



Social Exclusion and Depression among undergraduate students: the mediating roles of rejection sensitivity and social self-efficacy

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Abstract

Nowadays, depression has been a prominent mental health problem throughout the world. A common but negative social experience, social exclusion (also known as ostracism) is a great risk factor for individuals' health and adaptation. Undergraduate students are in a development period of challenges and transitions, so they are vulnerable to suffering from depression and negative social experiences. Against this background, the present study aimed to examine the association between social exclusion and undergraduate students' depression as well as the underlying mechanism - the mediating roles of rejection sensitivity and social self-efficacy. Seven hundred sixty-two undergraduate students were recruited to participate in this study, who were asked to complete a set of questionnaires measuring social exclusion, depression, rejection sensitivity, and social self-efficacy. After controlling for gender, social exclusion was positively associated with undergraduate students' depression. And rejection sensitivity and social self-efficacy could significantly mediate this relation through three mediating paths - the separate mediating effects of rejection sensitivity and social self-efficacy, as well as the serial mediating effect of rejection sensitivity and social self-efficacy. These results could not only deepen our understanding of this theme, but also have several practical implications for the intervention of depression, for example, relevant social skill training and cognitive therapy could be adopted to intervene the rejection sensitivity and social self-efficacy.

Keywords Social exclusion · Depression · Social self-efficacy · Rejection sensitivity · Undergraduate students

Introduction

Nowadays, depression has been a prominent mental health problem throughout the world, with more than 350 million people suffering from it. A meta-analysis revealed that the

prevalence of depression was as high as 12.9%, with the data of 1 million participants from 30 countries from 1994 to 2014 (Chen et al., 2013; Lei et al., 2016; Lépine & Briley 2011; Lim et al., 2018). Depression would cause harm to individuals' health and well-being, such as the absence of positive affect, physical fatigue, psychological pain, disrupted sleep and appetite (APA, 2013; Caroleo et al., 2019). What is worse, these detrimental effects may further impair their quality of life, aggravate suicidal ideation, and even lead to suicide (Conejero et al., 2018; Shumye et al., 2019). To some extent, it also creates a considerable burden on society due to these harmful influences (Lei et al., 2016; Lépine & Briley 2011) and may become the first medical burden by 2030 (Mathers & Loncar, 2006; WHO, 2017).

Against this background, depression and its influencing factors have been the focus of relevant research. As human is by nature social animal, good and harmonious interpersonal relationships are of great significance for individuals' health and well-being, while poor interpersonal relationships or negative social interaction experiences are harmful to individuals' adaptation (Brenner et al., 2013), such

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as leading to depression (Ara et al., 2017). Social exclusion (also defined as ostracism) is not only a common negative interpersonal experience in our daily life, but also one of the most alarming and unpleasant experiences for humans, with various negative effects on individuals' adaptation (Riva & Eck, 2016). For example, social exclusion, which means poor companionship and social connectedness, serves as a risk factor for loneliness (Park et al., 2020). Based on these, this study aimed to examine the association between social exclusion and depression as well as its underlying mechanism. At the same time, discussing this issue is more prominent under the background of the COVID-19 pandemic – on the one hand, the COVID-19 pandemic causes great negative influences (e.g., stress and negative emotions) and further increases the risk of depression (Ettman et al., 2020; Prowse et al., 2021; Salari et al., 2020); on the other hand, the COVID-19 pandemic also causes challenges for interpersonal relationships. For example, closed-off management may make people more likely to suffer from negative social experiences, especially for students (He et al., 2020; Ren et al., 2021; Wang et al., 2021).

In addition, though depression and social exclusion may exist among individuals of all ages, both of them are more prominent among undergraduate students. Regarding depression, emerging adults (ranging from 18 to 25 years old) are in an important period of transition, facing many pressures and challenges (Yavuzer et al., 2019; Zeng et al., 2021); in particular, undergraduate students are far away from home, and have to face and cope with various challenges (e.g., academic, interpersonal, and economic stress) alone (Chen et al., 2013; Ibrahim et al., 2013). As a result, they are more vulnerable to suffering from depression, and the prevalence among them was estimated to range from 23.8 to 42.66% (Khan et al., 2020; Lei et al., 2016). At the same time, undergraduate students tend to hold a strong motivation to seek social recognition and a sense of belonging through harmonious relationships with peers (Lee, 2011), and they are not only sensitive to but also more likely to be confronted with negative social experiences (e.g., social exclusion). As a result, this study aimed to examine the relationship between social exclusion and depression as well as its underlying mechanisms among undergraduate students.

