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Article

Relationship Between Purposeful Rumination and Post-Traumatic Growth of College Students Who Experienced Childhood Trauma: A Regulated Intermediary Model

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Abstract: The purpose of this study is to explore the relationship between positive coping and post-traumatic growth in trauma experiencers, as well as the mediating role of positive coping and the moderating role of social comprehension support (family support). Methods: In this study, 811 college students aged 18-28 who had traumatic experience were selected through the Traumatic Events Lifelong Experience Questionnaire (Student Version) as the research subjects, and the survey covered many provinces in China, and the purpose rumination scale, post-traumatic growth and positive coping scale and social comprehension rating scale were used for investigation. Results: Correlation analysis showed that purposive rumination, positive coping and post-traumatic growth were significantly correlated. Regression analysis showed that purposive rumination had a significant direct effect on post-traumatic growth ($\beta=0.148, P<0.001$). The results of the mediated moderation model showed that positive coping and social comprehension support played a chain mediating role in the relationship between purposive rumination and post-traumatic growth, and social comprehension support played a moderating role in the relationship between positive coping and post-traumatic growth. Furthermore, the simple slope analysis showed that the predictive effect of purposive rumination on PTG was not significant when the perceived social support was high, and the positive predictive effect of purposive rumination on PTG was significant when the perceived social support was low, indicating that the predictive effect of purposive rumination on PTG gradually increased with the decrease of perceived social support.

Keywords: post-traumatic growth; purposeful rumination; perceived social support; positive coping

1. Introduction

In the process of individual's growth, individual may experience some traumatic events, such as domestic violence, campus bullying, natural disasters and so on. Some studies have found that more than 70% of people have suffered at least one traumatic event in their lives, among which 85% of college students have suffered childhood trauma. When individuals have experienced traumatic events, their traumatic symptoms are mainly manifested as repeated invasive traumatic experiences, persistent high vigilance, negative emotional experiences and avoidance behaviors (Zhang Yuejuan et al., 2013). Individuals who suffering from or witnessing bullying, violence, sexual assault, accidental injury, disease and other serious injuries or death-threatening events may have traumatic symptoms. Traumatic symptoms are a very common psychological disorder. The study on the relationship between psychological disorders caused by college students experiencing traumatic events is also an important topic in injury epidemiology (Dai Jinhui and Yuan Jing, 2016). Previous studies on trauma largely focused on the negative impact of trauma on individuals, but some studies found that when individuals experienced traumatic events, they may have negative consequences

and positive changes which let them gain a certain degree of growth. Tedeschi and Calhoun called these changes Post-traumatic Growth (PTG) (Teng Yan, 2023). Post-traumatic growth will bring individuals positive effects, such as dealing with the same events more calmly in the follow-up, understanding more truth from traumatic events to promote individual growth. When we begin to pay attention to the positive effects brought by trauma, we can better conduct psychological counseling for college students, which is conducive to the development of mental health education in colleges and universities.

With the rise and development of positive psychology, the influencing factors and mechanisms of post-traumatic growth have gradually gained attention from researchers. Intentional rumination is regarded as an important factor affecting post-traumatic growth, which means that individuals consciously think positively about the clues of traumatic events and tend to face difficulties and solve problems calmly, which is a constructive cognition (Zhou Xiao et al., 2014; Cann et al., 2011). Studies have shown that purposeful rumination is positively related to post-traumatic growth, which can promote individuals to achieve psychological growth after trauma. This growth is reflected in many aspects, such as personal courage in facing life, handling of interpersonal relationships and spiritual changes. Intentional rumination has a significant positive predictive effect on post-traumatic growth (Yao Lingyu et al., 2019; Henson et al., 2021). Therefore, the first hypothesis of this study is: purposeful rumination can positively predict post-traumatic growth.

Intentional rumination will make individuals think whether they have found something meaningful thus changing their lives after experiencing trauma. With the increase of the frequency of purposeful rumination, the post-traumatic growth level of individuals will also increase accordingly, prompting individuals to constantly reflect and gain positive influence. When an individual has experienced a traumatic event and does not have enough coping resources, many stress reactions may be triggered, including symptoms of post-traumatic stress disorder (Trickey et al., 2012). However, if these symptoms of stress disorder are overcome by individuals, they can be transformed into catalysts for growth, and may lay the foundation for individual self-identity (Taku&McDiarmid, 2015). When an individual has experienced a trauma, it may not only be pain and obstacles, but also an opportunity for self-changing. Through these experiences, the individual can better cope with the trauma and realize his self-meaning and personal growth (Chen Jieling et al., 2015). It can be seen that purposeful rumination can help individuals better cope with traumatic events, realize psychological growth and transformation, and change people's cognition and their behavior. Theoretically, the premise of post-traumatic growth is the basic assumption that trauma can shake the self and the world (Tedeschi & Calhoun, 2004; Zhangqian and Zheng Yong (2009), this basic assumption can guide individuals' cognition and behavior, help individuals to clarify the causes of events, which includes individuals' understanding and thinking about themselves, others and the world (Zhang Xuehua, 2011). Therefore, purposeful rumination can encourage individuals to think positively after experiencing traumatic events, so that individuals can face and solve problems in an effective way. Therefore, only when individuals ruminate purposefully can they adopt the correct coping style, which is positive, thus promoting post-traumatic growth. Previous studies have also confirmed that positive coping is closely related to post-traumatic growth, and individuals who take positive coping methods to deal with traumatic events can often recover from trauma faster, reduce psychological troubles and promote post-traumatic growth. The research of An Yuanyuan et al. (2013) also confirmed that positive coping can significantly predict PTG of individuals. To sum up, we can put forward research hypothesis 2: purposeful rumination promotes post-traumatic growth through active coping.

