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ORIGINAL PAPER

Longitudinal Relationship Between Emotional Insecurity and Adolescent Mental Health: the Mediation of Rejection Sensitivity and Moderation of Dispositional Mindfulness

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Abstract

Objectives Mental health problems among adolescents are increasingly prominent. The negative effects of emotional insecurity on adolescent mental health have garnered empirical support. It is important to understand the psychological processes underlying this relationship. Using a longitudinal design, the present study aimed to reveal the explanatory mechanism of the association between emotional insecurity and mental health problems among Chinese adolescents by testing the mediating effect of rejection sensitivity and the moderating effect of dispositional mindfulness.

Methods The participants were 1156 Chinese adolescents (45.00% male; $M_{age} = 15.96$) who completed self-report questionnaires regarding emotional insecurity, rejection sensitivity, mental health problems (depression, anxiety, and stress), and dispositional mindfulness at three time points during the course of half a year (3-month interval).

Results The results showed that retrospective reports of emotional insecurity in wave 1 were positively associated with adolescent depression, anxiety, and stress in wave 3 and that rejection sensitivity in wave 2 partly mediated this association. Furthermore, dispositional mindfulness in wave 3 moderated the pathway from rejection sensitivity to later adolescent depression, anxiety, and stress in the mediated model. Specifically, the effect of high rejection sensitivity on mental health problems was weaker in adolescents who reported high dispositional mindfulness.

Conclusions Identifying the mechanisms by which emotional insecurity is associated with adolescent mental health problems over time has potential value for prevention and intervention.

Keywords Emotional insecurity · Rejection sensitivity · Mental health · Dispositional mindfulness · Longitudinal

Mental health problems are highly prevalent among adolescents worldwide and have long been a focus of society. As individuals in this developmental stage are at the turning period of physical and mental development, they face many pressures and contradictions, and the prevalence of mental health problems in these individuals is increasing (Liu et al., 2020). According to a survey of the mental health among 3965 adolescents in 10 middle schools in China, the prevalence of anxiety/depression in Chinese adolescents ranges from 30.7 to 42.3% (Ma et al., 2013). Depression and anxiety, as indicators of psychological maladjustment, can have adverse effects on individuals, such as impaired normal functioning, burnout, health problems, and suicidal ideation (Chen et al., 2013; Maurizi et al., 2013). They even have far-reaching and potentially long-lasting negative effects on families and the wider community (Burke et al., 2021). Therefore, it is worthwhile to identify factors that increase the risk of mental health problems in Chinese adolescents.

The family is the cradle of adolescents' physical and mental health development, and family-related risk factors are associated with adolescents' mental health problems (Bian et al., 2016). Adolescent emotional insecurity is a state of general unease mainly triggered by conflicting interparental marital relationships and improper parenting that leads

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to feelings of vulnerability or threat (Cummings & Davies, 1995), and it has many negative effects on and harms adolescent psychological adaptation. According to the emotional security theory, there are two processes involved in insecurity (Cummings & Davies, 1995; Cummings et al., 2012). One is the activation of emotions and behaviors in response to a situation, and the other is the formation of internal mental representations of the causes and consequences of a threat (Cummings & Davies, 1995; Cummings et al., 2012). Frequently triggered insecure reactions and mental representations render adolescents less able to regulate emotional and behavioral responses, influence subsequent perceptions of danger, and lead to an increased risk for mental health problems (Cummings & Davies, 1995; Cummings et al., 2012). Empirical research has revealed that individuals who experience emotional insecurity show more internalizing problems (Cummings et al., 2012). Further research has found that emotional insecurity is linked to internalizing problems such as depression, anxiety, withdrawal in adolescents (Alegre et al., 2014) and a longitudinal predictor of future internalizing problems in adolescents (Cummings et al., 2006). Both theoretical and empirical studies have shown that emotional insecurity is a risk factor that increases the possibility of mental health problems in adolescents.

Moreover, other constructs related to a negative cognitive-affective state that may account for the link between emotional insecurity and mental health problems, such as rejection sensitivity (Cardi et al., 2013), which has not yet been incorporated into the model despite being a key mediator of many mental disorders. Therefore, a purpose of the present study is to examine whether rejection sensitivity plays a mediating role in the relationship between emotional insecurity and adolescent mental health problems.

