BMC Psychology

RESEARCH

Open Access

The relationship between neuroticism and social aggression: a moderated mediation model

Fangying Quan[1,2], Yan Gou[1,2], Yibo Gao[1,2], Xinxin Yu[1,2*] and Bao Wei[3*]

Abstract

Neuroticism appears to be a factor that triggers social aggression, but the relationship between neuroticism and social aggression and its underlying mechanisms is unclear. Questionnaire data from 942 college students ranging in age from 17 to 24 (M_{age} = 20.33, SD = 1.03) were analysed to assess whether depression symptoms mediated the relationship between neuroticism and social aggression, and to test a moderating effect of perceived social support. Results showed that neuroticism positively predicted social aggression and this association was mediated by depression symptoms. Moderation was found for the association between neuroticism and depression symptoms, as well as between neuroticism and social aggression, and that neuroticism had a stronger predictive effect on depression symptoms and social aggression under low compared to high perceived social support. These findings may inform prevention and intervention efforts to reduce social aggression.

Keywords Depression symptoms, Neuroticism, Perceived social support, Social aggression

Introduction

Social aggression is a form of indirect or covert aggression that involves the intentional manipulation or undermining of others through verbal or non-physical means. It is also regarded as a form of violent behavior that harms relationships [1, 2]. Some studies argue that social aggression encompasses the behavior of relational aggression and indirect aggression, but there is still existing dispute that Coyne suggesting relational, indirect and social aggression are much more similar than they are different, and proposing ways in which the three terms can be integrated into one research area [3]. Social aggression is less likely to be detected than explicit physical aggression, though it occurs frequently and is associated with emotional and behavioral problems in both the aggressor and the victim. Aggression of this nature not only deteriorates interpersonal relationships and increases the risk of direct aggression at the individual level, but may also affect societal stability more broadly [4]. Studies on social aggression have thus far typically focused on children and adolescents. However, there is growing evidence that social aggression is also evident in adulthood, including among college students [5]. Therefore, exploring mechanisms that influence social aggression among college students could have theoretical and practical implications for research in this area and inform prevention attempts.

*Correspondence:
Xinxin Yu
gxnudhx@126.com
Bao Wei
2232552379@qq.com
[1]Department of Psychology, Faculty of Education, Guangxi Normal University, Guilin 541004, China
[2]Guangxi University and College Key Laboratory of Cognitive Neuroscience and Applied Psychology, Guangxi Normal University, Guilin 541004, China
[3]Lyceum New Essence Senior High School, Chongzuo 532199, China

Neuroticism and social aggression

A number of aggression-related personality variables are known to increase the likelihood of aggression, including neuroticism, trait anger, narcissism, and impulsivity. As a prominent theory of personality dimensions, the five-factor model [6] is very useful for understanding the relationship between personality and aggression. Neuroticism is a personality trait associated with negative emotionality and is characterized by emotional susceptibility, with the facets including anxiety, angry hostility, impulsiveness and escapism [7, 8]. According to the General Aggression Model (GAM) [9], certain personality traits such as neuroticism are important contributors to aggressive behavior. Indeed, compared with other dimensions, neuroticism has been identified as a particularly important risk factor for increased aggressive behavior in several studies [7, 10]. For example, studies have found that neuroticism often positively correlates with trait aggression [7, 8, 11, 12], or predict greater aggression [13]. Research also showed that higher neuroticism increases individual's level of relational aggression [10, 14]. This may be because highly neurotic individuals tend to be more emotional and impulsive, which can lead to socially aggressive behaviors. However, the research evidence regarding the relationship between neuroticism and social aggression and its psychological mechanism is still insufficient. Especially in the context of Chinese culture, the psychological mechanism of neuroticism in predicting social aggression is still unclear. That said, evidence in this area is limited in terms of age and geographic location. Thus, in the present study we seek to expand the available evidence base using a sample of college students in China. The first hypothesis is that a positive correlation exists between neuroticism and social aggression.

A mediating role of depression symptoms

Although existing theory and empirical research support the prediction of neuroticism to social aggression, the underlying psychological mechanisms of this relationship remain unclear. To elucidate a potential mediating mechanism, we propose a model in neuroticism predicts social aggression via depression symptoms. The term "depression symptoms" can refer to emotional problems ranging from mild negative emotions to severe mood disorders, though depression symptoms are generally characterized by negative emotions such as sadness and distress accompanied by behavioral symptoms such as social withdrawal and inattention [15]. Depression symptoms may play a mediating role in the association between neuroticism and social aggression. The reasons are as follows: theoretically, as GAM [9] states that, traits, attitudes, and situational factors(e.g., frustration) can influence aggression via their impact on internal states, such as anger, aggressive thoughts, and physiological arousal. Research has also shown that personality traits can be either directly or indirectly associated with aggression through an individual's emotions [16]. Neuroticism may be associated with aggression behavior because it promotes the development and chronic accessibility of aggressive emotions and attitudes [17]. A large twin study suggests that neuroticism is an independent predictor on major depression [18]. Consequently, neuroticism may be both directly related to social aggression and indirectly related through its effect on depressed mood.