The stress buffer model holds the belief that understanding social support can make individuals get some buffer after being traumatized (Cohen & Wills, 1985). When individuals are traumatized, if they can get social support, they will feel the strength and support from others, so that individuals can have a more positive attitude when dealing with and facing traumatic events, and they can get more care and support from others when facing pressure and challenges. Therefore, we can adopt a more positive coping style and understand that social support can not only improve the individual's

ability to solve problems, but also relieve psychological pressure, promoting their positive reflection on traumatic events and their post-traumatic growth. Understanding social support is different from actual social support, which is a subjective evaluation of one's intuitive feelings and various social support levels [3], and understanding social support can adjust negative emotions and one's own pressure, so that individuals can get more support and help on the basis of positive response, constantly improve their psychological intervention mechanism, cultivate their psychological quality of loving life, and promote their post-traumatic growth. Brooks(2016) and other scholars have confirmed that the level of social support can directly predict the level of post-traumatic growth of students in adversity. The same research results (Tian Ruijie et al., 2018) confirmed that the higher the understanding of social support, the higher the post-traumatic growth level of dialysis patients. Through the above research, the following hypothesis can be put forward: purposeful rumination is regulated by the understanding of social support through active coping to promote post-traumatic growth.

Based on the above research and assumptions, this paper puts forward a regulated mediation model to explore the mechanism of purposeful rumination, positive coping and understanding social support on post-traumatic growth. Intentional rumination directly affects post-traumatic growth, and positive coping plays an intermediary role in the relationship between purposeful rumination and post-traumatic growth, while social support plays a regulatory role in this process.

2. Research methods

(1) *The Research Object*

In this study, college students of all grades in three universities were selected as subjects. A total of 1000 questionnaires were distributed and 900 were successfully recovered, of which 811 were valid, with a recovery rate of 90% and an effective rate of 90.1%. By using the Lifelong Experience of Traumatic Events Questionnaire-Student Version (LITE-S) for screening, we identified college students aged between 18 and 28 as the research objects. The screening criterion is that at least one of the 16 traumatic events listed in the questionnaire is selected as "Yes". The results show that the number of people who have experienced at least one traumatic event (that is, the research object) is 597, accounting for 85% of the total number. Among them, the number of people who experienced four or more traumatic events was 204, accounting for 29% of the total number. The number of people who have not experienced any traumatic events is 105, accounting for 15% of the total number. The age of the participants in this study ranged from 18 to 28 years old, with the largest number of participants aged 20 and 21, accounting for 45.1% of the total number. The average age of testers is 21.70 years old. In terms of gender distribution, there are 328 boys and 483 girls. See the table for the basic information of the subjects.

(2) *Research Tools*

1. Intentional Rumination Scale

In the Chinese version revised by Dong Chaoqun (2013), the scoring method is Likert4 points, where 0 stands for "never" and 4 stands for "often". The higher the score, the higher the ruminant meditation level. The questionnaire is based on the theory of post-traumatic growth, and it is used to evaluate the adaptability and non-adaptability of post-traumatic cognitive processing of the injured. In this study, Cronbach's α coefficients of the total table and each dimension are 0.974, 0.963 and 0.960 respectively. See attached table [2].

2. Post-Traumatic Growth Scale

Tedeschi and Calhoun compiled it in 1996. The scale includes 21 items, which are divided into five dimensions: interpersonal relationship, new possibility, personal strength, mental change and appreciation of life. The scoring method is 0 ~ 5 points and 6 grades. The higher the score, the higher

the post-traumatic growth level. The internal consistency reliability of the scale is α coefficient 0.90, and the two-month retest reliability is 0.71. This study adopts the Chinese version revised by Zhang Yuejuan et al. (2013), and the applicability of this version has been studied in military college students and other groups. See attached table [3].

3. Positive Coping Scale

The subscale of positive coping style in Simplified Coping Style Scale (Xie Yanan et al. 2000) was adopted, including 12 items. The scoring method was Likert4 points, with 0 representing "never" and 4 representing "often", and the score represented the more positive coping style. The positive coping dimension is 1-12 questions, and its reliability is measured. The reliability and validity of the positive coping dimension are 0.90 and 0.89. See attached table [4].

4. Social Comprehension Scale

Jiang Ganjin and others translated and revised the Social Support Multidimensional Scale (MSPSS) compiled by Zimet and others, and compiled it into the Perceived Social Support Scale (PSSS), which is used as a tool to measure the degree of personal self-perception from various social supports. The scale consists of 3 dimensions and 12 items, which are as follows: Family support, that is, the degree of subjective support from family (items 3, 4, 8 and 11); Support from friends, that is, the degree of support from friends (items 6, 7, 9 and 12); Other support, that is, the subjective feeling of support from others except family and friends (items 1, 2, 5 and 10). The scale adopts a 7-level scoring method (1 point = "completely inconsistent" and 7 points = "completely consistent"). The higher the total score, the higher the level of support from others in society, which is divided into 12-36 as low comprehension support level, 37-60 as intermediate comprehension support level and 61-84 as high comprehension support level. The α coefficients of family support, friend support, other support and the whole scale are 0.87, 0.85, 0.91 and 0.88 respectively, and the test-retest reliability is 0.85, 0.75, 0.72 and 0.85 respectively.