Rejection sensitivity is a cognitive-affective bias for readily perceiving, anxiously expecting, and negatively overreacting to rejection (Downey & Feldman, 1996). According to the rejection sensitivity theory (Levy et al., 2001), rejection sensitivity was originally conceptualized as a personality disposition that explains why some individuals (e.g., individuals with emotional insecurity) appear to be more likely to perceive rejection by others and to experience greater maladjustment (e.g., depression, anxiety, and stress) when rejection is perceived. On the one hand, emotional insecurity may have a potential connection with rejection sensitivity. Although prior research has rarely demonstrated a direct relationship between emotional insecurity and rejection sensitivity, there are two reasons supporting this link. First, the insecure emotional reactions and negative mental representations of the consequences of parental conflict may have a spill-over effect, resulting in anxious expectations and intense responses to general interpersonal communication in adolescents (Flook & Fuligni, 2008). Second, rejection sensitivity is thought to develop as a result of an individual's early experience of rejection, neglect, or abuse (Ayduk et al., 2008) and can also be explained as a state of a defensive motivational system in individuals with emotional insecurity (Downey et al., 2004; Romero-Canyas et al., 2010). Overall, it is reasonable to assume that emotional insecurity has a potential association with rejection sensitivity. On the other hand, high rejection sensitivity could help aggravate internalizing issues. For example, individuals with higher rejection sensitivity report more maladaptive expectations of and reactions to interpersonal rejection and other stressors (Zimmer-Gembeck & Nesdale, 2013; Zimmer-Gembeck et al., 2014). According to the cognitive-affective processing system, the chronic accessibility of maladaptive cognitive-affective units may cause individuals to distort their perception of a given situation, leading to maladaptive reactions (Eaton et al., 2009). Rejection sensitivity, as a cognitive-affective processing disposition, may also have similar negative effects. Furthermore, a growing body of literature has reported a close relationship between rejection sensitivity and depression, anxiety, and loneliness (Gao et al., 2017; Zimmer-Gembeck et al., 2016). Considering that emotional insecurity may be associated with high rejection sensitivity and that high rejection sensitivity in turn increases internalizing problems, this study speculated that rejection sensitivity plays a mediating role in the relationship between emotional insecurity and mental health problems.

In addition, perhaps some protective factors may act as a buffer of this process by which emotional insecurity increases adolescent mental health problems via high rejection sensitivity. In other words, even though emotional insecurity may increase rejection sensitivity, not all teenagers with high rejection sensitivity tend to have mental health problems. Previous studies have found that dispositional mindfulness plays a significant role in helping alleviate internalizing issues (An et al., 2019; Li et al., 2020), and it could alter the effect of rejection sensitivity on emotions and other outcomes (Heppner et al., 2008).

Dispositional mindfulness is defined as one's general tendency to attend to the present moment purposefully, nonjudgmentally, and nonreactively with openness and acceptance (Bishop et al., 2004; Brown & Ryan, 2003). According to the re-perceiving model of mindfulness, mindfulness can help people reperceive experiences moment-by-moment, facilitate cognitive and behavioral flexibility, eliminate habitual or impulsive responses, and facilitate adaptive responses to negative stimulations (Shapiro et al., 2006). Individuals with higher dispositional mindfulness are able to better accept internal and external experiences (Bishop et al., 2004). As such, they may experience rejection in a nonjudgmental and nonreactive way, thereby reducing the tendency to be overwhelmed by these experiences. Mindfulness-based interventions are effective in treating disorders characterized by rejection sensitivity, including social anxiety and other

emotional issues (Goldin & Gross, 2010). Individuals sensitive to rejection who can accept the occurrence of painful thoughts and rejection-related feelings without judgment may be able to recover faster and experience less of a lasting impact on emotion and function (Hafner et al., 2018; Peters et al., 2016). In contrast, if they ruminate on rejection events, engaging in self-critical and secondary elaborative processes about the rejection experiences, they may amplify their distress considerably. Therefore, dispositional mindfulness, a variable that "varies from person to person", may be a moderating factor in the mechanism underlying the relationship between rejection sensitivity and adolescent mental health problems.

The present study aimed to provide an explanatory mechanism for the association between emotional insecurity and adolescent mental health problems (depression, anxiety, and stress) by testing the mediating effect of rejection sensitivity and the moderating effect of dispositional mindfulness via a 3-wave longitudinal design. Based on psychological theories and past empirical research, the present study used a moderated mediation model to propose the following hypotheses: (a) emotional insecurity is positively associated with adolescent mental health problems; (b) greater emotional insecurity is associated with increased rejection sensitivity, which in turn is associated with a higher level of adolescent mental health problems; and (c) dispositional mindfulness buffers the second part of the mediation process, namely, the effect of rejection sensitivity on adolescent mental health problems. These results can inform efforts at prevention and intervention.

