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Article

The Effect of Cyber-Ostracism on Social Anxiety among Undergraduates: The Mediating Effects of Rejection Sensitivity and Rumination

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Abstract: To examine the relation between cyber-ostracism and social anxiety among undergraduate, and to investigate the underlying mechanism of effects of cyber-ostracism, rejection sensitivity and rumination on social anxiety. A total of 864 undergraduates were investigated by Cyber-Ostracism Questionnaire, Chinese version of Interaction Anxiousness Scale, Chinese version of Rejection Sensitivity Questionnaire and Chinese version of Ruminative Responses Scale. The results showed that (1) Cyber-ostracism had a positive effect on social anxiety; (2) Cyber-ostracism directly influenced social anxiety. Meanwhile, cyber-ostracism had indirect effects on social anxiety via rejection sensitivity and rumination respectively. Additionally, cyber-ostracism also had indirect effects on social anxiety by the chain-mediating effects of rejection sensitivity and rumination. Analysis of the research results indicates that rejection sensitivity and rumination may play mediating role in the relationship between cyber-ostracism and social anxiety.

Keywords: cyber-ostracism; social anxiety; rejection sensitivity; rumination

1. Introduction

Unlike the reality and intuitiveness of learning and communication among high school students, Internet technology has permeated the study, life, and communication of college students. Individuals can maintain existing relationships while establishing new ones without being constrained by distance. The convenience and real-time interactivity of this kind of online communication have to a certain extent satisfied the social needs of college students. However, the high degree of involvement in online social interaction can also increase the chances of individuals being ignored and excluded in the network. This phenomenon is called cyber-ostracism [1], that is, the extension and development of real social exclusion in network social situations [2].

Cyber-ostracism is closely related to negative emotions. Agnew, the proponent of general strain theory, pointed out that the negative relationship between an individual and others is the essential cause of stress and pressure. When an individual has excessively high expectations of others but does not receive corresponding treatment, it can trigger negative emotions such as disappointment, anxiety, depression, and anger [3]. Relevant research has found that individuals who experience cyber-ostracism exhibit negative emotions [1], and social anxiety is a common negative emotional experience. Studies have shown that when individuals experience cyber-ostracism, they tend to experience more anxiety [4]. Baumeister and Tice also discovered that anxiety is the primary response of individuals to social exclusion [5].

In Williams' temporal need-threat model [6], individuals who experience social exclusion undergo three distinct phases, each marked by varied psychological responses. During the reflexive stage, the excluded individual reacts instinctively, a response that is largely independent of individual differences and situational factors. The second phase, the reflective stage, involves an assessment of the cause and significance of social exclusion. In this stage, both situational factors and

individual differences influence cognitive evaluation, which subsequently shapes behavioral responses in the withdrawal stage. According to this model, an individual's reaction to cyber-ostracism is influenced, on the one hand, by the characteristics of the online context, such as its uncertainty, ambiguity, disembodiment, and variability, and on the other hand, by individual differences, including personality traits and cognitive styles.

Rejection sensitivity, as a personality trait, refers to an individual's excessive worry and negative anticipation about potential rejection, exclusion, or non-acceptance in social interactions [7]. High rejection sensitivity is one of the contributing factors to the development of anxiety disorders [8]. Individuals with high rejection sensitivity tend to interpret ambiguous or unintelligible information from others in social exchanges as indications of rejection, leading to negative emotions such as anxiety [9]. Buckley et al. found that rejection sensitivity is closely related to an individual's reactions to interpersonal rejection and acceptance, but it does not play a moderating role in these reactions [10]. From an evolutionary psychological perspective, Kerr and Levine argue that humans' sensitivity to the threat of interpersonal rejection has deep evolutionary significance [11]. The social monitoring system theory suggests that individuals possess a keen ability to detect social rejection in online contexts [12]. In online social interactions, individuals with high rejection sensitivity are prone to anticipating rejection, even in neutral or uncertain online social situations. They tend to excessively worry about being rejected by others, resulting in negative emotional experiences such as anxiety and depression. Therefore, rejection sensitivity may play a mediating role between cyber-ostracism and social anxiety.