5. Trauma Experience Scale

The Life Experience Scale for Traumatic Events-Student Edition, compiled by Greenwald and Rubin(1999) and translated by Liao Ximing (2007), was adopted. The scale consists of 16 items, the first 15 items include various types of traumatic events, and the 16th item is an open question. Participants made a "yes" or "no" judgment on the first 15 questions. If they answered "yes", they will further complete the "pain degree at that time" score, using 0 (none) to 2 (many) points. In this study, the Cronbach's α coefficient of the whole scale is 0.82.

(3) Data Processing

Data processing by SPSS27.0. Harman single factor analysis is used to test the deviation of common method; Pearson correlation matrix is used to analyze the correlation between variables; nonparametric percentile Bootstrap method with deviation correction is used to test the mediating effect. If there are missing values in a questionnaire, it is directly eliminated.

3. Results

(1) Common Method Deviation Test

According to Haman's theory of single factor analysis, an exploratory factor analysis was carried out, and the results showed that six common factors with eigenvalues greater than 1 were put forward. The first principal factor explained the criterion that the variance was 17.906% and less than 40% (Zhou Hao and Long Lirong, 2004). Therefore, this study is not seriously affected by the deviation of common methods. See attached table [1]

(2) Descriptive Statistics

1. Demographic characteristics

(1) In this study, SPSS27.0 was used to make statistics on the number of cases and analyze the demographic characteristics, and the following results were obtained: Table 1, General table of demographic variables:

Table 1. Statistics on the number of cases.

Statistics									
	gender	age	Mother's education level	Father's education level	Do you come from a single-parent family?	Origin of students	Is it an only child?	grade	
Effective	811	804	811	811	811	811	811	811	811
Num Deficiency	0	seven	0	0	0	0	0	0	0

(2) Demographic characteristics of the subjects

The demographic characteristics (gender, place of origin, grade, only child, mother's education level, father's education level, and whether he comes from a single-parent family) of the subjects are analyzed, and the following results are shown in Table 2:

Table 2. Demographic characteristics of subjects.

Demographic variable	Category	Evaluation	Num	Percent age%
gender	man	1	328	40.4
	woman	2	483	59.6
Origin of students	Large and medium-sized cities	1	85	10.5
	city	2	294	36.3
	village	3	432	53.3
grade	freshman	1	646	79.7
	Sophomore	2	48	5.9
	junior	3	94	11.6
Is it an only child?	senior	4	23	2.8
	be	1	179	22.1
	no	2	632	77.9
Mother's education level	Primary school and below	1	195	24.0
	junior school	2	362	44.6
	High school and technical secondary school	3	180	22.2
	Undergraduate and junior college	4	64	7.9
	Bachelor degree or above	5	eight	1.0
Father's education level	Primary school and below	1	136	16.8
	junior school	2	335	41.3
	High school and technical secondary school	3	233	28.7
	Undergraduate and junior college	4	92	11.3
	Bachelor degree or above	5	13	1.6
	be	1	108	13.3

Do you come from a single-parent family?	no	2	703	86.7
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2. The difference analysis of purposeful rumination, positive coping and post-traumatic growth from the demographic perspective.

Table 3. purposeful rumination, positive coping, post-traumatic growth and understanding of gender differences.

variable	variable value	Sample size	average value	standard deviation	T test	Welch's T test	Average difference	Cohen's d value
Comprehend social support	1.0	328	56.253	14.683	T=-2.247 P=0.025**	T=-2.197 P=0.028**	2.209	0.161
	2.0	483	58.462	13.063				
	amount to	811	57.568	13.775				
Posttraumatic growth	1.0	328	79.963	24.565	T=-1.693 P=0.091*	T=-1.631 P=0.103	2.671	0.121
	2.0	483	82.634	20.153				
	amount to	811	81.554	22.068				
Intentional rumination	1.0	328	20.238	8.289	T=1.532 P=0.126	T=1.524 P=0.128	0.894	0.11
	2.0	483	19.344	8.063				
	amount to	811	19.705	8.162				
Positive coping dimension	1.0	328	33.445	6.828	T=-0.837 P=0.403	T=-0.827 P=0.409	0.394	0.06
	2.0	483	33.839	6.384				
	amount to	811	33.679	6.566				

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively.

As can be seen from Table 4, the average score of boys and girls in social support is 56.253 and 58.462, with significant difference ($P=0.025^{**}$, Cohen's $d=0.161$). There was no significant difference in the growth after trauma ($P=0.103$, Cohen's $d=0.121$). There is no significant difference between men and women in the dimensions of purposeful ruminant meditation and active coping (P is 0.126 and 0.403, Cohen's d is 0.11 and 0.06, respectively). An independent sample T test was conducted on the post-traumatic growth of trauma patients. The results showed that the scores of different genders were significantly different only in the dimension of understanding social support ($p<0.05$), and there was no significant difference in other dimensions. The boys' understanding of social support was significantly higher than that of girls, with the effect of 0.025 and the statistical test force of 2.657, which was significant.