The diathesis-stress model of depression suggests that depression is the result of a combination of individual diathesis factors and stress-inducing events [19]. Neuroticism has been shown to significantly predict depression symptoms in college students and adolescents [12, 20]. It means that, the occurrence and development of depression may also be influenced by individual who with higher levels of neuroticism. Furthermore, according to the acting-out model, depressive feelings can act out as aggressive behavior [21]. Empirical studies indicate that depression symptoms increase an individual's engagement in aggressive behavior that including intimate partner aggression, general aggression, and self-aggression [22–24]. Longitudinal investigations have found that depression symptoms predict negative behaviors such as aggression in adolescents up to one year after assessment [25]. Depression symptoms can also predict social aggression [26, 27]. In brief, depression symptoms may be one mechanism explaining the relationship between neuroticism and social aggression. Thus, our second hypothesis is that depression symptoms mediate the relationship between neuroticism and social aggression.

The moderating role of perceived social support

If our proposed mediation effect is accurate, it is also important to consider factors that might moderate this effect. Perceived social support refers to the degree to which individuals feel recognized, understood, and supported by others [28]. When individuals feel more supported in interpersonal interactions, they are more inclined to adopt positive coping styles [29] whereas when perceived social support is low, negative coping styles such as avoidance become more common [30]. The Buffering model of perceived social support frames it as a protective mechanism that buffers the effects of individual factors or stressful situations on physical and mental health outcomes [31, 32]. By regulating the impact of adverse stimuli on physical and mental health, this protective mechanism helps to reduce negative emotions, externalizing behaviors, and to promote maintenance of physical and mental health. Statistically, social support can moderate the relationship between neuroticism and various aspects of mental health(e.g., depression

symptoms, anxiety) among college students [33]. The lower one's level of social support, the stronger the negative impact of neuroticism on mental health, and vice versa. Moreover, a study has found that perceived social support can moderate the relationship between adolescent narcissism and aggression [34]. Thereby, theoretically, perceived social support for individuals with neurotic tendencies would decrease their use of aggression as a strategy for responding to threat situations, and this inference may also apply to the relationship between depression and social aggression. We therefore propose our third hypothesis, perceived social support moderates the association between neuroticism and depression symptoms, neuroticism and social aggression, depression and social aggression. The relationship between these variables, will be weaker at high levels of perceived social support and stronger at low levels.

In summary, based on well-supported theoretical perspectives such as the GAM and the Buffering model, neuroticism appears to be particularly related to aggression. However, as we have noted, little, if any, empirical study confirms the mediating mechanism between neuroticism and social aggression, and the extent to which the apparent protective role of perceived social support in the association between neuroticism, depression symptoms, and social aggression has not yet been examined. The aims of this study are to explore the association between neuroticism and social aggression in college students, and to test a possible mediating role of depression symptoms, and a moderating role of perceived social support on these associations.

Method

Participants

Undergraduate students from 6 Chinese universities in Guangxi, Chongqing, Guizhou, and Minnan, China were recruited to participate in the study. The selection of these six universities as survey objects was based on the convenience of sampling, and the diversification of sample sources as much as possible. A total of 1,115 questionnaires were distributed, ranging from 103 to 270 for each university. After excluding 173 questionnaires with too many missing values or random answers due to limited understanding ability and careless filling, a total of 942 valid questionnaires were returned. Among completed valid questionnaires, 579 (62%) were females and 363 (38%) were males. The age of the sample ranged from 17 to 24 (M_{age} = 20.33, SD = 1.03).

Measures

Neuroticism

Neuroticism was measured with the Neuroticism subscale of the NEO Personality Inventory-3 (NEO PI-3) [6]. The neuroticism subscale contains 12 questions and is scored on a five-point Likert scale (1 for strongly disagree and 5 for strongly agree). Higher mean scores indicate higher neuroticism. The Chinese version of the NEO PI-3 has good reliability in Chinese samples [35]. The Cronbach's α coefficient of this scale in the current study was 0.86.

Social Aggression

Social aggression was measured with the Social Aggression Subscale of the Subtypes of Antisocial Behavior Questionnaire (STAB-SAS) [36]. Participants were asked to assess how often they engage in social aggression on a five-point Likert scale (1 for never, 5 for nearly all the time), with higher scores indicating a higher frequency of social aggression. The Chinese version of the STAB-SAS has good reliability and validity in the college student population [1]. Cronbach's α was 0.91 in this sample.

Perceived Social Support

The Perceived Social Support Scale (PSSS) [37] was used. Participants were asked to assess aspects of social support on a seven-point Likert scale (1 for disagree, 7 for agree), with higher scores indicating higher perceived social support. The PSSS has good reliability and validity [38]. Cronbach's α in this study was 0.93.

Depression symptoms

Depression symptoms was measured using the Center for Epidemiological Studies Depression Scale (CES-D) [39] Participants were asked to rate the frequency of depression symptoms in the past week on a four-point Likert scale (0 for occasional or none, 3 for persistent). The Chinese version of the CES-D has good reliability [40]. Cronbach's α in this study was 0.74.

Procedure and data analysis

After determining the 6 survey schools by sampling method, and the number of student classes (2–3 classes in each school), we recruited 2–3 researchers in each school, and uniformly trained all subjects before the test, all the researchers were trained in the guidance, test content and precautions. With the agreement of the class teachers and the students, the trained researchers explained the unified instructions to ensure that all participants understood the test requirements. The whole class was then surveyed for about 15 min. The questionnaire was returned immediately after the survey.

