

The relationship between peer relationship and social anxiety-the intermediary role of rumination

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Abstract:

Social anxiety is a major content of psychological health education in senior high school. Handling social anxiety problems of high school students is of great importance for them to complete their studies and grow up healthily. Therefore, it is crucial to investigate the factors that cause social anxiety for psychological intervention of high school students. This study explores the relationship between peer relationships, rumination level, and social anxiety in two high schools by collecting questionnaires from 200 experimental subjects. Through statistical analysis, the following conclusions were drawn: First, high school students' peer relationships, parent-child relationships, and teacher-student relationships are significantly positively correlated with negative rumination. Second, these relationships predict social anxiety, with peer relationships being the strongest predictor, followed by parent-child relationships, and teacher-student relationships being the weakest. Additionally, positive and negative rumination in high school students are significantly associated with gender and grade level. Furthermore, various peer relationships (same-sex, opposite-sex) and teacher-student relationships are significantly related to negative rumination and social anxiety. Finally, we found that negative rumination plays a mediating role in the relationships between peer relationships, teacher-student relationships, same-sex peer relationships, and opposite-sex peer relationships and social anxiety. So, the conclusion is that peer relationships are related to social anxiety and negative rumination in high school students, and negative rumination is a mediating variable between peer relationships and social anxiety.

Keywords: Peer relationships; Rumination; Social anxiety; Mental health

1. Introduction

Under the fast pace of life and high pressure of study, adolescents' social anxiety will face many threats (Lou Weiqun, Qi Iridium, 2020; Wang Tian et al. 2021;). Peer relationship is one of the factors affecting social anxiety (Liu Guangzeng et al., 2019). Social anxiety is characterised by long duration and high incidence (Bian Chenyang et al., 2014), and it is easy to cause other psychological problems, including suicidal ideation (Peng Shun et al., 2019), social anxiety (Wu Xiaowei et al., 2015), loneliness (Wu Lina et al., 2020), social network addiction (Teng Xiongcheng et al., 2021), and mobile phone addiction (Li Fang, 2021). Moreover, High school students face tremendous learning pressure because of the challenges of the college entrance exams, and these pressures come from their classmates on the one hand inter-competition, and on the other hand from parents' demands and expectations for themselves. Under the influence of continuous pressure, high school students are prone to negative cognitions (Wang, Yulong et al., 2020), such as rumination. Rumination thinking further affects individuals' perceptions of social situations (Wong, moulds, 2012), thus affecting high school students' social anxiety. Therefore, for us to investigate the relationship between rumination thinking and peer relationships and social anxiety is crucial for the development of psychology.

Zhou Zongkui define peer relationships as a developable interpersonal relationship that people of a comparable age or psychological maturity establish with each other through interaction and sociability.(Zhouzongkui,2015) The term social anxiety was first used by the French psychopathologist Janet in 1903, when she first used the term "social anxiety" to describe the behaviour of a person who is "socially anxious".It was only in 1966 that British psychiatrists Mark and Gelder clearly defined social anxiety, distinguishing it from phobic disorders and suggesting that social anxiety manifests itself as a fear of all social activities. In addition, Chinese researchers Pan et al. (2018) also defined social anxiety as an irrational and excessive fear of interpersonal interactions and one's performance in social situations, accompanied by intense tension, stress, and a tendency to avoid socialising.

Conway defines ruminative thinking as the persistent repetitive thinking of negative information by individuals due to the failure to achieve a predefined goal.And there is a response style theory proposed by Nolen-Hoeksema mentions the following different response styles that individuals exhibit when experiencing negative emotions: rumination problem solving.In a study, it was found that counterproductive rumination intervention was often conducted in group counseling. For example, Guan Yunxia selected 32 students with lower levels of social anxiety

and conducted eight sessions of positive rumination group counseling over a period of one and a half months. The results showed that adding positive rumination to group counseling can improve positive rumination, reduce negative rumination, improve social anxiety, and lower anxiety levels. The results showed that social anxiety and negative rumination were significantly reduced, positive rumination was significantly increased, indicating that positive rumination training can help middle school students with social anxiety develop positive cognitive tendencies, increase their positive experiences in social interactions, reduce negative rumination and anxiety levels. The results show that positive rumination training can help middle school students with social anxiety develop positive cognitive tendencies, increase their positive experiences in social interactions, reduce their negative thoughts and anxiety levels.Furthermore, during our literature review, we found that children's anxiety levels were inversely related to their popularity (Verduin & Kendall, 2008), meaning that children with lower anxiety levels are more likely to be popular among their peers. A recent study also found that those with anxiety are more likely to have a poor peer relationship compared to those who are confident (Baker, Hudson & Taylor,2014; Boivin,Hymel,1997). They found that children who withdrew socially were more likely to be attacked by their peers.