Social exclusion and depression

Social exclusion, also termed as ostracism, refers to the phenomenon that someone experiences being left out by others or the breaking of social bonds or ties (Zeigler-Hill & Shackelford, 2020). It is a common and prominent negative phenomenon and experience in daily social life, making individuals feel less accepted, respected, and supported by others and greatly harming their health and adaptation

(Arslan, 2020; Li et al., 2018). It can not only damage the four fundamental human needs: belonging, self-esteem, control, and meaningful existence, but also induce various negative outcomes, such as lower self-esteem, psychological pain, social anxiety, loneliness, helplessness, and meaninglessness (Kumar et al., 2017; Riva et al., 2017).

Regarding depression, research suggested that social exclusion was a strong predictive factor for depression, and people who were socially excluded were more likely to suffer from depressive symptoms (Li et al., 2018; Niu et al., 2016). In spite of the robust relationship between social exclusion and depression, the underlying mechanism needs further examination, which is of great significance. In particular, the diathesis-stress model of depression indicated that the joint effect of individual diathesis and stress is an important factor leading to depression. Especially, stress may activate susceptibility to diathesis and further increase the risk of depression (Arnau-Soler et al., 2019). The cognitive model of depression further explained the diathesis as the negative cognitive tendency, defining these cognitive factors as the direct or near-end factors causing depression (Beck, 2002). Rejection sensitivity and social self-efficacy are not only individual diatheses but also important individual cognition factors, which may potentially underlie the impact of social exclusion on depression. Therefore, it is of great necessity to examine the roles of rejection sensitivity and social self-efficacy between social exclusion and depression.

The mediating role of rejection sensitivity

Rejection sensitivity refers to the fear of rejection and increased distress when experiencing rejection (Downey & Feldman, 1996), which has multiple negative influences on people's social interactions and relationships, because individuals sensitive to rejection are more likely to expect, perceive, and overreact to social rejection (Caculidis-Tudor et al., 2021; Downey & Feldman, 1996), and thus consider some neutral or vague social situations as negative or threatening ones (Berenson et al., 2009; Downey & Feldman, 1996; Downey et al., 1998). So, rejection sensitivity could make individuals vulnerable to various adaptation problems, including external problems (Gao et al., 2021) and internal problems such as depression (Gao et al., 2017).

At the same time, rejection sensitivity is also influenced by social experience, and relevant studies showed that rejection experience (parental rejection as well as peer rejection) could greatly increase individuals' rejection sensitivity (Rosenbach & Renneberg, 2014), and experiencing more discrimination also tended to expect future rejection (Feinstein et al., 2012). Frequent negative social experiences would lower the identification threshold and boost their

negative expectations for social interactions. Thus, repeated and frequent experiences of social exclusion confirm their negative expectations and perceptions and even make individuals more sensitive to social exclusion (Downey et al., 1998). According to the main points of the diathesis-stress model of depression (Arnau-Soler et al., 2019), stress would increase the risk of depression through the activation of susceptibility diathesis (Monroe & Simons, 1991). As discussed above, rejection sensitivity is an important individual diathesis (making individuals sensitive to rejection and thinking negatively) and social exclusion is a main and common form of social stress in daily life. Thus, frequent social exclusion may induce individuals to form rejection sensitivity, which may further make them experience more and suffer more from social exclusion (Bungert et al., 2015; Ehnvall et al., 2009). To some extent, it may become a vicious circle. Namely, social exclusion may induce individuals' rejection sensitivity and further increase the risk of depression. Previous studies have also verified the mediating role of rejection sensitivity in the influence of negative social experiences (e.g., experiencing more gossip, exclusion, and discrimination) on loneliness, social anxiety, and depression (Feinstein et al., 2012; Zimmer-Gembeck et al., 2014). Based on that theoretical and empirical evidence, it was hypothesized that rejection sensitivity could mediate the relationship between social exclusion and depression.