SPSS 26.0 was used for descriptive statistics, correlation analysis, and common method bias, and the Process macro program developed by Hayes (2013) was applied for mediating effect test and moderated mediating effect analysis. Bootstrap method was used to verify the significance of the mediation effect.

Table 1 Means, standard deviations, and correlation coefficients for each variable

	M	SD	1	2	3	4	5	6	7	8
1. Gender	0.39	0.49	1							
2. Major	1.73	0.71	0.32***	1						
3. PE	1.50	0.69	0.01	0.03	1					
4. ME	1.35	0.60	0.02	0.02	0.66***	1				
5. Age	20.32	1.05	0.09**	-0.08*	-0.14***	-0.152***	1			
6. Neuroticism	2.88	0.63	-0.07*	-0.03	-0.09***	-0.141***	-0.01	1		
7. SA	1.84	0.57	0.06	-0.01	0.01	-0.01	-0.04	0.37***	1	
8. PSS	5.42	1.00	-0.11***	-0.10**	0.078*	0.07*	0.00	-0.25***	-0.26***	1
9. DS	0.93	0.33	-0.01	-0.02	-0.02	-0.02	-0.03	0.51***	0.35***	-0.21***

Note PE=Paternal education; ME=Maternal education; SA=Social aggression; PSS=Perceived social support; DS=Depression symptoms; ***$p<0.001$; **$p<0.01$; *$p<0.05$

Results

Common method bias

Harman's single-factor test [41] was employed to assess common method bias. Results revealed six factors with eigenvalues exceeding 1, with the initial common factor accounting for 14.06% of the variance, falling below the 40% threshold. Consequently, it was determined that the data did not significantly suffer from common method bias.

Descriptive statistics and correlation analysis

Table 1 displays the descriptive statistics and correlations among the study variables and the demographic variables. The results showed significant negative correlations between neuroticism and perceived social support and between perceived social support and depression symptoms. Neuroticism was significantly positively correlated with depression symptoms, and both neuroticism and depression symptoms were significantly positively correlated with social aggression. In addition, gender, major, and parental education were significantly correlated with neuroticism or perceived social support, age was not significantly correlated with any study variables. To avoid the possible influence of demographic variables, gender, major and parental education will be controlled as covariates in the subsequent statistical analysis.

Mediation analysis

The mediating effect of depression symptoms on the association between neuroticism and social aggression was tested using Model 4 in Hayes' (2013) PROCESS program. Neuroticism as an independent variable, depression symptoms as a mediating variable, social aggression as a dependent variable, were included in the model. After controlling for gender, major and parental education, results showed that neuroticism significantly predicted social aggression ($\beta=0.24$, $SE=0.03$, $p<0.001$) and depression symptoms ($\beta=0.27$, $SE=0.02$, $p<0.001$), and that depression symptoms significantly predicted social aggression ($\beta=0.35$, $SE=0.06$, $p<0.001$). The significance of the mediating effect was determined by the Bootstrap method, which showed a mediating effect value of 0.10 with a 95% confidence interval of 0.06–0.14. As this did not contain 0, a significant mediating effect of depression symptoms could be assumed. This effect accounted for 29.41% of the total effect (0.34) (See Fig. 1 and Table 2).

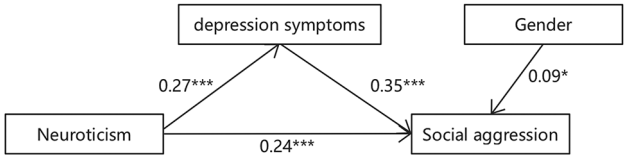

Fig. 1 The mediation model of neuroticism, social aggression and Depression symptoms (***$p<0.001$; *$p<0.1$; to simplify the graph, only results with significant path coefficients are presented)

Table 2 Mediation analysis

Mediator	Effect	Effect value	Bootstrapped standard error	95% CI
Depression symptoms	Total effect	0.34***	0.03	[0.28, 0.39]
	Direct effect	0.24***	0.03	[0.18, 0.31]
	Indirect effect	0.10***	0.02	[0.06, 0.14]

Note 95% CI=95% bootstrapped confidence interval; ***$p<0.001$

Moderated mediation model analysis

Model 59 in the PROCESS program was used to test a moderated mediation model with perceived social support as a possible moderator by controlling gender, major and parental education. Results showed that, the product term of neuroticism and perceived social support was significant in the prediction of depression symptoms (β = -0.03, $SE=0.01$, $p<0.05$) and social aggression ($\beta=0.08$, $SE=0.03$, $p<0.01$), suggesting that perceived social support moderated the association between neuroticism and depression symptoms, and between neuroticism and social aggression. However, the interactions involving perceived social support and depression symptoms on