Method

Participants

Participants were recruited from two high schools in Gansu and Xinjiang, China. They were told that their participation was voluntary and that they could withdraw at any time during data collection. They were also required to complete the questionnaire independently, and were ensured that their privacy would be protected. The final sample consisted of 1156 adolescents ranging in age from 13 years old to 19 years (45% male; $M_{age} = 15.96$ years; SD = 0.97 years).

Procedure

The purpose of the study was highlighted before the survey, and informed consent forms were provided to all participants and their teachers and parents. The current study was a three-wave longitudinal study, conducted every 3 months. In wave 1, a total of 1266 adolescents (45.42% male, $M_{age} = 16.04$, SD = 0.96) were included in the baseline assessment. In wave 2, 1260 adolescents (99.53% of the original sample; 45.90% male) participated in the assessment. In wave 3, 1237 adolescents (97.71% of the original sample; 45.11% male) participated in the assessment. By matching the ID numbers, 1156 participants who participated in all 3 waves representing the current sample of the study. After each survey, we offered the participants a lecture on mental health for compensation at the request of the respondents' schools.

Measures

Emotional Insecurity

In wave 1, emotional insecurity was measured with the Security in the Interparental Subsystem Scales (SISs; Davies et al., 2002), on which adolescents rated their responses to interparental arguments. The Chinese version, which was revised by Wang et al. (2014) (the Cronbach's alpha value was 0.85), is a 17-item questionnaire consisting of two subscales: negative emotions (for example, "When my parents quarrel, I feel scared") and negative representations (for example, "When my parents quarrel, I worry about the future of my family"). Each item is rated using a Likert-type scale from 1 (never) to 4 (absolutely). The scores of items were summed to obtain an emotional insecurity score, with higher scores indicating higher levels of emotional insecurity. In the present study, the Cronbach's alpha value for the scale was 0.94.

Rejection Sensitivity

In wave 2, rejection sensitivity was measured with the Tendency to Expect Rejection Scale (TERS) devised by Jobe (2003). The Chinese version of the TERS has been shown to be reliable and valid, and it consists of 18 items (for example, "It's important for me to be accepted by the people around me") (Yang, 2017; the Cronbach's alpha value was 0.75). Each item is rated using a Likert-type scale from 1 (almost never) to 5 (almost always). The scores of the items were summed to obtain a rejection sensitivity score, with higher scores indicating higher levels of rejection sensitivity. In the present study, the internal consistency of the scale was good ($\alpha = 0.82$).

Mental Health

In wave 1 and wave 3, mental health was assessed by the Depression, Anxiety and Stress Scale (DASS; Lovibond & Lovibond, 1995), which contains 21 items in three subscales (depression, anxiety, and stress). The Chinese version of the DASS is considered reliable and valid (Gong et al., 2010; the Cronbach's alpha value were 0.77, 0.79, and 0.76, respectively). The depression (for example, "I lost

interest in everything"), anxiety (for example, "I'm scared for no reason"), and stress (for example, "I find it difficult to relax myself") (DAS) subscales were all made up of 7 items, with each item rated on a 4-point scale from 1 (never) to 4 (always). The scores for the depression, anxiety, and stress items were summed to obtain depression, anxiety, and stress scores, with higher scores indicating higher levels of depression, anxiety, and stress. In the present study, the Cronbach's alphas were 0.84, 0.81, and 0.78 in wave 1 and 0.86, 0.84, and 0.84 in wave 3.

Dispositional Mindfulness

In wave 3, dispositional mindfulness was measured using the Chinese version of the Child and Adolescent Mindfulness Measure (CAMM) (Liu et al., 2019; the Cronbach's alpha value was 0.81). The original CAMM (Greco et al., 2011) is a widely used scale that assesses adolescents' dispositional mindfulness. This scale comprises 10 items (for example, "I think that some of my feelings are bad and that I shouldn't have them"), and each item is rated using a Likert-type scale from 0 (almost never) to 4 (almost always). The items were reverse scored, and the scores were summed to obtain a mindfulness score, with higher scores indicating higher levels of dispositional mindfulness. In the present study, the internal consistency of the scale was good ($\alpha = 0.82$).

Data Analyses

All analyses were performed using SPSS 20.0. First, descriptive statistics and correlation analyses were conducted. Then, the mediation model and moderated mediation model were tested by using the SPSS macro PROCESS (Hayes, 2013), which has been widely used to test complex models, including the moderated mediation model (e.g., Liu et al., 2017).