The mediating role of social self-efficacy

Social self-efficacy is another personal factor influencing depression. It refers to individuals' beliefs that they are capable of initiating social contact and developing new friendships, which is the concrete embodiment of self-efficacy in social life (Gecas, 1989; Smith & Betz, 2000). It was well established that social self-efficacy would promote positive interpersonal interaction and further benefit diversified indicators of social adaptation, such as happiness, high self-esteem, low social anxiety, and loneliness (Li et al., 2014; Raskauskas et al., 2015). Regarding depression, low social self-efficacy was also found to be a key risk contributing to depression (Ahmad et al., 2014; Hermann & Betz, 2006). Meanwhile, relevant studies also showed that self-efficacy could positively predict the mental component summary of quality of life for depressive patients, whereas disorder severity is the opposite (Choo et al., 2019).

At the same time, social self-efficacy was affected by daily social experiences - good social experiences could promote self-efficacy, while negative experiences (e.g., interpersonal conflict and social exclusion) could damage it. Specifically speaking, when encountering negative social experiences, individuals may develop a wrong self-perception - they are unacceptable by others, incapable of maintaining

a relationship, and even helpless (Abramson et al., 1989). Empirical studies also found that, as a kind of undesirable social experience, social exclusion was negatively related to social self-efficacy (Jian et al., 2018). In conclusion, social exclusion may decrease individuals' sense of social self-efficacy and increase the risk of depression. Namely, social self-efficacy may serve as a vital mediator between social exclusion and depression. Empirical studies also found that social self-efficacy mediated the relationship between social environmental factors (such as stressful life events and social relations) and depressive symptoms (Fiori et al., 2006; Maciejewski et al., 2000). This is also consistent with the cognitive model of depression, pointing out that the cognition (e.g., social self-efficacy) caused by environmental factors is the direct factor accounting for depression (Beck, 2002; Beck & Weishaar, 1989). Therefore, it was hypothesized that social self-efficacy could act as a mediator in the relationship between social exclusion and depression.

The serial mediating effect of rejection sensitivity and social self-efficacy

In addition, rejection sensitivity is closely associated with self-efficacy. Individuals with high rejection sensitivity would not only experience more negative social experiences, but also suffer more from it (Bungert et al., 2015; Ehnvall et al., 2009); at the same time, they would hold more negative beliefs about themselves and interpersonal relationships, such as the decrease in social self-efficacy and increase in social-anxiety, and further induce maladjustment and even depression (Ayduk et al., 2001; Butler et al., 2007; Kraines & Wells, 2017). In particular, individuals with rejection sensitivity pay more attention to negative social cues and experience more negative social experiences, thus experiencing lower social self-efficacy (Bungert et al., 2015). In other words, social exclusion was associated with depression through not only the separate mediating effects of rejection sensitivity and social self-efficacy, but also the serial mediating effect of rejection sensitivity and social self-efficacy.

In conclusion, combined with the cognitive model and the diathesis-stress model of depression, the present study constructed a serial mediation model (see Fig. 1) to examine the mechanisms underlying the relationship between social exclusion and depression among undergraduate students. Based on relevant empirical and theoretical evidence, the following hypotheses were pointed out (the hypothesized model was presented in Fig. 1):

H1. Social exclusion would be positively correlated with undergraduate students' depression.