Table 3 Moderated mediation model test

Regression equation		Overall fit index			Significance of regression coefficients	
Outcome variable	Predictor variable	*R*	R^2	*F*	*β*	*t*
DS	Gender	0.53	0.28	42.7	0.02	0.95
	FE				0.00	0.01
	ME				0.03	1.49
	Major				0.01	-0.87
	Age				0.00	-0.40
	Neuroticism				0.26***	16.83
	PSS				-0.03**	-2.97
	Neuroticism × PSS				-0.03*	-2.20
Social aggression	Gender	0.45	0.20	22.30	0.07	0.04
	FE				0.04	0.03
	ME				0.01	0.04
	Major				-0.02	0.03
	Age				-0.02	0.02
	Neuroticism				0.20***	6.07
	DS				0.32***	5.20
	PSS				-0.09***	-5.01
	Neuroticism × PSS				0.08**	2.59
	DS× PSS				-0.02	-0.38

Note PE=Paternal education; ME=Maternal education; PSS=Perceived social support; DS=Depression symptoms; ***: $p<0.001$, **: $p<0.01$

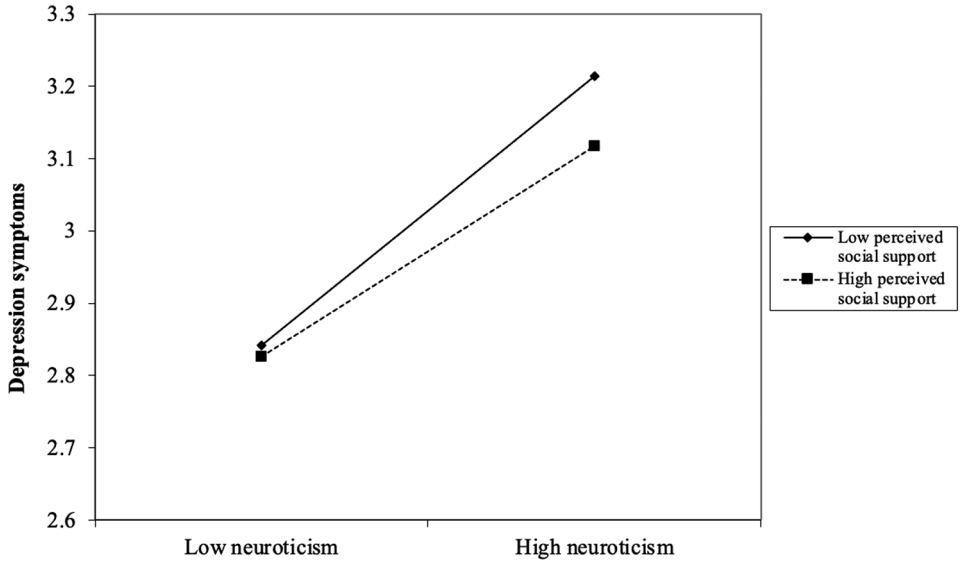

Fig. 2 Moderating role of perceived social support in the relationship between neuroticism and depression symptoms

social aggression was not significant (β = -0.02, SE=0.06, $p>0.05$) (See Table 3).

To clarify the moderating effect of perceived social support on the relationship between neuroticism and depression symptoms, a simple slopes analysis was conducted based on high and low groupings (plus and minus one standard deviation) of perceived social support. Results showed that in those with high perceived social support, neuroticism was less predictive of depression symptoms (β=0.23, $p<0.001$), with 95% confidence intervals of 0.19-0.27. In contrast, for individuals with low perceived social support, neuroticism was more predictive of depression symptoms (β=0.29, $p<0.001$), with a 95% confidence interval of 0.25-0.34 (Fig. 2). And then, the second simple slopes analysis was conducted to clarify the moderating effect of perceived social support on the relationship between neuroticism and social aggression. Based on high and low groupings of perceived social support, the results showed that in those with high perceived social support, neuroticism was less predictive of social aggression (β = 0.28, p < 0.001), with 95% confidence intervals of 0.20-0.37. In contrast, for individuals

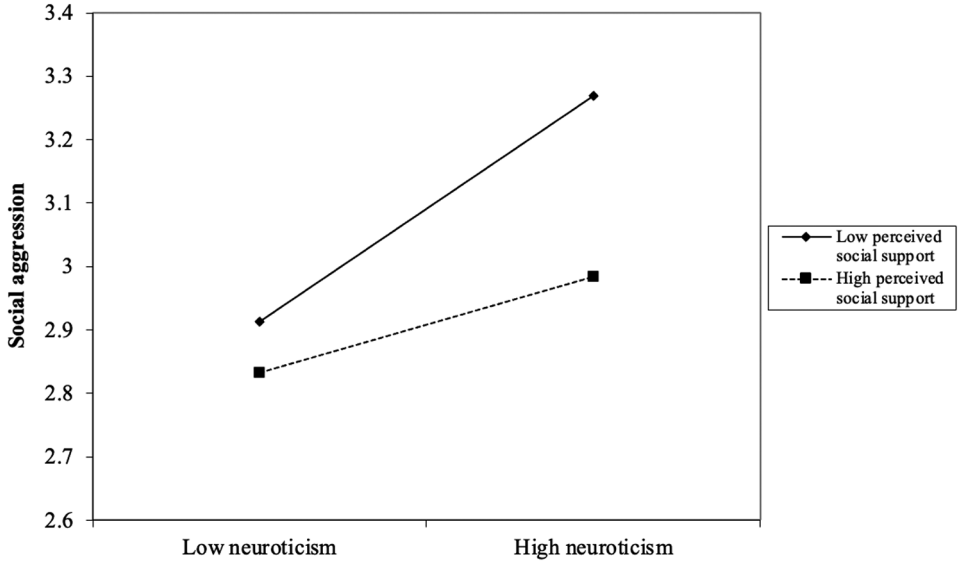

Fig. 3 Moderating role of perceived social support in the relationship between neuroticism and social aggression

with low perceived social support, neuroticism was more predictive of social aggression ($\beta = 0.11$, $p < 0.05$), with a 95% confidence interval of 0.02-0.21 (Fig. 3).