Table 4. Differences of purposeful rumination, positive coping and post-traumatic growth in families with only children.

variable name	variable value	Sample size	average value	standard deviation	T test	Welch's T test	Average difference	Cohen's d value
Comprehend social support	2.0	632	57.441	13.138	t=- 0.493P=0.622	T=- 0.444P=0.657	0.576	0.042
	1.0	179	58.017	15.853				
	amo unt to	811	57.568	13.775				
Posttraumatic growth	2.0	632	80.861	21.496	t=- 1.682p=0.093*	T=- 1.586P=0.114	3.139	0.142
	1.0	179	84	23.884				
	amo unt to	811	81.554	22.068				
Purposeful ruminant meditation	2.0	632	19.698	8.02	T=- 0.049P=0.961	T=- 0.047P=0.962	0.034	0.004
	1.0	179	19.732	8.67				
	amo unt to	811	19.705	8.162				
Positive coping dimension	2.0	632	33.625	6.449	T=- 0.443P=0.658	T=- 0.424P=0.672	0.247	0.038
	1.0	179	33.872	6.978				

From Table 4, it can be seen that non-single-parent families and single-parent families understand social support ($P=0.657$, Cohen's $d=0.042$), post-traumatic growth ($P=0.093$, Cohen's $d=0.142$), purposeful ruminant meditation ($P=0.961$, Cohen's $d=0.004$). An independent sample T test was conducted to find out whether the trauma victims were the only child in their families. The results showed that there were significant differences in the growth of the only child in different families after trauma ($p<0.05$), but there were no significant differences in other dimensions. The only child was significantly higher than the non-only child, with the effect of 0.093 and the statistical test value of 2.313, which was significant.

As can be seen from Table 5, the average values of freshmen (1), sophomores (2), juniors (3) and seniors (4) in actively coping with the dimensions (1-12) are 33.639, 32.458, 34.181 and 35.304, respectively, which meet the homogeneity of variance, and the single sample variance test P value is $0.303 > 0$. In the total score of understanding social support, the average values are 57.824, 57.312, 55.723 and 58.478, which meet the homogeneity of variance. The single sample variance test P value is $0.568 > 0.05$, and the result is not significant, and there is no significant difference in this respect among different grades. In the post-traumatic growth, the average values were 82.127, 79.333, 77.745 and 85.652, which did not meet the homogeneity of variance. Welch's variance test P value was $0.326 > 0.05$, and the results were not significant, and there was no significant difference in different grades. In purposeful ruminant meditation, the average values are 20.096, 18.438, 1.872 and 18.87, which meet the homogeneity of variance. The single sample variance test P value is $0.054 > 0.05$, and the results are not significant, and there is no significant difference in this respect among different grades.

Table 5. Differences of purposeful rumination, active coping and post-traumatic growth in grades.

variable name	variable value	Sample size	average value	standard deviation	variance test	Welch's variance test
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			deviati on			
Positive coping dimension	1.0	646	33.639	6.597	F=1.215P=0.303	F=1.382P=0.255
	3.0	94	34.181	6.704		
	4.0	23	35.304	5.889		
	2.0	48	32.458	6.102		
	amount to	811	33.679	6.566		
Comprehend social support	1.0	646	57.824	13.67	F=0.674P=0.568	F=0.624P=0.602
	3.0	94	55.723	14.23		
	4.0	23	58.478	14.743		
	2.0	48	57.312	13.976		
	amount to	811	57.568	13.775		
Posttraumatic growth	1.0	646	82.127	21.126	F=1.508P=0.211	F=1.174P=0.326
	3.0	94	77.745	27.912		
	4.0	23	85.652	19.94		
	2.0	48	79.333	22.221		
	amount to	811	81.554	22.068		
Purposeful ruminant meditation	1.0	646	20.096	8.226	F=2.554P=0.054*	F=2.627P=0.057*
	3.0	94	17.872	7.959		
	4.0	23	18.87	6.203		
	2.0	48	18.438	8.092		
	amount to	811	19.705	8.162		

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively.

Table 6. Differences of purposeful rumination, active coping and post-traumatic growth in the place of origin.

variable name	variabl e value	Sample size	average value	standar d deviati on	variance test	Welch's variance test
Positive coping dimension	2.0	294	33.833	6.543	F=3.52P=0.030**	F=3.616P=0.028**
	3.0	432	33.259	6.574		
	1.0	eighty- five	35.282	6.402		
	amount to	811	33.679	6.566		
	2.0	294	20.126	8.22		
Intentional rumination	3.0	432	19.113	7.934	F=3.081P=0.046**	F=2.866P=0.059*
	1.0	eighty- five	21.259	8.882		
	amount to	811	19.705	8.162		
	2.0	294	82.48	20.296		
	3.0	432	79.306	22.88		
Posttraumatic growth	1.0	eighty- five	89.776	21.815	F=8.558P=0.000***	F=8.384P=0.000***
	amount to	811	81.554	22.068		
	2.0	294	58.854	13.558		
	3.0	432	55.954	13.551		
	Comprehend social support	2.0	294	58.854		
	3.0	432	55.954	13.551		

1.0	eighty-five	61.329	14.592
amount to	811	57.568	13.775

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively.