In recent years, although research on rumination has gradually attracted public attention, it is still in the exploratory stage, and there are many limitations in related studies. Issues such as whether there are differences in conclusions in different cultural contexts and whether rumination can positively predict social anxiety remain to be explored. Most of the existing studies on rumination, peer relationships, and social anxiety mainly revolve around two issues, and there has been no research that combines the three, leaving room for discussion for the implementation of this study. Therefore, it is believed that on the basis of previous studies, a comprehensive study is needed to explore the mediating role of rumination in peer relationships and social anxiety. Thus, this paper intends to investigate the relationship between peer relationships and rumination, a cognitive style, and social anxiety among high school student participants and attempts to construct a mediating model of rumination between peer relationships and social anxiety. In view of this, this study intends to explore the relationship between peer relationships and rumination, this cognitive style, and social anxiety among high school student participants and attempts to construct a mediating model of rumination for social anxiety and peer relationships. This study mainly includes exploring the mediating role of rumination on peer relationships and social anxiety and establishing a mediating relationship

model. And three hypotheses are listed: (1) There are differences in demographic variables among high school student peer relationships, rumination, and social anxiety; (2) There are significant correlations between high school student peer relationships, rumination, and social anxiety; (3) Positive and negative rumination play a mediating role in the prediction of social anxiety by peer relationships among high school students.

2. Material and method

2.1 Subjects of the study

Data were collected from two high schools in Tibet, with 217 questionnaires distributed and 200 valid responses. The sample included 130 first-year, 29 second-year, and 41 third-year students, comprising 103 males and 97 females, with an average age of 15 to 18 years.

2.2 Research tools

2.2.1 Peer Relationship Scale

The Comprehensive Peer Relationship Scale developed by Chien-ChungWoh and Chong-TeLin (2001) has a coefficient of 0.782, which has good reliability, and is divided into four dimensions which are same-sex, opposite-sex peer relationships, parent-child relationships, and teacher-student relationships. The coefficients of the same-sex and opposite-sex peer relationship scales are 0.69 and 0.66, which are both acceptable. Teacher-student relationship, parent-child relationship is 0.72,0.71, excellent reliability, suitable for use.

2.2.2 Positive and Negative Rumination Thinking Scale

In this study, the Positive and Negative Rumination Thinking Scale (PANRS) developed by Zhong Wang (2016) was used to measure the numerical value of rumination level of high school students, who included five aspects (positive recall: enjoying happiness, positive coping, negative recall: repressing happiness, self-negation, and negative attribution), with a total of 23 items in a four-point Likert-type scale. the total reliability of this scale reached 0.79, with good reliability and validity.

2.2.3 Social Anxiety Scale for Adolescents

The Chinese version of the Social Anxiety Scale for Adolescents (SAS-A) was used, as revised by Haidong Zhu (2008). This scale consists of three dimensions: fear of rejection, social avoidance, and stress in unfamiliar situations and in general, and a five-point Likert-type scale was used to determine the level of social anxiety. The scale has a reliability of 0.90, which is considered good.

2.3 Statistical methods

The statistical software applied was SPSS with MPLUS for statistical analysis, correlation analysis, t-test, ANOVA with validating factor analysis, and mediation analysis.

3. Analysis of the study

3.1 Common methodological biases

In this study, the Harman one-factor test was employed to assess the common method bias. The critical threshold for the Harman one-factor test is typically 50%, and after performing the maximum variance rotation, it can be concluded that there is no single dominant factor, indicating that the common method bias is not significant.

The results of the common method bias analysis, using extraction methods with eigenvalues greater than 1, are presented in Table 1.

Specifically:

(1) For the equivalence scales, the first common factor without rotation explained 34.705% of the variance, while the first common factor using maximum variance rotation explained 12.164% of the variance.

(2) For the Ruminative Thinking Scale, the first common factor without rotation accounted for 27.841% of the variance, whereas the first common factor extracted using maximum variance rotation accounted for 21.494% of the variance.

(3) For the Social Anxiety Scale, the first common factor without rotation explained 54.970% of the variance, while the first common factor using maximum variance rotation explained 36.641% of the variance.

Overall, all of the scales in this study passed the common method bias test and there was no significant common method bias.