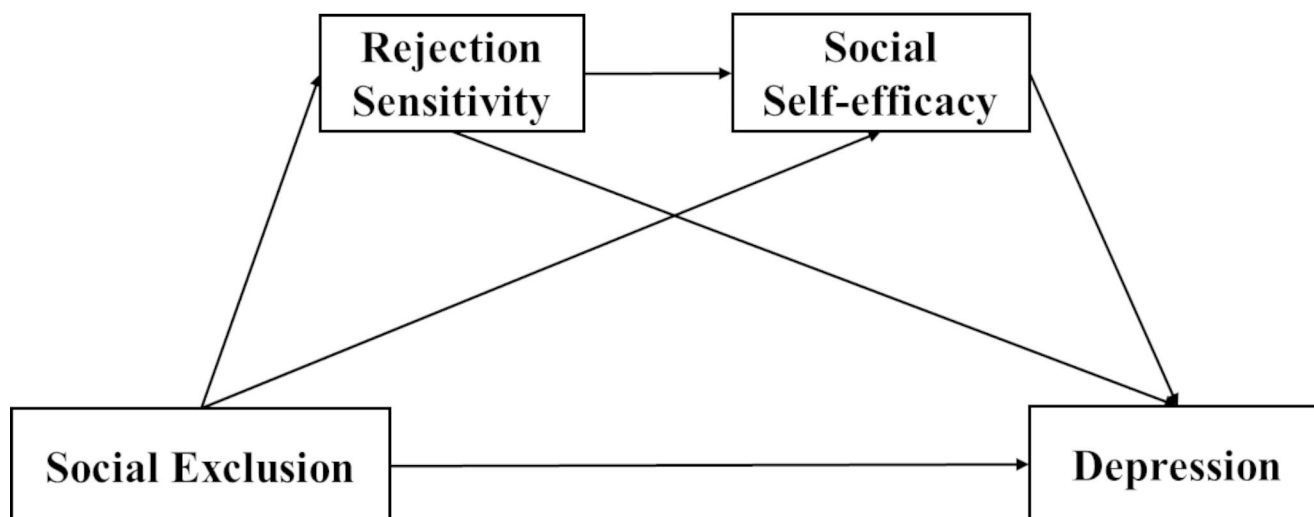


Fig. 1 The hypothesized serial mediation model

H2. Social exclusion would predict undergraduate students' depression via rejection sensitivity and social self-efficacy, respectively.

H3. Rejection sensitivity and social self-efficacy operated as serial mediators between social exclusion and undergraduate students' depression.

Methods

Participants

Eight hundred students were recruited randomly (through convenience sampling) from two public universities in central China, who were asked to participate in an online questionnaire survey. At last, 762 undergraduate students (40% male students) volunteered to participate in and complete the survey, whose ages ranged between 17 and 24 years ($M=19.06 \pm 1.34$ years). All participants signed informed consent before participating in the study.

Measurements

Social exclusion

The Chinese version (Niu et al., 2016) of the Ostracism Experience Scale for Adolescents (OES-A) was adopted to measure social exclusion in this study, which is a widely used measure to assess the social exclusion experiences among young teenagers, including adolescents and undergraduate students (Gilman et al., 2013). This scale consists of 11 items (e.g., In general, others ignore me; In general, others invite me to go out to eat with them), and participants were asked to respond on a 5-point Likert scale ranging

from 1 (*never*) to 5 (*always*). Higher scores indicate more experiences of social exclusion one encounters in daily life. Cronbach's alpha for this scale was 0.84 in this study.

Rejection sensitivity

The Chinese version (Li, 2007) of the Tendency to Expect Rejection Scale (Jobe, 2003) was used in this study. The scale is an 18-item (e.g., I'm very sensitive to rejection) self-reported instrument, and participants scored a 5-point Likert-type scale (from 1 "*strongly disagree*" to 5 "*strongly agree*"), with a higher score indicating greater sensitivity to rejection. Cronbach's alpha for this scale was 0.81.

Social self-efficacy

The revised Chinese version of the Adult Social Self-Efficacy Inventory (Fan et al., 2005) was adopted to assess individuals' social self-efficacy, which was first developed by Smith and Betz (2000). It includes 18 items (e.g., How much confidence do you have to strike up a conversation with someone you don't really know), and participants were asked to respond on a 5-point Likert scale (from 1 "*have no confidence at all*" to 5 "*have full confidence*"), with high scores indicating high levels of social self-efficacy. In this study, Cronbach's alpha for the scale was 0.83.

Depression

The Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D) was adopted in this study (Wang et al., 2013) to measure participants' depressive symptoms, which was originally created by the National Institute of Mental Health (Radloff, 1977). This scale consists of 20

Table 1 Descriptive statistics and intercorrelations between variables

	<i>M</i>	<i>SD</i>	1	2	3	4
1. Social exclusion	28.83	5.80	1			
2. Social self-efficacy	60.16	11.32	-0.54***	1		
3. Rejection sensitivity	60.33	7.40	0.24***	-0.30***	1	
4. Depression	34.79	9.42	0.44***	-0.37***	0.32***	1

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

items, and participants were asked to assess how often they have been bothered by each item over the last week on a 4-point Likert scale, with higher scores indicating more severe depressive symptoms. In this study, Cronbach’s alpha for the scale was 0.86.