Discussion

This study of college students in China was designed to test mechanisms underlying the association between neuroticism and social aggression. Results of a moderated mediation analysis supported our hypotheses that depression symptoms mediated the relationship between neuroticism and social aggression, and the association between neuroticism and depression symptoms, as well as neuroticism and social aggression were moderated by perceived social support.

The direct effect of neuroticism on social aggression

The finding that neuroticism predicts social aggression supports our first hypothesis and extends the GAM, which posits that personality factors can trigger aggressive behavior [26]. This result further confirms that neuroticism is an important risk factor for social or relational aggression in previous studies [10, 14]. For example, study using the Five Factor Model of personality showed that the personality profile of individuals high on relational aggression is characterized by heightened the components of neuroticism, such as anger hostility and impulsivity [42]. High neuroticism is typically characterized by emotional instability and a tendency to be hostile, anxious, and impulsive. When faced with life problems, neurotic individuals tend to become depressed and upset. Such psychological and social responses may activate or exacerbate aggressive behavior [43]. Individuals high in neuroticism are prone to breaking down, panicking, or becoming confused when faced with emotionally provocative interpersonal situations and, as a result, may be more likely to be aggressive toward others by engaging in behaviors such as manipulation or spreading rumors. Above all, neuroticism significantly direct impacts social aggression.

Mediating mechanisms of neuroticism predicting social aggression

Results show that there is a partial mediating effect of depression symptoms on relationship between neuroticism and social aggression. Our finding regarding the mediating effect of depression symptoms supports our second hypothesis and implies an important role of depression symptoms in the emergence of undesirable behaviors that are triggered by neuroticism. This is perhaps evidence of the idea that personality can influence aggression via a promoting or suppressing effect on negative emotions, as indicated in the GAM [9, 17]. The finding that neuroticism was associated with depression symptoms further enriches the view illustrated in the diathesis-stress model that personality factors are associated with depression symptoms [44]. Longitudinal investigations have shown that heightened neuroticism predicts the onset of depression symptoms [45]. Individuals with high neuroticism may adopt maladaptive emotion regulation strategies that consume more cognitive resources, induce greater neurological activation, and produce a higher level of stress, which may in turn raise the likelihood of depression symptoms [46]. The observation that depression symptoms was associated with social aggression extends the acting out model of depression symptoms [47], which suggests that individuals high in depression symptoms are more likely to engage in socially aggressive behaviors such as spreading

rumors. In summary, individuals high in neuroticism are less resilient to stressful life events and prone to depressive experiences that exacerbate negative cognitions and emotions, which, in turn, may promote socially aggressive behaviors.

The moderating role of perceived social support

Neuroticism is more strongly linked to depression symptoms in individuals with low compared to high perceived social support (see Fig. 2). In other words, as perceived social support decreases, the association between neuroticism and depression symptoms become stronger. The finding that perceived social support moderated the neuroticism-depression pathway supports our third hypothesis, which is based on the Buffering model of perceived social support [31] and the interaction of perceived social support with personality factors to predict psychological symptoms, as has been found in earlier research [48]. According to the Buffering model, not all individuals with high levels of neuroticism experience depression symptoms. Other factors, such as having a strong social support system, can motivate individuals to adopt positive coping styles, thus reducing the likelihood of depression. In this sense, perceived social support acts as a protective factor.

Figure 3 shows that perceived social support moderates the relationship between neuroticism and social aggression, which also supports our research hypothesis, and the view that perceived social support can dissuade the college students from viewing aggression as an appropriate response to threatening social situations [34]. Specifically, high levels of neuroticism can cause individuals to develop sadness or anger rumination, impulsivity, and hostility toward others, which can lead to increased levels of social aggression. However, when they perceive social support from peers, family, and significant others, the association between this personality predisposition factor and social aggression is mitigated. In other words, when individuals with high neuroticism levels perceive social support, their original negative emotions and perceptions may dispelled, thus preventing them from acting in an aggressive manner.

Surprisingly, perceived social support does not moderate the relationship between depression symptoms and social aggression. The reason for this unexpected result may be sampling bias, or data bias. Meanwhile, this result may be suggesting that perceived social support is difficult to effectively alleviate the relationship between depressive symptoms and social aggression in college students, and direct intervention of depressive symptoms or exploration of more important psychological mechanisms affecting the correlation between the two is a prerequisite for effective prevention.

