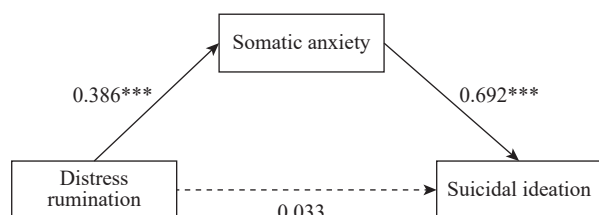


FIGURE 1. Analysis of the mediating effect of somatic anxiety on the relationship between distress rumination and suicidal ideation.

\*\*\*  $P < 0.001$ .

the presence of suicidal ideation; and 2) distress rumination following traumatic events appeared to influence the severity of suicidal ideation through the mediating role of somatic anxiety.

In this study, it was found that 21.08% of college students had experienced at least one major traumatic event, aligning with the findings of Freedy et al. which reported that 19.2% of college students had undergone a similar experience (6). The results of our study demonstrated that distress rumination following traumatic events was significantly associated with suicidal ideation among college students, thus supporting Hypothesis 1. This finding is in line with the stress-sensitization model, which posits that the interaction between stress (e.g., traumatic events) and individual susceptibility factors (e.g., distress rumination) can lead to suicidal ideation (7). It is postulated that distress rumination may amplify negative emotions and entrap individuals in a mindset of hopelessness, potentially causing them to view suicide as an attractive escape.

Our findings demonstrated that somatic anxiety had a significant mediating effect on the relationship between distress rumination after traumatic events and suicidal ideation, supporting Hypothesis 2. Distress rumination, characterized as a maladaptive coping style, may exacerbate anxiety. This finding aligns with the response style theory, which posits that college students with elevated levels of distress rumination

after traumatic events tend to adopt a ruminative response style (8). As a result, these students may involuntarily focus on their negative emotions instead of actively seeking solutions, leading to heightened anxiety levels. Anxiety is a prominent negative emotion that can adversely impact college students' mental and physical health (9). If students are unable to effectively manage their anxiety, they may be at risk for suicidal behavior (10).

This study is the first to uncover the mediating role of somatic anxiety in the relationship between rumination and suicidal ideation. Somatic anxiety emerges as a crucial factor contributing to suicidal ideation in the context of distress rumination following traumatic events. This finding not only elucidates the underlying mechanism of somatic anxiety's influence but also corroborates previous research on the impact of post-traumatic distress rumination on suicidal ideation. Consequently, interventions aimed at reducing somatic anxiety may aid in decreasing suicidal ideation among college students.

One of the limitations of the present study is its cross-sectional design, which precludes causal inferences. Future researches may benefit from employing a longitudinal approach. Moreover, this study exclusively relies on self-reported data; future investigations might consider incorporating multiple sources of information, such as interviews. Finally, it is recommended that future work also explore the potential mediating effects of other emotions.

In conclusion, a statistically significant association has been found between rumination following distressing events and the presence of suicidal thoughts. Furthermore, somatic anxiety appears to serve as a mediating factor in this relationship.

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