Rumination is a learned mode of thinking, categorized as a cognitive bias [13], where an individual unconsciously and persistently focuses on their emotions, behaviors, and thoughts, engaging in continuous and repetitive contemplation of their possible causes, resulting consequences, and event details, rather than actively seeking solutions. As a cognitive style that repeatedly attends to one's negative emotions and related events, rumination plays a pivotal mediating role between cyber-ostracism and social anxiety. Previous studies have shown that individuals with high rejection sensitivity are more prone to engage in ruminative thinking [13]. Those with heightened rejection sensitivity are more easily trapped in ruminative thoughts, which, in turn, lead them to pay greater attention to negative events, thereby exacerbating anxiety. Therefore, rejection sensitivity and rumination may play a chain mediating role between cyber-ostracism and social anxiety.

In summary, based on the temporal need-threat model and relevant empirical research findings, this study proposes to construct a multiple mediation model, which includes the following mediation effects: (1) Rejection sensitivity significantly mediates the relationship between cyber-ostracism and social anxiety among college students. (2) Rumination significantly mediates the relationship between cyber-ostracism and social anxiety among college students. (3) Rejection sensitivity and rumination play a significant chain mediation role between cyber-ostracism and social anxiety among college students.

2. Materials and Methods

2.1. Participants

A cluster random sampling method was adopted to select university freshmen in Xuzhou, Jiangsu Province and Guangzhou, Guangdong Province as the research participants. The survey was conducted collectively with classes as the unit, and 1042 questionnaires were distributed. Questionnaires with an answer time of less than 180 seconds and those with completely identical responses were excluded. Finally, 864 valid questionnaires were remained, resulting a response rate of 82.9%. The average age of the participants was 18.8 years old ($SD=0.8$ years). Among them, there were 269 males and 595 females, 319 students majored in science and engineering, 323 students majored in liberal arts, and 222 students majored in arts and sports.

2.2. Measures

2.2.1. Cyber-Ostracism

The Cyber-Ostracism Questionnaire developed by Tong [14] was adopted, consisting of 14 items with a 5-point Likert scale. It encompasses three dimensions: cyber-ostracism in online personal chat, cyber-ostracism in online group chat, and cyber-ostracism in personal web space. A higher total score indicates a higher frequency of online social exclusion experienced by the individual. The internal consistency coefficient of the questionnaire in this study was 0.96.

2.2.2. Social Anxiety

The Interaction Anxiety Scale (IAS) developed by Leary and revised by Xiang Dong et al. [15,16] was adopted, consisting of 15 items with a 5-point Likert scale. Items 3, 6, 10, and 15 are reverse-scored. A higher total score represents more severe social anxiety. The internal consistency coefficient of the scale in this study was 0.86.

2.2.3. Rejection Sensitivity

The Rejection Sensitivity Questionnaire (RSQ) developed by Downey and Feldman and revised by Zhao Yanlin et al. [17] was adopted, consisting of 18 items rated on a 6-point Likert scale. It covers various situations in daily life where college students need help from others and requires individuals to imagine requesting something from another person while anticipating their response. Each item contains two questions: the first assesses the anxiety level towards rejection from significant others, with a higher score indicating greater anxiety; the second assesses the expectation of acceptance from significant others, with a higher score indicating a higher anticipation of acceptance. Rejection sensitivity total score = anxiety degree score × acceptance expectation degree reverse score, with a higher total score indicating higher rejection sensitivity. The internal consistency coefficient of the scale in this study was 0.92.

2.2.4. Ruminative

The Ruminative Responses Scale (RRS) developed by Nolen-Hoeksema and revised by Han Xiu and Yang Hongfei [18] was adopted, consisting of 22 items rated on a 4-point Likert scale. It comprises three dimensions: symptom rumination, reflective pondering, and brooding. A higher score indicates a higher level of rumination. The internal consistency coefficient of the scale in this study was 0.94.

2.3. Data Analysis

Descriptive statistics, common method bias test, and correlation analysis were conducted using SPSS 26.0, while the mediation model test was performed using Amos 26.0.

3. Results

3.1. Common Method Biases

Harman’s one-factor test was used to perform common method bias test. The results indicated that 14 eigenvalues greater than 1 were obtained without rotation, and the first factor explained only 22.17% of the total variance, falling below the critical threshold of 40%. These results suggest no substantial common method biases in this study.