Data analysis

SPSS 24.0 and the SPSS macro PROCESS (<http://www.afhayes.com>) suggested by Hayes (2016, 2017), were adopted to analyze the data. Firstly, descriptive statistics, mean differences, and correlations were calculated. Thereafter, Hayes’ (2016, 2017) SPSS macro PROCESS (Model 6) was used to test the present model, which is able to test both the mediating effect and the serial mediating effect in a single model. Furthermore, we used 5000 bias-corrected bootstrapped resampling to estimate the 95% confidence interval (without zero in the interval indicating the statistical significance) of the mediating effect. In the analyses, students’ gender was included as a control variable, as gender was found to be associated with depression and was usually adopted as a control variable in previous studies (Girgus & Yang, 2015; Ibrahim et al., 2013; Mahmudi et al., 2021).

Results

Descriptive statistics and correlation analysis

Means, standard deviations, and Pearson’s correlation analyses were summarized in Table 1. Social exclusion was

positively correlated with rejection sensitivity and depression ($r = 0.24, p < 0.001$; $r = 0.44, p < 0.001$, respectively), and negatively correlated with social self-efficacy ($r = -0.54, p < 0.001$). Social self-efficacy was negatively correlated with rejection sensitivity and depression ($r = -0.30, p < 0.001$; $r = -0.37, p < 0.001$, respectively). Rejection sensitivity was positively correlated with depression ($r = 0.32, p < 0.001$).

The serial mediation model analysis

The main results of the serial mediation analysis generated by Hayes’ (2016, 2017) SPSS macro PROCESS are presented in Table 2. As can be seen, after controlling for gender, social exclusion was positively associated with rejection sensitivity ($\beta = 0.23, p < 0.001$), and negatively associated with social self-efficacy ($\beta = -0.51, p < 0.001$). As can be seen from the dependent variable model for predicting depression, after controlling for gender, social exclusion was positively correlated with depression ($\beta = 0.30, p < 0.001$).

Then, a bootstrap program was adopted to further test and calculate the mediating effects found in our serial mediation model. It was found that all the three mediating paths did not include 0 in the 95% confidence interval, which means that each mediating path was significant. The total mediating effect value was 0.14; these three mediating paths accounted for 31.82% of the total effect of social exclusion on depression, which is the ratio of indirect effects to the total effects. The effect values for each mediating path are presented in Table 3.

Table 2 Testing the serial mediation effect of social exclusion and depression

Outcome	Predictors	<i>R</i> ²	<i>F</i>	β	<i>t</i>	LLCI	ULCL
Rejection sensitivity	Gender	0.07	29.19***	0.11	3.30**	0.04	0.17
	Social exclusion			0.23	7.01***	0.17	0.30
Social self-efficacy	Gender	0.34	131.08***	-0.13	-4.47***	-0.19	-0.07
	Social exclusion			-0.51	-16.63***	-0.58	-0.45
	RS			-0.18	-5.44***	-0.24	-0.11
Depression	Gender	0.27	70.50***	-0.14	-4.34***	-0.20	-0.07
	Social exclusion			0.30	7.95***	0.23	0.38
	RS			0.23	6.59***	0.16	0.30
	Social self-efficacy			-0.16	-4.10***	-0.23	-0.08

Note: N = 762, LL = low limit, CI = confidence interval, UL = upper limit. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. gender: 0 “male”, 1 “female”

Table 3 Total, direct and indirect effects of social exclusion (X) on depression (Y) through rejection sensitivity (M1) and social self-efficacy (M2) (N = 762)

Effect	Value	SE	LLCI	ULCI	Relative value
Total effects	0.44	0.03	0.01	0.38	
Direct effect	0.30	0.04	0.01	0.23	
Total indirect effect	0.14	0.02	0.10	0.19	31.82%
Model1 (X→M1→Y)	0.05	0.01	0.03	0.08	11.36%
Model2 (X→M2→Y)	0.08	0.02	0.04	0.12	18.18%
Model3 (X→M1→M2→Y)	0.01	0.01	0.01	0.01	2.27%