The average values of post-traumatic growth of 2.0 and 3.0 and 1.0 were 82.48/79.306/89.776, respectively. Because the homogeneity of variance is satisfied, the p value of variance analysis is 0.000 $** \leq 0.05$ by single sample variance test, so the statistical results are significant, indicating that there are significant differences in post-traumatic growth among different students.

3. Correlation Analysis

Considering the linear relationship between variables, Pearson correlation analysis is used to calculate the correlation coefficient in this study. The result in Table 7 were obtained:

Table 7. Pearson correlation coefficient table.

	1	2	3	4	5	6	7	8
gender	--							
age	.158**	--						
Do you come from a single-parent family?	.010	.012	--					
Origin of students	.053	.089*	.071*	--				
Is it an only child?	.167**	-.024	.211**	.272**	--			
Purposeful ruminant meditation	-.054	-.060	-.015	-.087*	-.002	--		
Posttraumatic growth	.126	.089	.659	.013	.961		--	
Positive coping di mension	.059	-.039	.020	-.139**	-.059	.155**		--
	.091	.271	.566	.000	.093	.000		
	.029	.031	.076*	-.089*	-.016	.146**	.392**	--
	.403	.383	.030	.012	.658	.000	.000	

Note: 1: gender,2:age, 3: Whether from a single parent family, 4: student source, 5: whether the only child, 6: Purposeful ruminant meditation,7:Posttraumatic growth,8:Positive coping di mension.

First of all, the psychological phenomenon of purposeful rumination shows a negative Pearson correlation trend in the dimensions of gender, age, place of origin, family structure (whether it is a single parent or not) and whether it is a single child. What is particularly striking is that its correlation with place of origin has reached a significant level. However, when the eyes turn to the dimensions of post-traumatic growth and positive coping, purposeful rumination shows a positive correlation, further revealing its inherent complexity and versatility.

The dimension of positive coping reveals the interaction between personal characteristics and environmental factors from a more unique perspective. It has a positive correlation with whether the agent is the only child in his or her family, but it has a negative correlation with other factors such as whether agent comes from a single-parent family and the place of origin, and it also has a significant correlation with purposeful rumination and post-traumatic growth. Post-traumatic growth shows its complex relationship with the environment. It is negatively related to age, place of origin and whether agent is the only child. At the same time, it is positively related to purposeful rumination and positive coping. The identity of the single child also plays an important role in the picture. It is

not only negatively correlated with age, birthplace, post-traumatic growth, positive coping and purposeful rumination, but also positively correlated with other factors such as gender. This multifaceted correlation has undoubtedly deepened our understanding of the psychological characteristics and environmental adaptability of the single child group. The family structure (single parent or not) is only negatively related to purposeful rumination, but the subtle relationship between family environment and individual psychological development behind it deserves our in-depth discussion. The geographical factor of the origin of students also shows its influence that can't be ignored in the picture. It has a significant negative correlation with gender, whether it is an only child, post-traumatic growth and purposeful rumination, while it has a positive correlation with whether it comes from a single-parent family. This reminds us that external environmental factors such as regional culture and educational resources have a far-reaching impact on individual psychological development. Finally, the relationship between age and gender also plays an important role. The negative correlation between them may imply some interweaving and conflict between gender roles and age stages in the process of psychological development. The negative correlation between age and places of origin, purposeful rumination and other factors further emphasizes the challenges and changes faced in the process of age growth. To sum up, this thermal coefficient diagram reveals a complex and colorful psychological world for us, which has both challenges and tempering, as well as hope and strength. It reminds us that when we understand individual psychological development, we should fully consider the interweaving and interaction of various factors and explore the mystery from a more comprehensive and in-depth perspective.

4. Analysis of the Intermediary Role of Positive Response

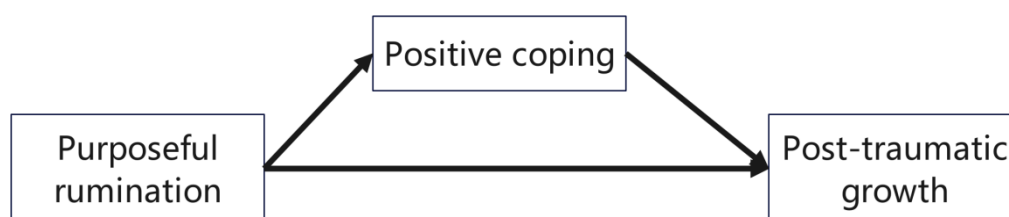


Figure 1. Intermediary model diagram.