Results

Descriptive Statistics and Correlation Coefficients

The descriptive statistics and correlation matrix are presented in Table 1. Emotional insecurity in wave 1 and rejection in wave 2 were positively associated with depression, anxiety, and stress in wave 1 and wave 3 and negatively associated with dispositional mindfulness in wave 3. Emotional insecurity in wave 1 was positively correlated with rejection sensitivity in wave 2. Dispositional mindfulness in wave 3 was negatively associated with depression, anxiety, and stress in wave 1 and wave 3. There were strong relations between depression, anxiety, and stress in wave 1 and wave 3 in adolescents.

Testing for the Mediation Model

As seen in Table 2, the results showed that retrospective reports of emotional insecurity collected in wave 1 were positively associated with depression ($\beta = 0.09$, $p < 0.001$), anxiety ($\beta = 0.11$, $p < 0.001$), and stress ($\beta = 0.12$, $p < 0.001$) in wave 3, even after including the depression, anxiety, and stress levels in wave 1 as a covariate. The direct path was still significant once the mediator was taken into account, indicating that the indirect association between emotional insecurity in wave 1 and depression, anxiety, and stress in wave 3 was partly mediated by rejection sensitivity in wave 2. Emotional insecurity in wave 1 positively predicted rejection sensitivity in

Table 1 Descriptive statistics and correlations between variables

Variables	1	2	3	4	5	6	7	8	9
1. T1 Emotional insecurity	—								
2. T2 Rejection sensitivity	0.31***	—							
3. T3 Depression	0.23***	0.34***	—						
4. T3 Anxiety	0.29***	0.41***	0.79***	—					
5. T3 Stress	0.28***	0.47***	0.77***	0.80***	—				
6. T3 Mindfulness	−0.29***	−0.46***	−0.56***	−0.58***	−0.65***	—			
7. T1 Depression	0.24***	0.30***	0.59***	0.50***	0.49***	−0.40***	—		
8. T1 Anxiety	0.32***	0.39***	0.51***	0.59***	0.53***	−0.44***	0.75***	—	
9. T1 Stress	0.29***	0.43***	0.48***	0.50***	0.58***	−0.46***	0.72***	0.80***	—
M	34.95	57.93	4.02	5.04	6.05	23.08	3.51	4.41	5.48
SD	11.73	10.00	3.84	4.02	3.99	6.38	3.52	3.65	3.67

T1 Emotional insecurity, emotional insecurity in wave 1; *T2 Rejection sensitivity*, rejection sensitivity in wave 2; *T3 Depression*, depression in wave 3; *T3 Anxiety*, anxiety in wave 3; *T3 Stress*, stress in wave 3; *T3 Mindfulness*, mindfulness in wave 3; *T1 Depression*, depression in wave 1; *T1 Anxiety*, anxiety in wave 1; *T1 Stress*, stress in wave 1. ***$p < 0.001$

Table 2 Mediation analysis

Dependent variable	Independent variable	T3 Depression			T3 Anxiety			T3 Stress		
		β	*t*	*p*	*β*	*t*	*p*	*β*	*t*	*p*
Outcome variables (T3 Depression, T3 Anxiety, T3 Stress) β										
	Constant	-0.00	-0.03	0.98	-0.00	-0.03	0.97	-0.00	-0.01	0.99
	Gender	-0.05	-1.94	0.05	-0.05*	-2.06	< 0.05	-0.03	-1.05	0.29
	Age	-0.00	-0.14	0.89	0.01	0.32	0.75	0.01	0.37	0.71
	T1 Outcome variables	0.57***	23.28	< 0.001	0.56***	22.44	< 0.001	0.54***	21.31	< 0.001
	T1 Emotional Insecurity	0.09***	3.74	< 0.001	0.11***	4.31	< 0.001	0.12***	4.81	< 0.001
Mediation variable: T2 Rejection sensitivity										
	Constant	0.00	0.01	0.99						
	T1 Emotional Insecurity	0.30**	10.84	< 0.001						
*Outcome variables (T3 Depression, T3 Anxiety, T3 Stress)** 10.84										
	Constant	−0.00	−0.03	0.97	−0.00	−0.04	0.96	−0.00	−0.03	0.98
	Gender	−0.07**	−3.14	< 0.01	−0.08***	−3.39	< 0.001	−0.06**	−2.66	< 0.01
	Age	0.01	0.24	0.81	0.02	0.75	0.45	0.03	1.24	0.22
	T1 Outcome variables	0.53***	21.31	< 0.001	0.49	19.24	< 0.001	0.44	16.87	< 0.001
	T1 Emotional Insecurity	0.05	1.99	< 0.05	0.06**	2.60	< 0.01	0.07**	2.77	< 0.01
	T2 Rejection sensitivity	0.18***	7.12	< 0.001	0.21***	8.09	< 0.001	0.27***	10.13	< 0.001