Discussion

Many scholars have increasingly recognized that social exclusion, as a negative or stressful social experience, would increase the risk of depression. However, much less is known about how social exclusion leads to depression. Based on relevant theoretical and empirical evidence, as well as the actual lives of undergraduate students, we constructed a serial mediation model to examine the mechanisms underlying the association between social exclusion and undergraduate students' depression. The present study indicated that the experience of being socially excluded in real life would increase individuals' rejection sensitivity and decrease their social self-efficacy, and finally increase the risk of depression. Especially, the mediating effects contain three mediating paths - the separate mediating effects of rejection sensitivity and social self-efficacy, as well as the serial mediating effect of rejection sensitivity and social self-efficacy.

The effect of social exclusion on depression

As hypothesized, social exclusion was significantly and positively associated with undergraduate students' depression. As a very negative and stressful experience in daily social life, social exclusion would evoke social and physical pain, which may further induce anxiety, sadness, and depression (Bungert et al., 2015; MacDonald & Leary, 2005). From the cradle to the retirement home, in school, in the workplace, and in online social networks, social exclusion may exist everywhere with serious harm to individuals (Eck & Riva, 2016). Especially, along with the development of online communication, social exclusion also expands into the online space or activities. Although online social exclusion is more illusory and uncertain than social exclusion in real life, it was also found to be closely associated with depression; and one thing that needs special attention is that, individuals who suffer from social exclusion in real life are often victims of online social exclusion (Niu et al., 2018; Sun et al., 2017), which may boast the negative influences

of social exclusion. Undergraduate students are faced with various interpersonal relationships, including relationships with their tutors, classmates, roommates, and so on (Chen et al., 2013; Ibrahim et al., 2013). Unfortunately, those complicated relationships mean that undergraduate students are more likely to experience negative social experiences such as social exclusion.

The mediating roles of rejection sensitivity and social self-efficacy

On this basis, this study further aimed to examine the mediating mechanisms - the mediating roles of rejection sensitivity and social self-efficacy. Firstly, the independent mediating effects of rejection sensitivity and social self-efficacy conform to Beck's cognitive model of depression (Beck, 2002; Beck & Weishaar, 1989). This theory indicates that negative life events (social exclusion) and cognition (the cognitive mechanisms of rejection sensitivity and social self-efficacy) are closely associated with depression; in particular, cognitive factors are the key and direct vulnerability factors contributing to depression (Beck & Weishaar, 1989). At the same time, individual cognition toward the environment (rejection sensitivity) and self (social self-efficacy) were developed and influenced by social experience (Jian et al., 2018). As a negative social experience, social exclusion makes individuals more sensitive to rejection and does great harm to their social self-efficacy (Sun et al., 2021). Individuals with high rejection sensitivity and low social self-efficacy are usually predisposed to interpret interpersonal events negatively, ruminate, and even lose faith in social interaction, all of which contribute to depression in the end.

To be more specific, when being excluded, individuals with rejection sensitivity tend to take the negative expectations for granted and adopt the inappropriate attributional style to evaluate themselves (Greening et al., 2005). That's to say, their false cognition would be reinforced, and they are more likely to be depressed. In terms of social self-efficacy, individuals with low social self-efficacy tend to have negative self-cognition and evaluation. Those dysfunctional beliefs are the direct and key factors leading to depression (Beck, 2010; DeRubeis et al., 2010). This finding is also consistent with the interpersonal risk model (Patterson & Capaldi, 1990), which postulates that good and harmonious interpersonal relationships could induce negative influences through social self-efficacy. However, social exclusion can impair interpersonal functioning by causing a decrease in social self-efficacy (Butler et al., 2007; Sun et al., 2021). Consequently, social exclusion not only leads to negative adaptation (e.g., depression), but also leads to a vicious cycle of negative interpersonal relationships, which further exacerbates the risk of depression. Therefore, this finding

confirmed that rejection sensitivity and social self-efficacy serve as significant mediating roles between social exclusion and depression.