Implications of the study

Findings of this study have certain theoretical and practical implications. Theoretically, these results help to enhance understanding of the mechanisms underlying the relationship between neuroticism and social aggression. Specifically, our data provide a novel emotion-based perspective on how neuroticism triggers social aggression, and extend current knowledge about the conditions under which the neuroticism-depression link is most likely to occur. Regarding practical application, our results perhaps hint at methods to prevent social aggression in college students. It seems that personality-based interventions that aim to improve individuals' emotional states and cultivate stable emotions is a valid method to reduce problematic outcomes. For example, High levels of neuroticism can be treated through mindfulness-based cognitive therapy [49]. Specifically, mindfulness interventions may help high levels of neuroticism individual to notice the occurrence of unhelpful mental processes, such as self-criticism, rumination, negative attitudes, avoidance, and cultivate individuals in developing more self-compassion, as well as the permission and acceptance of difficulties [49]. Intervening in individual's depression symptoms can also prevent social aggression. For example, physical activity can strengthen individuals' brain regions and neural circuits, improve mood and behavioral regulation [50], and thus, depression symptoms can be alleviated through physical activity interventions [51, 52]. In addition, it is also apparent that social support from parents, classmates, and teachers can help individuals who seek recognition and support from others to reduce social maladjustment and promote mental health [53]. Therefore, university teachers and staff should do their best to ensure that students know about the importance of building and maintaining a broad social support system, as this is a potentially valuable protective factor against negative outcomes, particularly among those high in neuroticism.

Limitations and future directions

The study was limited by a number of issues that may affect the interpretation of our results. First, the generalizability of the findings is limited by the fact that the study was conducted only with college students. In future, the research questions could be extended to other population groups such as groups of addicts, those incarcerated in penitentiaries with aggressive behavior, intimate couples in crisis, and other communities. Second, the study used a cross-sectional design, meaning that longitudinal or experimental studies are required to clarify any causal relationships. Third, our analysis was limited to the mediating role of depression symptoms and the moderating role of perceived social support. As such, there may be other important psychological mechanisms

at play that were not assessed here. Future research is needed to investigate theses additional mechanisms.

Conclusion

Results of this questionnaire study using a sample of undergraduates in China found that neuroticism is associated with social aggression and that this association is mediated by depression symptoms. This mediation effect was found to be moderated by perceived social support. Specifically, neuroticism is a stronger predictor of depression symptoms and social aggression in individuals with low compared to high perceived social support. Findings may be informative for those interested in designing prevention and intervention campaigns for social aggression, particularly among college students.

Acknowledgements
We would like to express our appreciation to all participants in this study.

Author contributions
B.W., Y.G. and Yi.G. wrote the main manuscript text. F.Q. and X.Y. substantively revised the work. All authors reviewed the manuscript.

Funding
This work was supported by the National Natural Science Foundation of China (No. 32360210); Guangxi Natural Science Foundation project(No.2022JJA140512); Guangxi Philosophy and Social Science Planning Research Project (No. 22FSH016); Innovation Project of Guangxi Graduate Education (No. XJCY2022014); Cross-science Training Project of Guangxi Normal University (No. 2021JC007).

Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
The study is in accordance with the Declaration of Helsinki, and was approved by the Research Project Ethical Review Application Form, Faculty of Psychology, Southwest University. The application date is December 20, 2017, and the approval number is H17024. Written informed consent was obtained from all participants in this study.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 20 May 2024 / Accepted: 6 August 2024
Published online: 16 August 2024