N = 1156. *T3 Depression*, depression in wave 3; *T3 Anxiety*, anxiety in wave 3; *T3 Stress*, stress in wave 3; *T1 Outcome variables*, depression/anxiety/stress in wave 1; *T1 Emotional insecurity*, emotional insecurity in wave 1; *T2 Rejection sensitivity*, rejection sensitivity in wave 2. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

wave 2 ($\beta = 0.30$, $p < 0.001$), which in turn positively predicted depression ($\beta = 0.18$, $p < 0.001$), anxiety ($\beta = 0.21$, $p < 0.001$), and stress ($\beta = 0.27$, $p < 0.001$) in wave 3.

The results (see Table 3) indicated that the mediation effects were significant (for depression: indirect effect = 0.06, $p < 0.001$, 95% CI [0.04, 0.08]; for anxiety: indirect effect = 0.06, $p < 0.001$, 95% CI [0.04, 0.09]; for stress: indirect effect = 0.08, $p < 0.001$, 95% CI [0.06, 0.10]). The mediation effect accounted for 66.67%, 54.54%, and 66.67% of the total effect. In addition, gender was significantly related to depression ($\beta = 0.07$, $p < 0.01$), anxiety ($\beta = 0.08$, $p < 0.001$), and stress ($\beta = 0.06$, $p < 0.01$) in wave 3 in this model.

Testing of the Moderated Mediation Model

The main results of the moderated mediation analysis by Hayes' (2013) SPSS macro PROCESS are presented in Table 4. As seen from the dependent variable model for predicting depression, anxiety, and stress in wave 3 after controlling for gender, age, and depression, anxiety, and stress in wave 1, rejection sensitivity in wave 2 was positively correlated with depression ($\beta = 0.05$, $p < 0.05$), anxiety ($\beta = 0.09$, $p < 0.01$), and stress ($\beta = 0.13$, $p < 0.001$) in wave 3, while the interaction between rejection sensitivity in wave 2 and dispositional mindfulness in wave 3 was negatively correlated with depression ($\beta = -0.06$, $p < 0.01$), anxiety ($\beta = -0.07$, $p < 0.001$), and stress ($\beta = -0.06$, $p < 0.01$) in wave 3. Namely, dispositional mindfulness in wave 3

Table 3 Bootstrapping indirect effect and 95% confidence interval (CI) for the mediation model

Indirect path	Estimated effect	95 CI		Ratio to total effect on outcome variables
		Lower	Upper	
EI → RS → T3 Depression	0.06[a]	0.04	0.08	66.67%
EI → RS → T3 Anxiety	0.6[a]	0.04	0.09	54.54%
EI → RS → T3 Stress	0.08[a]	0.06	0.10	66.67%

N = 1156; Bootstrap sample size = 5000; *CI* confidence interval. [a]Empirical 95% confidence interval does not overlap with zero. *EI*, emotional insecurity in wave 1; *RS*, rejection sensitivity in wave 2; *T3 Depression*, depression in wave 3; *T3 Anxiety*, anxiety in wave 3; *T3 Stress*, stress in wave 3

Table 4 Conditional process analysis

	β	*t*	*p*	*β*	*t*	*p*	*β*	*t*	*p*
Mediator variable model for predicting rejection sensitivity									
Constant	0.00	0.01	0.99						
Emotional insecurity	0.30***	10.18	< 0.001						
Dependent variable model	**T3 Depression 10.39**			**T3 Anxiety**			**T3 Stress**		
Constant	−0.03	−1.20	0.23	−0.03	−1.52	0.13	−0.03	−1.26	0.21
Gender	−0.10***	−4.34	< 0.001	−0.10***	−4.71	< 0.001	−0.09***	−4.18	< 0.001
Age	−0.02	−1.13	0.26	−0.02	−0.73	0.47	−0.00	−0.09	0.93
T1 Outcome variables	0.42***	11.92	< 0.001	0.39***	12.25	< 0.001	0.31***	10.24	< 0.001
T1 Emotional insecurity	−0.01	−0.15	0.88	0.02	0.93	0.35	0.01	0.02	0.61
T2 Rejection sensitivity	0.05*	1.98	< 0.05	0.09**	3.25	< 0.01	0.13***	5.26	< 0.001
T3 Mindfulness	−0.39***	−12.11	< 0.001	−0.38***	13.72	< 0.001	−0.46***	−16.42	< 0.001
T2 Rejection sensitivity × T3 Mindfulness	−0.06**	−2.63	< 0.01	−0.07***	−3.50	< 0.001	−0.06**	−3.29	< 0.01