In addition, it was also found that the serial mediating effect of rejection sensitivity and social self-efficacy in the relation between social exclusion and depression. Previous studies found a close association between rejection sensitivity and social self-efficacy (Sun et al., 2021). Especially, socially excluded individuals have higher rejection sensitivity, deeming some neutral social cues in their interpersonal interactions as negative or as social exclusion (Berenson et al., 2009; Downey & Feldman, 1996). What is worse, misunderstanding and responding to signals in interpersonal communication makes it more difficult for individuals to develop and maintain friendships (Downey & Feldman, 1996). Regrettably, rejection sensitivity would make individuals attribute the bad consequences to themselves, which in turn causes a decrease in their social self-efficacy (Greening et al., 2005). Besides, this finding is also consistent with the temporal need-threat model of ostracism (Saylor et al., 2013; Williams & Nida, 2011) - when individuals are socially excluded, their subsequent response could be divided into 3 stages: reflexive stage, coping stage and resignation stage, through which social exclusion would boost rejection sensitivity and damage social self-efficacy, and further induce negative outcomes (e.g., depression). At the first stage, the brain is alert to rejection cues and induces social pain (similar to physical pain to some extent). Moreover, the experience of social exclusion will also boost rejection sensitivity, making individuals overestimate the rejection experience and feel more pain. At the second stage, cognitive appraisals occur, namely ostracized individuals will repeatedly think about and estimate the exclusion experience. During this stage, individual factors do affect their reaction and desire to cope with it. Individuals with a high level of rejection sensitivity and social self-efficacy may overestimate the effect of social exclusion and do believe they are unable to cope with these kinds of things. If this continues, the last stage occurs, the individuals' resources for coping are depleted. From this perspective, individuals are incapable of resisting the detrimental consequences of social exclusion, and they may experience alienation, helplessness, unworthiness, and depression successively. Thus, social exclusion would boost rejection sensitivity, further damage individuals' social self-efficacy, and finally increase the risk of suffering from depression.

Implications and limitations

Our findings also have some theoretical and practical implications. Theoretically, first of all, this study firstly deepens our understanding of the influences and underlying

mechanisms of social exclusion on depression by revealing the mediating roles of rejection sensitivity and social efficiency from the perspective of social cognition. Secondly, these findings further highlight the adverse effect of social exclusion on undergraduate students. Practically, individuals with negative interpersonal relationships or social experiences, such as social exclusion, should be paid special attention. At the same time, it's of great importance to prevent and intervene with depression through interpersonal psychotherapy. In particular, relevant intervention procedures such as social skills training could be adopted to help students avoid being excluded (Markowitz & Weissman, 2004); and the relevant cognitive therapy could also be conducted to change their interpretation, attribution, and coping of negative social events (Adler et al., 2015), so as to reduce rejection sensitivity and increase social self-efficacy, and further reduce the risk of depression.

However, several limitations should also be acknowledged. First, the participants were Chinese undergraduate students, and relevant research suggested that collectivist culture more emphasizes the harmony of interpersonal relations (Chen et al., 2018). Future studies may examine the cultural differences with diverse participants. Secondly, with the widespread use of online interaction, people may encounter social exclusion in both real life and online space (Niu et al., 2018). Future studies can examine whether this model is applicable to online social exclusion and the interaction effect of them on individuals. Thirdly, the indirect effect is relatively small, suggesting that there may exist individual differences or other underlying mechanisms (especially the protective factors) that need further examination. For instance, the role of gender in this serial mediation model also needs further research, as evidenced by a post-hoc analysis we conducted by gender that suggested the serial mediation was present primarily for women, which bears further exploration.

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Data Availability The data that support the findings of this study are available from the Key Laboratory of Adolescent Cyberpsychology and Behavior (CCNU), but restrictions apply to the availability of these data, which were used under licence for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of the Key Laboratory of Adolescent Cyberpsychology and Behavior (CCNU).

Declarations

Conflict of Interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethical approval The study strictly complied with the Declaration of Helsinki and was approved by the Ethics Committee for Scientific Research at the first author's institution.

Informed consent Informed consent was obtained from all individual participants included in this study.

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