References

1. Li R, Xia LX. The mediating mechanisms underlying the longitudinal effect of trait anger on social aggression: testing a temporal path model. J Res Pers. 2020;88:104018. https://doi.org/10.1016/j.jrp.2020.104018
2. Liu XJ, Liu M. Relational aggression: invisible school violence. J Schooling Stud. 2020;17(1):34–40.
3. Coyne SM, Archer J, Eslea M. We're not friends anymore! unless… the frequency and harmfulness of indirect, relational, and social aggression. Aggressive Behav. 2006;32(4):294–307. https://doi.org/10.1002/ab.20126
4. Lei Y, Wang L, Zhou Z, Zhu X, Dou G. Association between ostracism and relational aggression: the role of self-esteem and implicit theories of personality. Chin J Clin Psychol. 2019;27(3):501–5. https://doi.org/10.16128/j.cnki.1005-3611.2019.03.015
5. Gong X, Quan F, Wang L, Zhu W, Lin D, Xia LX. The relationship among regional gray matter volume in the brain, Machiavellianism and social aggression in emerging adulthood: a voxel-based morphometric study. Curr Psychol. 2023;42(29):25160–70. https://doi.org/10.1007/s12144-022-03574-1
6. Costa P, McCrae RR. Revised NEO personality inventory (NEO PI-R) and NEO five-factor inventory, Odessa, Florida, FL. Psychological Assessment Resources Differences. 1992;35:1285–92.
7. Bettencourt BA, Talley A, Benjamin AJ, Valentine J. Personality and aggressive behavior under provoking and neutral conditions: A meta-analytic review. Psychological Bulletin. 2006;132(5):751–77. https://doi.org/10.1037/0033-2909.132.5.751
8. Liu S, Hu Y, Sun H. Mediating effect of neuroticism and coping styles between stress and depression. Chin J Clin Psychol. 2018;26(6):1230–3. https://doi.org/10.16128/j.cnki.1005-3611.2018.06.040
9. Anderson CA, Bushman BJ. Human aggression. Ann Rev Psychol. 2002;53:27–51. https://doi.org/10.1146/annurev.psych.53.100901.135231
10. Kokkinos CM, Kountouraki M, Voulgaridou I, Markos A. Understanding the association between Big Five and relational aggression: the mediating role of social goals and friendship jealousy. Pers Indiv Differ. 2020;160:109946. https://doi.org/10.1016/j.paid.2020.109946
11. Gardner BO, Boccaccini MT, Bitting BS, Edens JF. Personality assessment inventory scores as predictors of misconduct, recidivism, and violence: a meta-analytic review. Psychol Assess. 2015;27(2):534–44. https://doi.org/10.1037/pas0000065
12. Llorca A, Malonda E, Samper P. The role of emotions in depression and aggression. Med oral Patologia oral y Cir Bucal. 2016;21(5):559–64. https://doi.org/10.4317/medoral.21561
13. Sun JW, Xue JM, Bai HY, Zhang HH, Lin PZ, Cao FL. The association between negative life events, neuroticism and aggression in early adulthood. Pers Indiv Differ. 2016;102:139–44. https://doi.org/10.1016/j.paid.2016.06.066
14. Deason DL, Dahlen ER, Madson MB, Bullock-Yowell E. Five-factor model of personality, social anxiety, and relational aggression in college students. J Coll Student Dev. 2019;60(1):110–4. https://doi.org/10.1353/csd.2019.0007
15. Cassano P, Fava M. Depression and public health: an overview. J Psychosom Res. 2002;4:849–57. https://doi.org/10.1016/s0022-3999(02)00304-5
16. Barford KA, Smillie LD. Openness and other big five traits in relation to dispositional mixed emotions. Pers Indiv Differ. 2016;102:118–22. https://doi.org/10.1016/j.paid.2016.07.002
17. Barlett CP, Anderson CA. Direct and indirect relations between the big 5 personality traits and aggressive and violent behavior. Pers Indiv Differ. 2012;52(8):870–5. https://doi.org/10.1016/j.paid.2012.01.029
18. Kendler KS, Gatz M, Gardner CO, Pedersen NL. Personality and major depression: a Swedish longitudinal, population-based twin study. Arch Gen Psychiatry. 2006;63(10):1113–1120. https://doi.org/10.1001/archpsyc.63.10.1113
19. Walker EF, Diforio D. Schizophrenia: a neural diathesis-stress model. Psychol Rev. 1997;104(4):667–85. https://doi.org/10.1037/0033-295X.104.4.667
20. Williams AL, Craske MG, Mineka S, Zinbarg RE. Neuroticism and the longitudinal trajectories of anxiety and depressive symptoms in older adolescents. J Abnorm Psychol. 2021;130(2):126–40. https://doi.org/10.1037/abn0000638
21. Van der Giessen D, Branje S, Overbeek G, Frijns T, van Lier PAC, Koot HM, Meeus W. Co-occurrence of aggressive behavior and depressive symptoms in early adolescence: a longitudinal multi-informant study. Eur Rev Appl Psychol. 2013;63(4):193–201. https://doi.org/10.1016/j.erap.2013.03.001
22. Tisak J, Tisak MS, Baker ER, Amrhein KE, Jensen C. The association among parental bonding, depression, social aggression, and criminal assault: are there gender differences between male and female youth offenders? J Interpers Violence. 2021;36(3–4):1883–908. https://doi.org/10.1177/0886260517744192
23. Yavuzer Y, Albayrak G, Kılıçarslan S. Relationships amongst aggression, self-theory, loneliness, and depression in emerging adults. Psychol Rep. 2019;122(4):1235–58. https://doi.org/10.1177/0033294118784866
24. Dutton DG, Karakanta C. Depression as a risk marker for aggression: a critical review. Aggress Violent Beh. 2013;18(2):310–9. https://doi.org/10.1016/j.avb.2012.12.002
25. Kofler MJ, McCart MR, Zajac K, Ruggiero KJ, Saunders BE, Kilpatrick DG. Depression and delinquency covariation in an accelerated longitudinal sample of adolescents. J Consult Clin Psychol. 2011;79(4):458–69. https://doi.org/10.1037/a0024108