N = 1156; *T3 Depression*, depression in wave 3; *T3 Anxiety*, anxiety in wave 3; *T3 Stress*, stress in wave 3, *T1 Outcome variables*, depression/anxiety/stress in wave 1, *T1 Emotional insecurity*, emotional insecurity in wave 1; *T2 Rejection sensitivity*, rejection sensitivity in wave 2; *T3 Mindfulness*, mindfulness in wave 3. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

moderated the association between rejection sensitivity in wave 2 and depression, anxiety, and stress in wave 3.

To better understand the moderating effect of dispositional mindfulness in wave 3, plots of the relationship between rejection sensitivity in wave 2 and depression, anxiety, and stress in wave 3 at lower (1 SD below the mean) and higher (1 SD above the mean) levels of dispositional mindfulness in wave 3 were generated, as shown in Fig. 1. As shown in Fig. 1, for adolescents with a low level (− 1 SD) of dispositional mindfulness in wave 3, rejection sensitivity in wave 2 was positively associated with depression ($\beta = 0.27$, $p < 0.01$), anxiety ($\beta = 0.31$, $p < 0.001$), and stress ($\beta = 0.36$, $p < 0.001$) in wave 3, while these associations ($\beta = 0.22$, $p < 0.01$; $\beta = 0.25$, $p < 0.01$; $\beta = 0.30$, $p < 0.001$) were weaker for adolescents with a high level (+ 1 SD) of dispositional mindfulness in wave 3.

Discussion

Using a half-year longitudinal design, the present study found that retrospective reports of emotional insecurity predicted depression, anxiety, and stress in Chinese adolescents not only directly but also indirectly through the mediation of rejection sensitivity. In addition, the indirect effect was moderated by dispositional mindfulness (i.e., dispositional mindfulness moderated the second half of the model—the link between rejection sensitivity and depression, anxiety, and stress). Specifically, high rejection sensitivity was a stronger risk factor for lower mindfulness in adolescents.

In general, the present study found that emotional insecurity could significantly predict depression, anxiety, and

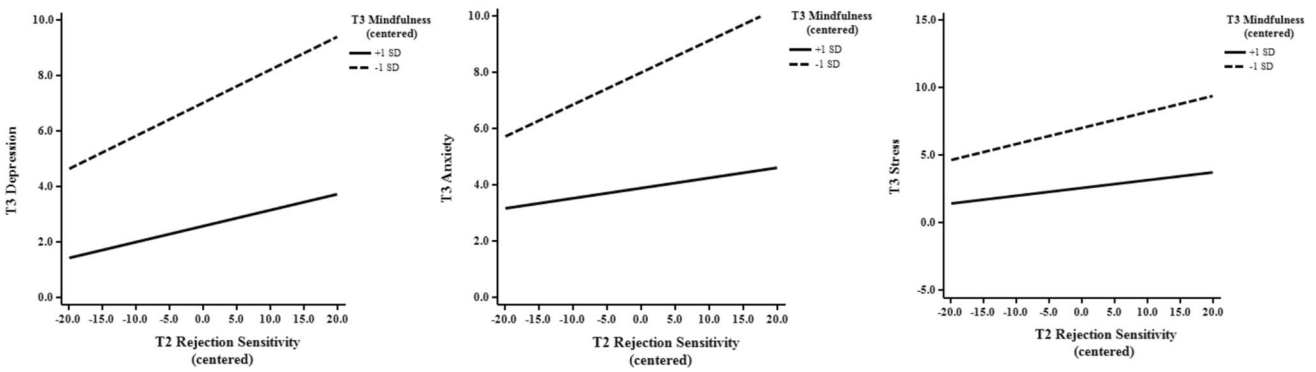

Fig. 1 Simple slopes of the interaction effect. T3 Mindfulness × T2 Rejection sensitivity. T3 Depression, depression in wave 3; T3 Anxiety, anxiety in wave 3; T3 Stress, stress in wave 3, T2 Rejection sensitivity, rejection sensitivity in wave 2; T3 Mindfulness, mindfulness in wave 3

stress in adolescents 6 months later. This result is consistent with previous longitudinal studies (Cummings et al., 2006). This result also coincides with the emotional security theory (Davies & Cummings, 1994), which proposes that experiences in the family influence adolescents' mental representations of safety, stability, and predictability, which have a bearing on these developmentally critical processes of problem internalization. In addition, insecure representations of negative experiences, as a guide to maladjustment, lead to parallel failures in different relationships or settings (Harold et al., 2004), which confirms self-defeating and internalizing thoughts. The present study used empirical research to verify clinical observations and the theoretical hypothesis that emotional insecurity may significantly predict adolescent mental health.