Because the demographic variables (gender, place of origin, age) and the core variables (purposeful rumination, positive coping, post-traumatic growth) in this study are partly related, in the test of mediation effect and the test of regulated mediation, gender, place of origin and age are taken as control variables and then included in the regression equation for analysis. In this study, all continuous variables are centralized, and then Model 4 of Process macro is used for mediation test. The results are shown in Table 2. The results show that the direct and positive prediction of PTG by purposeful rumination is significant ($\beta = 0.148$, $t = 4.259$, $P < 0.001$), and the positive prediction of PTG by purposeful rumination is still significant ($\beta = 0.095$, $t = 2.196$, $P < 0.005$). Intentional rumination has a significant positive predictive effect on positive coping ($\beta = 0.143$, $t = 4.106$, $P < 0.001$), and positive coping also has a significant positive predictive effect on PTG ($\beta = 0.368$, $t = 11.32$, $P < 0.001$). In addition, the mediating effect between purposeful rumination and PTG is 0.143, Bootstrap95% confidence interval is [0.059, 0.240], and the upper and lower limits do not contain the value of 0, which indicates that the direct effect and mediating effect of the model are significant, and purposeful rumination can not only predict the degree of PTG directly, but also predict PTG through the mediating effect of proactive rumination. The mediating effect of this model (0.143) accounts for 35.83% of the total effect (0.399).

Table 8. Actively Respond to Intermediary Role.

Mediating effect analysis result (n=811)

	Posttraumatic growth				Positive coping dimension				Posttraumatic growth				Standardization coefficient	
	Standard coefficient	Standard error	t	P	Standard coefficient	Standard error	t	P	Standard coefficient	Standard error	t	P		
constant	78.478	4.448	17.645	0.000**	32.019	1.334	24.009	0.000**	38.905	5.414	7.187	0.000**	-	
Intentional rumination	0.399	0.094	4.259	0.000**	0.148	0.115	0.028	4.10**	0.143	0.256	0.086	2.91**	0.004*	
gender	3.372	1.564	2.156	0.031*	0.075	0.617	0.469	1.316	0.189	0.046	2.609	1.453	1.79	0.073*
Origin of students	4.247	1.132	3.752	0.000**	0.13	0.773	0.339	2.276	0.023*	0.079	3.292	1.055	3.11**	0.002*
age	0.05	0.294	0.169	0.865	0.006	0.095	0.088	1.078	0.281	0.038	0.273	0.247	0.805	-0.008
Positive coping dimension										1.236	0.109	11.302	0.000**	0.368
R ²			0.045					0.03					0.176	
Adjust r			0.04					0.024					0.17	
F	F(4, 806)=9.53, P=0.000***				F(4, 806)=6.274, P=0.000***				F(5, 805)=34.457, P=0.000**					

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively.

5. Understand the Regulatory Role of Social Support.

Then, on the basis of the mediation model, we add the social support to explore whether it regulates the direct path of purposeful rumination to PTG and whether it regulates the first half of the mediation model. In this study, gender, age and place of origin are taken as control variables, positive coping as intermediary variables, perceived social support as moderating variable and PTG as dependent variable, and model 8 of SPSS macro program PROCESS is used to test the moderating effect of perceived social support (Hayes, 2013; Wen Zhonglin and Ye Baojuan, 2014).

Table 9. Test of Mediating Effect of Perceived Social Support on PTG.

	Model 1				Model 2			
	coefficient	Standard error	t	P	coefficient	Standard error	t	P
const	41.138	5.276	7.797	0.000***	24.731	7.835	3.157	0.002***
gender	2.018	1.458	1.385	0.167	1.87	1.452	1.288	0.198
age	0.093	0.273	0.34	0.734	0.108	0.272	0.398	0.691
Origin of students	-2.507	1.062	-2.359	0.019**	-2.619	1.059	-2.474	0.014**
Intentional rumination	0.456	0.087	5.228	0.000***	1.338	0.324	4.124	0.000***
Perceive the total score of social support	0.591	0.052	11.375	0.000***	0.887	0.117	7.587	0.000***

Respond positively * understand the total score of social support		-0.016	0.006	-2.823	0.005***
R ²	0.177			0.185	
Adjust r	0.172			0.179	
F	F(5,805)=34.715, P=0.000***			F(6,804)=30.508, P=0.000***	
ΔR^2	0.177			0.185	
ΔF	$\Delta F(1,805)=129.384, P=0.000***$			$\Delta F(1,804)=7.967, P=NaN$	

According to the results in Table 9, Equation 1 is significant in general, $f(5,805) = 34.715, p < 0.001$, and purposeful rumination has a significant positive effect on positive coping ($\beta = 0.456, p < 0.001$), and the interaction of positive coping and understanding social support has a significant effect on cognitive reappraisal ($\beta = 1.338$). Equation 2 is significant in general, $f(6,804) = 30.508, p < 0.001$, and the direct effect of purposeful rumination on PTG is also significant ($\beta = 0.194, p < 0.001$), and the interaction between purposeful rumination and understanding social support has a significant effect on the total score of post-traumatic growth ($\beta = -0.016, P < 0.001$).

In order to further reveal the regulation mechanism of perceived social support, this study divided perceived social support into high group (M+1SD) and low group (M-1SD) according to the principle of plus or minus one standard deviation for simple slope analysis (see Figure 4). The simple slope test shows that when the perceived social support is high, the predictive effect of purposeful rumination on PTG is not significant, while when the perceived social support is low, the significant positive predictive effect of purposeful rumination on PTG indicates that the predictive effect of purposeful rumination on PTG is gradually increasing with the decrease of perceived social support.