26. Blain-Arcaro C, Vaillancourt T. Longitudinal associations between depression and aggression in children and adolescents. J Abnorm Child Psychol. 2017;45(5):959–70. https://doi.org/10.1007/s10802-016-0204-2
27. Fite PJ, Stoppelbein L, Greening L, Preddy TM. Associations between relational aggression, depression, and suicidal ideation in a child psychiatric inpatient sample. Child Psychiatry Hum Dev. 2011;42(6):666–78. https://doi.org/10.1007/s10578-011-0243-4
28. Jin T, Wu Y, Zhang L, Yang X, Jia Y, Yang H. The effect of perceived chronic social adversity on aggression of college students: the roles of ruminative responses and perceived social support. Psychol Dev Educ. 2020;36(4):414–21. https://doi.org/10.16187/j.cnki.issn1001-4918.2020.04.04
29. Shen Y, Hu X, Ye B. The effect of stress on college students' depression: the mediating effect of perceived social support and coping style. Psychol Explor. 2018;3(38):267–72.
30. Zhang L, Xu J, Zhu A, Xie L, Li Y. Influence of perceived social support on college students' coping style: chain mediating effect of meaning in life and psychological resilience. China J Health Psychol. 2021;29(5):758–61. https://doi.org/10.13342/j.cnki.cjhp.2021.05.024
31. Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. Psychol Bull. 1985;98(2):310–57.
32. Fried Y, Tiegs RB. The main effect model versus buffering model of shop steward social support: a study of rank-and-file auto workers in the USA. J Organizational Behav. 1993;14(5):481–93. https://doi.org/10.1002/job.4030140509
33. Quan H, Ye M, He Z, Zhou H, Long F. Moderation effects of perceived society support between personality and mental healthy. Chin J Clin Psychol. 2007;6:598–600. https://doi.org/10.3969/j.issn.1005-3611.2007.06.013
34. Barry CT, Kauten RL, Lui JH. Self-perceptions of empathy and social support as potential moderators in the relation between adolescent narcissism and aggression. Individual Differences Res. 2014;12(4–A):170–9.
35. Su S, Quan F, Xia LX. Longitudinal relationships among interpersonal openness trait, hostile attribution bias, and displaced aggressive behaviour: big five treated as covariates. Int J Psychol. 2021;56(5):669–78. https://doi.org/10.1002/ijop.12745
36. Burt SA, Donnellan MB. Development and validation of the subtypes of antisocial behavior questionnaire. Aggress Behav. 2009;35(5):376–98. https://doi.org/10.1002/ab.20314
37. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. J Pers Assess. 1988;52(1):30–41. https://doi.org/10.1207/s15327752jpa5201_2
38. Wang X, Sun Y. The effect of perceived social support on adolescents' career adaptability: the chain mediating role of life purpose and personal growth initiative. Educ Meas Eval. 2024;4:84–97. https://doi.org/10.16518/j.cnki.emae.2024.04.008
39. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychol Meas. 1977;1(3):385–401. https://doi.org/10.1177/014662167700100
40. Zhang J, Wu Z, Fang G, Li J, Han B, Chen Z. Development of the Chinese age norms of CES-D in urban area. Chin Mental Health J. 2010;24(2):139–43.
41. Podsakoff PM, MacKenzie SB, Lee J-Y, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J Appl Psychol. 2003;88(5):879–903. https://doi.org/10.1037/0021-9010.88.5.879
42. Moroń M, Bochen A. Relational aggression in the context of personality metatraits. Pers Indiv Differ. 2024;230:112784. https://doi.org/10.1016/j.paid.2024.112784
43. Li Q, Xiao M, Song S, Huang Y, Chen X, Liu Y, et al. The personality dispositions and resting-state neural correlates associated with aggressive children. Soc Cognit Affect Neurosci. 2020;15(9):1004–16. https://doi.org/10.1093/scan/nsaa134
44. Bagby RM, Quilty LC, Ryder AC. Personality and depression. Can J Psychiatry. 2008;53(1):14–25. https://doi.org/10.1177/070674370805300104
45. Kendler KS, Kuhn J, Prescott CA. The interrelationship of neuroticism, sex, and stressful life events in the prediction of episodes of major depression. Am J Psychiatry. 2004;161(4):631–6. https://doi.org/10.1176/appi.ajp.161.4.631
46. Huang Y, Ma J, Zhang H. Neurotic personality and depression: chain mediator of expression suppression and stress perception in freshman. Chin J Clin Psychol. 2021;29(1):177–81. https://doi.org/10.16128/j.cnki.1005-3611.2021.01.036
47. Carlson GA, Cantwell DP. Unmasking masked depression in children and adolescents. Am J Psychiatry. 1980;137(4):445–9. https://doi.org/10.1176/ajp.137.4.445
48. Maliszewska K, Świątkowska-Freund M, Bidzan M, Preis K. Relationship, social support, and personality as psychosocial determinants of the risk for postpartum blues. Ginekologia Polska. 2016;87(6):442–7. https://doi.org/10.5603/gp.2016.0023
49. Armstrong L, Rimes KA. Mindfulness-based cognitive therapy for neuroticism (stress vulnerability): a pilot randomized study. Behav Ther. 2016;47(3):287–98. https://doi.org/10.1016/j.beth.2015.12.005
50. Belcher BR, Zink J, Azad A, Campbell CE, Chakravartti SP, Herting MM. The roles of physical activity, exercise, and fitness in promoting resilience during adolescence: effects on mental well-being and brain development. Biol Psychiatry Cogn Neurosci Neuroimaging. 2021;6(2):225–237. https://doi.org/10.1016/j.bpsc.2020.08.005
51. Barlow DH, Sauer-Zavala S, Carl JR, Bullis JR, Ellard KK. The nature, diagnosis, and treatment of neuroticism: back to the future. Clin Psychol Sci. 2014;2(3):344–65. https://doi.org/10.1177/2167702613505532
52. Stieger M, Robinson SA, Bisson AN, Lachman ME. The relationship of personality and behavior change in a physical activity intervention: the role of conscientiousness and healthy neuroticism. Pers Indiv Differ. 2020;166:110224. https://doi.org/10.1016/j.paid.2020.110224
53. Mukhtar S, Mukhtar S, Mahmood Z. A correlational approach to relational aggression: assessing individual, family and classroom variables/determinants of relational aggression among adolescents. Bahria J Prof Psychol. 2021;21(1):28–51.

Publisher's Note