Table 1 Results of the common method bias test

measures	Unrotated common factor variance contribution	Contribution to the variance of the rotated common factor
Peer Relationship Scale	34.705 %	12.164%
Ruminative Thinking Scale	27.841 %	21.494 %
Social Anxiety Scale	54.970 %	36.641%

3.2 General status of peer relationships, reflection and social anxiety among high school students

The descriptive statistics for each dimension of this research design are shown in Table 2.

Table 2 Results of descriptive statistics

dimension (math.)	N	minimum value	maximum values	average value	(statistics) standard deviation
Same-sex	199	8.00	31.00	12.0101	4.63516
Heterosexual	199	9.00	35.00	17.2312	5.75219
parent-child	199	4.00	18.00	7.4824	3.19223
teacher-student	199	4.00	19.00	7.8643	3.63439
Positive	199	17.00	44.00	25.5779	4.12833
Negative	199	12.00	43.00	27.5930	4.89590
social anxiety	199	13.00	65.00	35.9347	11.05408

For social anxiety, 50 to 59 is mild anxiety, 60 to 69 is moderate anxiety, and 69 or more is severe anxiety. The numbers and percentages of each category are shown in Table 3.

Table 3 Results of frequency analysis of social anxiety

form	frequency	per cent	Cumulative percentage
anxiety-free	184	92.5	97.5
mild anxiety	10	5.0	5.0
moderate anxiety	5	2.5	100.0
high anxiety	0	0.0	100.0

3.3 One-way analysis of variance (ANOVA)

A one-way ANOVA was performed to assess significant differences in same-sex and opposite-sex peer relationships, parent-child relationships, teacher-student relationships, positive and negative rumination, and social anxiety, considering gender and grade level as independent factors. The findings are summarized in Table 4.

The findings are summarized in Table 4.

Table 4 One-way ANOVA results

dimension (math.)	distinguishing between the sexes			grade			
	male	women	F	first year	second year	third-year	F
Same-sex peer	13.25±5.78	11.31±3.68	8.37 * *	18.17±8.7	11.64±4.05	13.56±6.51	7.29***
Heterosexual peer	18.06±6.49	16.76±5.26	2.33	22±7.59	16.98±5.5	18.11±7.01	2.48
parent-child	8.21±3.56	7.07±2.9	5.98*	9.17±4.17	7.33±3.13	8.39±3.38	1.77
teacher-student	8.51±4.07	7.5±3.33	3.65	11±3.52	7.71±3.58	8.33±3.83	2.58
Positive	25.88±4.22	25.41±4.08	0.58	23.83±3.43	25.41±4.14	27.78±3.61	3.31*
Negative	27.35±5.48	27.73±4.55	0.28	27±3.16	27.47±4.93	28.94±4.99	0.78
social anxiety	35.78±10.9	36.02±11.18	0.02	38.67±8.82	36.06±11.11	33.78±11.33	0.54

*p<0.05; **p<0.01; ***p<0.001

The results presented in Table 4 indicate that: (1) male students exhibit higher scores in same-sex peer relationships and parent-child relationships compared to female students; (2) there is a significant difference in same-sex

peer relationships and positive ruminative thinking across different grade levels. Positive ruminative thinking scores increased as the grade level increased, while same-sex peer relationships scored higher for seniors than for juniors, and lower for sophomores than for seniors

3.4 Correlation analysis

Following the correlation analyses using Pearson's correlation coefficient for each dimension of the three scales, as well as for gender (male=1, female=2) and grade level (senior=1, sophomore=2, junior=3), the results are presented in the table. The correlation analyses showed that

positive rumination was not significant with other factors except with negative rumination and grade level. In addition to this, the three factors of peer relations were validated against the middle effect of the three factors according to Baron and Kenn (1986) who proposed a middle effect principle.

Table 5 Results of correlation analysis

dimension (math.)	Same-sex	Heterosexual	parent-child	Teacher-student	Positive	Negative	social anxiety	distinguishing between the sexes	grade
Same-sex	1								
Heterosexual	0.67**	1							
parent-child	0.47**	0.44**	1						
teacher-student	0.57**	0.57**	0.57**	1					
Positive	0.01	0.04	0.06	0.08	1				
Negative	0.33**	0.42**	0.24**	0.40**	0.51**	1			
social anxiety	0.40**	0.54**	0.35**	0.38**	-0.02	0.47**	1		
distinguishing between the sexes	-0.20**	-0.11	-0.17*	-0.14	-0.05	0.04	0.01	1	
grade	-0.03	-0.03	0.03	-0.04	0.18*	0.08	0.07	-0.05	1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

3.5 Examination of Mediation Effects Using Structural Equation Modeling

Next, Structural equation modeling was employed using AMOS 24.0 to further investigate the parallel mediation effect. The results obtained from structural equation modelling and regression can be corroborated with each other. The bootstrap method was used to validate the mediation effect by computing 95% CIs over 500 resamples with the percentile method. An indirect effect is significant if the 95% CI does not include 0 or if the p-value is below 0.05. The results are shown in Figure 1 and Table 6.