In addition, when adolescent emotional insecurity increases and the increase in internalizing problems, there is deepening of problem internalization due to an increase in rejection expectations and rejection reactions in social scenes. Consistent with the above assumption, the present study found that emotional insecurity significantly predicts rejection sensitivity and that rejection sensitivity partially mediates the associations between emotional insecurity and depression, between emotional insecurity and anxiety, and between emotional insecurity and stress. For the first stage of the mediation process (i.e., the association between emotional insecurity and rejection sensitivity), the findings confirmed that family experiences spillover in adolescents' daily lives (Flook & Fuligni, 2008). Insecure emotional reactions and negative mental representations of parental relationships may foster general concerns about negative social evaluation, lead to negative expectations of adolescents' general interpersonal communication, and thus result in higher levels of sensitivity to being rejected (Paoli et al., 2017). Moreover, the results suggest that rejection sensitivity may be a defensive motivational system in individuals with emotional insecurity. When emotion insecurity is a threat, activation of the rejection sensitivity system prepares individuals to detect signs of social threat and be ready for immediate action to avert the danger by being self-defensive (Downey et al., 2004). Thus, adolescents who experienced emotional insecurity are more likely to develop rejection sensitivity. For the second stage of the mediation process (i.e., the association between rejection sensitivity and mental health problems), the result coincides with the Cognitive-affective Processing System (Eaton et al., 2009). This suggests that the chronic accessibility of rejection sensitivity may cause individuals to distort their perception of a given situation, leading to maladaptive reactions such as symptoms of depression, anxiety, and stress (Eaton et al., 2009). Furthermore, a high sensitivity to interpersonal changes and fear of interpersonal rejection may lead to unhealthy coping patterns such as emotional suppression, denial, and other emotional avoidance strategies (Zimmer-Gembeck & Skinner, 2015; Zimmer-Gembeck et al., 2016), which seem to be related to prolonged internalizing symptoms over time (Zimmer-Gembeck, 2015).

As expected, the present study also found that dispositional mindfulness moderated the pathway from rejection sensitivity to later adolescent mental health problems (the second part of the mediation process). Specifically, in adolescents with high rejection sensitivity, those with higher dispositional mindfulness were more inclined than those with lower dispositional mindfulness to experience attention of mental health problems later. In other words, higher dispositional mindfulness is a protective factor against the negative impact of rejection sensitivity on mental health problems in adolescents. Considering the re-perceiving model of mindfulness (Shapiro et al., 2006), adolescents with a higher level of mindfulness adopt a decentralized adaptive response to stress assessment and eliminate habitual or impulsive responses, which significantly attenuates adolescents' vulnerability to internalizing problems. In addition, dispositional mindfulness provides protection specifically against responses to perceived rejection (Hafner et al., 2018). The ability to process experiences in a nonjudgmental, nonevaluative manner can reduce the possibility of rejection and catastrophic ideas fusing. The ability of nonreactivity training to personal experience may reduce the automatic and reflective response to rejection, and in favor of more reflective and adaptive responses (Peters et al., 2016). Thus, bringing mindful awareness to one's experiences may provide a buffer for experiences of negative affect in individuals with high rejection sensitivity.

These findings provide support for the rejection sensitivity theory, which proposes that those with a stronger sense of emotional insecurity have a higher level of rejection sensitivity and are more prone to experiencing internalizing problems (Levy et al., 2001). Fortunately, if the individual has a high level of mindfulness, it may buffer the adverse consequences of high rejection sensitivity. This is encouraging, as mindfulness may meaningfully relate to the daily challenges experienced by this population (Peters et al., 2016). For example, Goldin and Gross (2010) described mindfulness-based interventions may buffer against negative emotional responding by modifying cognitive–affective processes. This suggests that improving the level of mindfulness in this population may be a beneficial focus for future intervention.