3.2. Descriptive Statistics and Correlations for Variables

A correlation analysis was conducted on cyber-ostracism, social anxiety, rejection sensitivity, and rumination. The results shows that there is a significant positive correlation between network social rejection, social anxiety, rejection sensitivity and rumination thinking. Table 1 provides the mean, standard deviation, and correlation matrix for each variable.

Table 1. Correlation between variables.

Variables	M	SD	1	2	3	4
1. Cyber-Ostracism	1.87	0.68	1			
2. Social Anxiety	3.23	0.63	0.20**	1		
3. Rejection Sensitivity	9.83	4.74	0.37**	0.38**	1	
4. Rumination	2.17	0.53	0.39**	0.49**	0.38**	1

Note. **P<0.01.

3.3. The Mediating Role of Rumination and Rejection Sensitivity between Cyber-Ostracism and Social Anxiety

First, the total effect of cyber-ostracism on social anxiety was investigated, and the model was constructed with cyber-ostracism as independent variable and social anxiety as dependent variable (Model 1). The results show that the model and data fit well ($\chi^2=4.35$, $\chi^2/df=4.35$, CFI=0.99, TLI=0.99, SRMR=0.01, RMSEA=0.06) The regression coefficient of cyber-ostracism on social anxiety was significant ($\beta =0.22$, $P<0.001$), indicating that the total effect of cyber-ostracism on social anxiety was significant.

Furthermore, the mediating roles of rejection sensitivity and rumination in the relationship between cyber-ostracism and social anxiety were examined. Taking cyber-ostracism as the independent variable, social anxiety as the dependent variable, and rejection sensitivity and rumination as the mediating variables (Model 2). Amos26.0 software was used to test the mediating effects. The result indicated that the fit of this model was acceptable ($\chi^2 = 116.13$, $\chi^2/df = 7.26$, RMSEA = 0.09, CFI = 0.98, GFI = 0.97, AGFI = 0.93, IFI = 0.98, NFI = 0.97, TLI = 0.96, SRMR = 0.03). The results of the mediating effect model are shown in Figure 1. The Bias-Corrected Bootstrap method was adopted, with 5000 repeated samples, to calculate the 95% confidence interval of the mediating effect. When 0 was not included in the interval, it indicated that the indirect effect was significant. The path effect values and 95% confidence intervals of the chain mediation model are shown in Table 2.

Table 2. Results of Bootstrap analysis for significance test of mediation effect.

Path	Effect size	95% CI	
		Lower	Upper
Cyber-Ostracism →Rejection Sensitivity →Social Anxiety	0.09	0.08	0.10
Cyber-Ostracism →Rumination →Social Anxiety	0.13	0.11	0.15
Cyber-Ostracism →Rejection Sensitivity →Rumination →Social Anxiety	0.05	0.04	0.06

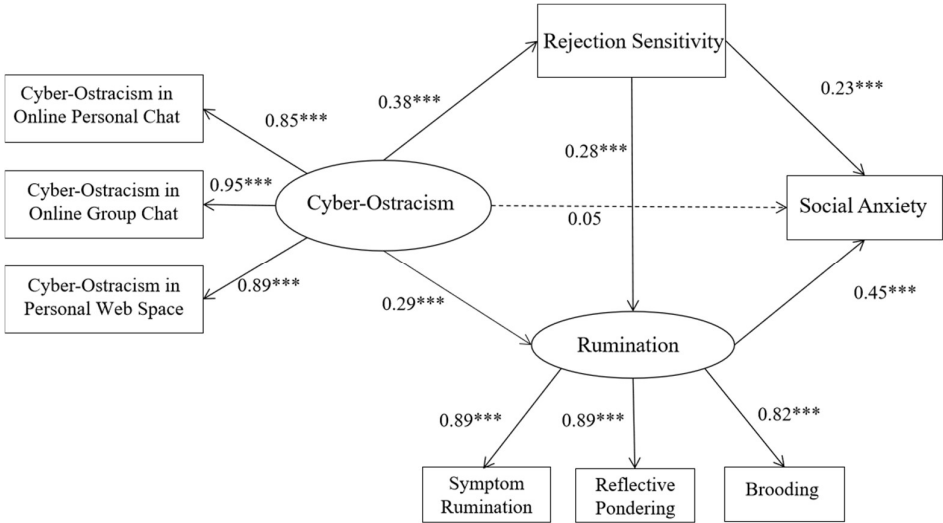


Figure 1. Results of the model of the chain mediation effect between cyber-ostracism and social anxiety.