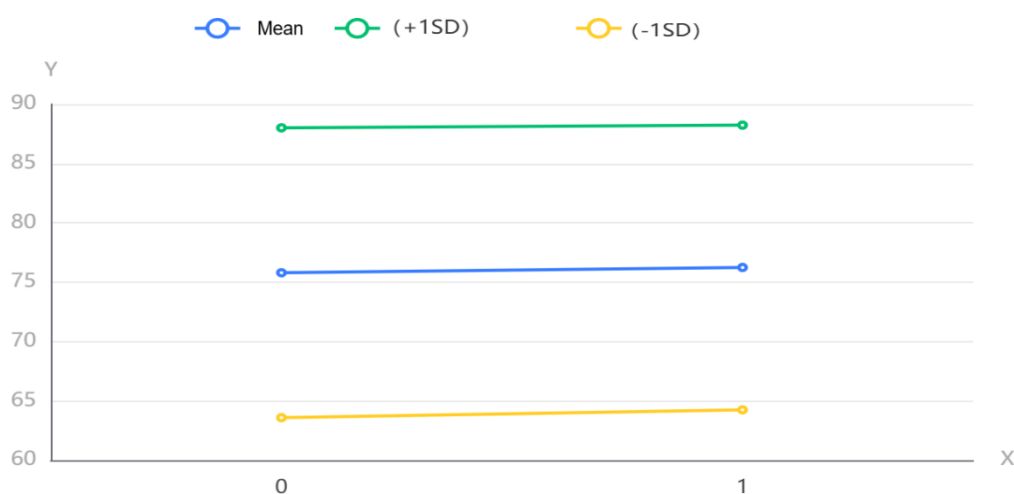


Figure 2. Understanding the moderating effect of social support between purposeful rumination and PTG.

4. Discussion

(1) Analysis of the Overall Demographic Variables of Traumatic Experience.

In this study, seven demographic variables, such as gender, place of origin, grade, whether this child is the only child in his/her family, education level of female mother, education level of father and whether he comes from a single-parent family, are used to analyze the differences in post-traumatic growth. According to the table X Pearson correlation coefficient table and heat map analysis of "3.3 Correlation analysis of purposeful rumination, positive coping and post-traumatic growth" above, the Pearson correlation coefficients related to post-traumatic growth in the above demographic variables are gender 0.059, age -0.039, grade -0.038, whether it is an only child -0.059, and whether it is from a single-parent family 0.02. According to the above correlation analysis, it can

be preliminarily judged. There are different (positive and negative, size) differences between different demographic variables and post-traumatic growth, so at the variable level, it can be preliminarily judged that there are different correlations between different demographic variables and post-traumatic growth, that is, there are differences among variables.

(2) the Overall Situation of the Post-Traumatic Growth Level of the Traumatic Experience.

On the individual level of demographic variables, according to the analysis of "3.4 Difference Analysis of purposeful rumination, active coping and post-traumatic growth from the perspective of demography", in the difference test of post-traumatic growth as a variable function, it seems that when the demographic variable is the source of life, the p value is 0.000***, and the significance level is 1%, which rejects the original hypothesis, so the whole is significant, indicating that there are significant differences in post-traumatic growth in different sources of life. However, according to the data analysis of other demographic variables, the significance level is higher than 10%, that is, $p > 0.1$, which cannot reject the original hypothesis, so it is difficult to explain that there are differences in post-traumatic growth of other demographic variables except the place of origin.

It shows that in the dimension of demographic variables (place of origin), the level of post-traumatic growth of traumatic experience will show significant differences. From this, it can be explained that the level of post-traumatic growth of trauma patients is different under the dimension of demographic variables (place of origin). This discovery shows that post-traumatic growth is not the same, but the influence of place of origin leads to the diversification of post-traumatic growth process. Therefore, when studying and intervening in post-traumatic growth, we need to fully consider the role of these factors in order to formulate more accurate and effective strategies and programs.

(3) Analysis of the Correlation Between Purposeful Rumination and Active Coping.

In the study, according to "3.3 Correlation Analysis of purposeful rumination, positive coping and post-traumatic growth", the correlation coefficient between purposeful rumination and positive coping is 0.146** according to Pearson correlation test, (** is at the level of 0.01 (double-tailed), and the observation data shows that there is a significant correlation between purposeful rumination variables and positive coping variables, and there is a positive correlation between variables from the positive and negative correlation coefficient. From this, we can draw a conclusion that there is a positive correlation between purposeful rumination and positive coping variables, which shows that when an individual is faced with pressure or challenge, if he tends to reflect purposefully (that is, purposeful rumination), then he is more likely to adopt a positive coping style. By cultivating individual's purposeful reflection ability and positive coping style, individual's growth and adaptation can be effectively promoted.

(4) The Predictive Effect of Purposeful Rumination on Post-Traumatic Growth Level.

According to "3.5 Mediation Analysis of Positive Coping", the analysis results of the predictive effect of purposeful rumination on the post-traumatic growth level are $\beta = 0.148$, $t = 4.259$, $p < 0.001$, and the significance level is 1%, which shows that the original hypothesis is rejected, so the result is significant. According to β , purposeful rumination has a direct and positive predictive effect on the post-traumatic growth level. The purposeful rumination has a positive predictive effect on the post-traumatic growth level, which shows that if individuals can actively and consciously reflect on traumatic events and seek positive growth and learning from them, this positive thinking process can promote their post-traumatic growth level. This effect can be achieved by promoting adaptive thinking, reducing negative emotions, enhancing psychological resilience and promoting self-cognition. Therefore, in post-traumatic intervention, individuals should be encouraged to ruminate purposefully to promote their post-traumatic growth.