It was found that (1) positive rumination did not play a significant mediating role in the explanation of peer relationships (same-sex peer relationships, opposite-sex peer

relationships, parent-child relationships, and teacher-student relationships) to social anxiety; (2) negative rumination played a significant mediating role in the explanation of opposite-sex peer relationships and teacher-student relationships to social anxiety. Negative rumination did not play a significant mediating role in the explanation of same-sex peer relationships and parent-child relationships to social anxiety.

By contrast, the influence of opposite-sex peer relationships and teacher-student relationships on negative rumination is more pronounced than that of same-sex peer relationships and parent-child relationships. This leads to a lack of significant direct impact of same-sex peer relationships and parent-child relationships on negative rumination, and subsequently, an insignificant mediating role of negative rumination in the context of social anxiety stemming from these relationships.

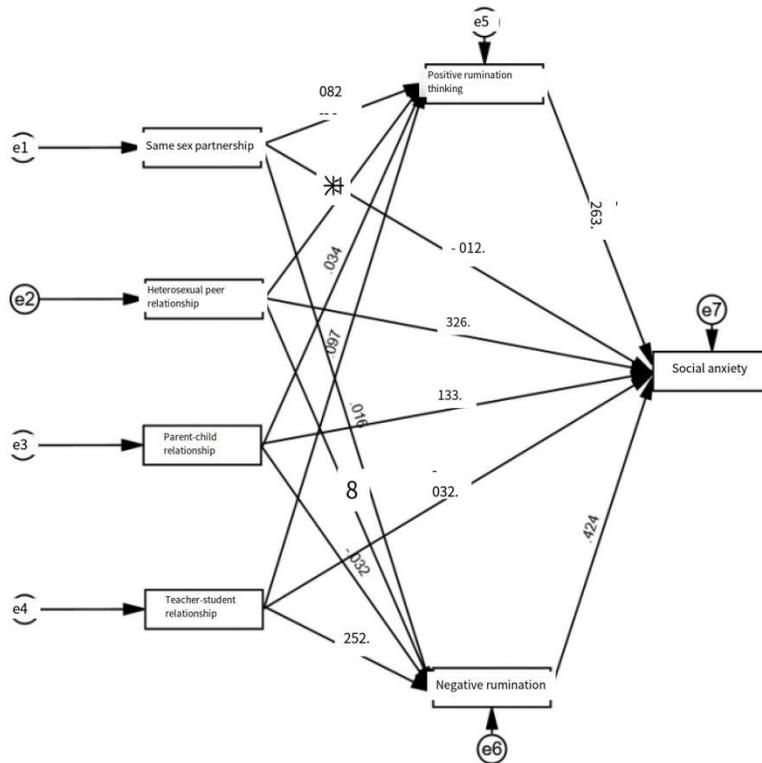


Figure 1 Structural equation modelling of the mediating effect of positive rumination thinking (standardised path coefficients)

Table 6 Analysis of the mediating effect of rumination (based on structural equation modelling)

effect (scientific phenomenon)	trails	Bias-Corrected 95 per cent			
		estimated value	(of Gods) descend to the world of mortals	upper bound	p
aggregate effect	Same-sex peer relationships-social anxiety	0.04	-0.19	0.23	0.88
	Heterosexual peer relationships-social anxiety	0.87**	0.07	0.40	0.01
	Parenting - Social Anxiety	0.39	-0.31	0.20	0.71
	Teacher-Student Relationships - Social Anxiety	0.15*	0.02	0.58	0.04
direct effect	Same-sex peer relationships-social anxiety	-0.03	-0.45	0.39	0.88
	Heterosexual peer relationships-social anxiety	0.63***	0.29	0.99	0.00
	Parenting - Social Anxiety	0.46	-0.08	0.91	0.07
	Teacher-Student Relationships - Social Anxiety	-0.09	-0.62	0.46	0.72