4. Discussion

Research has revealed that cyber-ostracism significantly and positively predicts social anxiety, aligning with previous findings [19] and supporting the broader perspective of general strain theory [3]. As the frequency of online social interactions among university students continues to escalate, the uncertainty, ambiguity, and unconstrained nature of these interactions easily lead individuals to perceive that they are not being treated as expected in these relationships, fostering experiences of cyber-ostracism, which subsequently triggers anxiety. Consequently, cyber-ostracism emerges as a crucial risk factor for social anxiety among university students. Furthermore, our study underscores that cyber-ostracism can indirectly induce social anxiety through three distinct pathways.

Specifically, cyber-ostracism positively predicts social anxiety through rejection sensitivity, consistent with previous research [9,20]. The rejection sensitivity model [21] posits that individuals who have experienced rejection enter a state of heightened vigilance, tied to anxious or hostile expectations of further rejection. These expectations may distort individuals' perceptions of others' words and actions, increasing defensiveness. This anxious anticipation can lead to a self-fulfilling prophecy, where individuals' fears of issues arising in online social situations materialize, perpetuating a cycle of rejection. Consequently, individuals with high rejection sensitivity are exquisitely sensitive to cues of rejection in their environment. Coupled with the ambiguity of online social settings, such as the absence of physical presence, the constant shift between online and offline status, incomplete or relatively unconstrained language expressions, and other vague information, these cues are often interpreted by highly rejection-sensitive individuals as rejection, thereby eliciting anxiety.

This study also found that cyber-ostracism positively predicts social anxiety through rumination, consistent with recent related research perspectives [22]. The response styles theory indicates that rumination is a maladaptive response style that plays a significant role in initiating, maintaining, and accelerating social anxiety [23,24], significantly predicting social anxiety. After experiencing cyber-ostracism, individuals develop conflicting beliefs about online social interactions, leading to immense psychological pressure and triggering rumination. As they repeatedly contemplate the events themselves and their outcomes, their cognitive resources become unable to shift away from negative events, hindering constructive actions. This exacerbates negative self-perceptions, emotional regulation difficulties, and other issues, ultimately inducing social anxiety.

Furthermore, this study discovered that cyber-ostracism positively predicts social anxiety through the multiple mediation of rejection sensitivity and rumination. Previous research has shown that individuals with high rejection sensitivity are highly sensitive to rejection cues in online social environments, even interpreting ambiguous or uncertain disclosures as rejection [25,26]. The need-threat time model [6] posits that during the reflection phase, situational factors and individual differences influence cognitive appraisal. The uncertainty and real-time dynamics of online communication contexts (situational factors), high rejection sensitivity (personality trait), and high rumination (thought pattern) are crucial situational and individual factors that affect individuals' cognition of events and online social environments, their judgments about future event developments, and the induction of social anxiety. Individuals with high rejection sensitivity not only influence their judgments about the future development of events but also impact themselves. In other words, they exacerbate their negative cognitions, making them more likely to engage in negative re-experiencing of events, fall into maladaptive rumination, and decrease their emotional regulation abilities, thereby increasing the likelihood of social anxiety.

This study investigates the current status and influencing mechanisms of social anxiety among college students, examining the predictive effects of cyber-ostracism, rejection sensitivity, and rumination on social anxiety. Theoretically, it integrates and validates the assumptions of the general strain theory and the temporal need-threat model, enhancing our understanding of the roles of rejection sensitivity and rumination. It confirms the hypothesis of a multiple mediation mechanism

by which cyber-ostracism affects social anxiety, further refining the theoretical model. Practically, the findings of this study reveal the pathways of social anxiety formation, providing empirical support for interpersonal communication guidance among college students. This not only helps students, from their early days in college, correctly understand the characteristics of online social interactions based on their personality traits and thought patterns, but also assists them in establishing positive cognitive patterns for online socializing. Consequently, it can disrupt the induction and intensification process of social anxiety, promoting healthy individual interactions.

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