(5) Actively Respond to the Intermediary Role Analysis

According to the analysis of the predictive function after adding the intermediary variable (positive coping), it is concluded that purposeful rumination has a direct positive predictive effect on the post-traumatic growth level, purposeful rumination has a positive coping and positive coping has a positive predictive effect on the post-traumatic growth level. The predictive factor β is (0.095, 0.143, 0.368) respectively. According to the data analysis in "Table 1 Positive Response Mediation and Table X Mediation Effect Test Summary" in "3.5 Positive Response Mediation Effect Analysis", the mediation effect test result shows that $a*b(P \text{ value}) = 0.002^{**}$, and the significant interval is 1%, generally speaking. We further test it by boot (see Table X in Table 3.5), and get the final result that "purposeful rumination \Rightarrow active coping dimension \Rightarrow post-traumatic growth" has some mediating effects. Therefore, we can get that purposeful rumination promotes the formation of positive coping styles. When individuals ruminate purposefully, they are more likely to take positive measures to cope with the pressures and challenges they face. Positive coping style further promotes post-traumatic growth. Individuals who adopt positive coping styles can better manage stress, reduce negative consequences and promote personal growth and development. Positive coping plays a partial mediating role between purposeful rumination and post-traumatic growth. Through purposeful rumination, individuals can better understand and cope with stress or traumatic events, thus forming a positive coping style and ultimately promoting post-traumatic growth. This study can provide important enlightenment for understanding and promoting the growth and development of individuals under pressure.

(6) Understanding the Analysis of the Regulatory Role of Social Support

According to the research, understanding social support is a regulatory variable that plays a regulatory role under the direct effect of positive coping on post-traumatic growth. According to the research of "3.6 Moderating Effect of Perceived Social Support", the data results show that the effect of the interaction between purposeful rumination and perceived social support on cognitive reappraisal is $\beta=1.338$, $p<0.001$, with a significant level of 1%, which shows that the effect of purposeful rumination on cognitive reappraisal is influenced by perceived social support. The interaction between purposeful rumination and perceived social support had a significant effect on the total score of post-traumatic growth ($\beta=-0.016$, $p<0.005$), indicating that perceived social support regulated the direct prediction of purposeful rumination on post-traumatic growth. We continue to introduce simple slope to study the adjustment mode of understanding social support, and get that when social support is high, the predictive effect of purposeful rumination on PTG is not significant, while when social support is low, the significant positive predictive effect of purposeful rumination on PTG shows that with the decrease of understanding social support, the predictive effect of purposeful rumination on PTG is gradually increasing, so we get the specific influence mode of realizing social support variables under the adjustment. This shows that understanding social support, as the care, respect and help perceived by individuals from others, has a significant impact on the mental health and growth of individuals. When individuals are experiencing trauma or stress, the perceived social support can provide them with emotional comfort and substantial help, thus helping to reduce psychological stress and promote individual recovery and growth. Understanding social support significantly moderates the mediating effect of positive coping on purposeful rumination and post-traumatic growth. This means that the higher the level of social support an individual perceives, the stronger the positive coping will promote the relationship between purposeful rumination and post-traumatic growth. This may be because social support provides individuals with more resources and support, making them more confident and capable of coping with pressures and challenges, and then achieving post-traumatic growth. Therefore, by enhancing the individual's understanding ability of social support, it can promote the individual's positive coping and post-traumatic growth more effectively.

5. Countermeasures and suggestions

The approach to post-traumatic growth involves several key strategies: fostering positive thinking and self-acceptance by encouraging purposeful rumination and distinguishing healthy rumination from unhealthy rumination; personalizing processing through tailored strategies that consider individual experiences and needs, such as exercise, singing, painting, art therapy, expressive writing, and personalized services like career planning; strengthening social support by encouraging social participation and building supportive networks to provide emotional comfort and practical help; constructing a psychological support system with regular educational interventions, including counseling, support services, and skills training in meditation, mindfulness, and art therapy to build resilience and positive coping strategies; establishing a safe learning and living environment for students, offering counseling, support services, and peer support groups to enhance belonging and reduce loneliness; and conducting continuous follow-up research and effect evaluation feedback to optimize service strategies and provide data support for interventions.

6. Research Conclusions

This study explores the relationship between purposeful rumination, positive coping, post-traumatic growth, and demographic differences, examining the mediating roles of positive coping and understanding social support. Key findings include: (1) the study is not significantly affected by common method deviation, ensuring data reliability and validity; (2) positive coping and purposeful rumination are positively correlated with post-traumatic growth, suggesting they promote recovery; (3) girls score higher in understanding social support than boys, but gender differences are insignificant in other dimensions; (4) family structure has no significant impact on post-traumatic outcomes, though only children show higher post-traumatic growth; (5) positive coping partially mediates the relationship between purposeful rumination and post-traumatic growth; and (6) perceived social support moderates this relationship, with high support weakening the impact of purposeful rumination and low support enhancing it. Overall, this study provides insights into psychological reactions and growth after trauma, offering valuable references for trauma psychology research and practice. Future research should delve deeper into post-traumatic growth mechanisms, and offer more effective interventions for trauma survivors.c

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