effect (scientific phenomenon)	trails	Bias-Corrected 95 per cent			
		estimated value	(of Gods) descend to the world of mortals	upper bound	p
indirect effect	Same-sex peer relationships - Positive rumination thinking - Social anxiety	0.05	-0.08	0.18	0.36
	Heterosexual peer relationships - Positive rumination thinking - Social anxiety	-0.01	-0.11	0.11	0.76
	Parent-Child Relationships - Positive Rumination Thinking - Social Anxiety	-0.03	-0.21	0.13	0.71
	Teacher-Student Relationships - Positive Rumination Thinking - Social Anxiety	-0.08	-0.25	0.07	0.32
	Same-sex peer relationships - Negative rumination thinking - Social anxiety	0.02	-0.18	0.22	0.87
	Heterosexual peer relationships - Negative rumination thinking - Social anxiety	0.24**	0.06	0.44	0.01
	Parenting - Negative Rumination Thinking - Social Anxiety	-0.05	-0.34	0.21	0.71
	Teacher-student relationships - Negative rumination thinking - Social anxiety	0.33*	0.02	0.62	0.04

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

4. Discussion

High school students generally exhibited higher levels of both positive and negative ruminative thinking. However, no significant gender differences were found in rumination, supporting the hypothesis of Yang Juan (2010), which posited no gender difference in rumination. The study did find significant differences in positive rumination across grade levels, with older students showing higher scores. This may be due to upperclassmen's greater emotional coping skills, higher stress tolerance, and more positive coping strategies developed through age and experience.

4.1 Peer Relationships of High School Students

The research indicated that high school participants generally had high-quality peer relationships. However, there were significant gender differences in same-sex peer relationships, parent-child relationships, and peer interactions. These differences may reflect the developmental stage of adolescence, where gendered thoughts and feelings shape relationship dynamics. Furthermore, peer relationships improved with grade level, as older students increasingly sought group belonging and social value, leading them to engage in more pro-social behaviors to establish strong peer relationships. As students progress through high school, their desire for group acceptance grows, influencing their behavior towards others.

4.2 The Phenomenon of Social Anxiety in High School Students

The overall level of social anxiety among high school students was low, with a detection rate of 7.5%, mainly indicating mild or moderate anxiety. Although females were found to experience slightly higher levels of social anxiety, the gender difference was not statistically significant. The study suggests that high school girls may be more vulnerable to social anxiety due to earlier psychological development and greater susceptibility to social pressures. Mental health education programs, however, seem to reduce social anxiety, especially among females, by helping students recognize and manage their emotions and cognitive patterns. These programs can improve students' emotional regulation, self-confidence, and social skills, ultimately reducing social anxiety.

4.3 Correlation Analysis

Significant positive correlations were found between peer relationships, ruminative thinking, and social anxiety. Better peer relationships were associated with higher levels of negative rumination, which in turn increased social anxiety. Conversely, fostering positive peer relationships and strong parent-child attachments, as well as harmonious teacher-student relationships, could mitigate negative rumination and social anxiety. The study suggested that enhancing social support networks could help reduce anxiety and improve students' emotional well-being.

4.4 Mediating Role of Negative Rumination

Negative rumination was identified as a significant mediator between certain types of peer relationships and social anxiety. Specifically, negative rumination mediated the relationship between opposite-sex peer relationships and teacher-student relationships to social anxiety. However, it did not play a mediating role in same-sex peer relationships or parent-child relationships. Previous research has confirmed that rumination impacts social anxiety through emotional processing and cognitive factors. High levels of negative rumination decrease self-esteem and trust in others, exacerbating social anxiety. The study suggests that controlling rumination, particularly negative rumination, can reduce social anxiety and improve social functioning. Building strong interpersonal networks with positive feedback mechanisms can also enhance individual social support and belonging, ultimately reducing anxiety.

5. Conclusion

- (1) Social anxiety scores were significantly and positively correlated with negative rumination thinking among high school students, as were peer relationships (same-sex peer relationships, opposite-sex peer relationships), parent-child relationships, and teacher-student relationships.
- (2) High school students' positive rumination and their negative rumination were significantly correlated with gender, and high school students' rumination was significantly correlated with grade level.
- (3) Significant correlations were found between parent-child relationships, teacher-student relationships, same-sex peer relationships, opposite-sex peer relationships, and negative rumination thinking and social anxiety.
- (4) Negative rumination thinking played a substantial intermediary role in the elucidation of heterosexual peer and teacher-student relationships to social anxiety.
- (5) Negative rumination thinking did not play a significant mediating role in the explanation of same-sex peer and parent-child relationships to social anxiety.

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