Limitations and Future Directions

Some limitations need to be discussed when interpreting the findings of this study. First, the causal relationship—that emotional insecurity leads to increased rejection sensitivity and then contributes to maladjustment—cannot be

definitively proven by the present research design. Future research may adopt an experimental plan to eliminate this limitation. Second, the 3-month interval between each wave may have been too short to assess the stability and change in the relationship between the key variables in this study. Future research should adopt a longitudinal design, covering a longer period to better capture actual development changes. Third, the data were self-ratings, and thus the results could have been affected by social desirability and common method bias. Future research should use multiple informants (e.g., peers, teachers, and parents) to increase the validity of the findings. Fourth, although the content of the mental health lectures after each survey did not address the main variables of the present study, it may have alleviated the participants' psychological stress to some extent compared with the adolescents who did not receive the mental health lectures. Therefore, future studies should be strictly controlled to prevent additional factors from influencing the results.

Moreover, although the Chinese version of the CAMM has been well validated, the understanding of key words frequently used in mindfulness measures is dependent on previous meditation experience and/or familiarity with mindfulness practice, and also, that the concordance between how mindful a person thinks he/she is and his/her true level of mindfulness may not necessarily be sufficiently accurate (Grossman & Van Dam, 2011). Controlling the meditation experience of adolescents and shifting the paradigm in new forms of concurrent scientific exploration of the subjective and objective, such as the concurrent of subjective mindfulness measurement and randomized control trials implementing mindfulness programs, are therefore required in future research. Finally, the participants were chosen from only two high schools in China, limiting the ability to generalize the findings to adolescents in other areas. Future research should include cross-cultural samples to test the generalizability of the present results.

Author Contributions SY designed and executed the study, assisted with recruitment of participants, conducted data analysis, and wrote the paper. JPS collaborated with the design of the study, recruited participants, conducted data cleaning, and edited the paper. JYH collaborated with the design of the study, and assisted with recruitment of participants. SYF collaborated with the theoretical conceptualization, design, and execution of the study, and assisted with data collection and the editing of the final manuscript. WX supervised the process and acquired foundation for this study. All authors approved the final version of the manuscript for submission.

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Data Availability All data are available at the Open Science Framework (https://osf.io/9qt43/).

Declarations

Ethics Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the Biomedical Research Institutional Review Board of Beijing Normal University and with the 1964 Helsinki declaration and its later amendments or comparable ethical standard.

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

Conflict of Interest The authors declare no competing interests.

References

Alegre, A., Benson, J. M., & Perez-Escoda, N. (2014). Maternal warmth and early adolescents' internalizing symptoms and externalizing behavior: Mediation via emotional insecurity. *Personality & Individual Differences, 60*, 24–47. https://doi.org/10.1016/j.paid.2013.07.077

An, Y., Fu, G., Yuan, G., Zhang, Q., & Xu, W. (2019). Dispositional mindfulness mediates the relations between neuroticism and post-traumatic stress disorder and depression in Chinese adolescents after a tornado. *Clinical Child Psychology and Psychiatry, 24*(3), 482–493. https://doi.org/10.1177/1359104518822672

Ayduk, Ö., Zayas, V., Downey, G., Cole, A. B., Shoda, Y., & Mischel, W. (2008). Rejection sensitivity and executive control: Joint predictors of borderline personality features. *Journal of Research in Personality., 42*(1), 151–168. https://doi.org/10.1016/j.jrp.2007.04.002

Bian, Y. F., Liang, L. C., & Zhang, Y. (2016). Effects of family on children's mental development. *Journal of Beijing Normal University (social Sciences), 61*(5), 46–54.

Bishop, S. R., Lau, M. A., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., Velting, D., & Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241. https://doi.org/10.1093/clipsy/bph077

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Burke, K., Dittman, C. K., Forbes, E. J., & Eggins, E. (2021). PROTOCOL: a systematic review and meta-analysis of randomised controlled trials evaluating the impact of parenting programmes for parents of adolescents (10–18 years) on adolescent mental health outcomes, positive development and the parent–adolescent relationship. *Campbell Systematic Reviews*, *17*, e1146. https://doi.org/10.1002/cl2.1146

Cardi, V., Di Matteo, R., Corfield, F., & Treasure, J. (2013). Social reward and rejection sensitivity in eating disorders: An investigation of attentional bias and early experiences. *World Journal of Biological Psychiatry, 14*, 622–633. https://doi.org/10.3109/15622975.2012.665479

Chen, J., Liu, J. T., Wang, Y., Yang, Y., & Zhang, Y. (2013). A structural equation model of personality traits, depression, anxiety and suicidal ideation among senior high students. *Chinese Journal of School Health, 34*(3), 291–294. https://doi.org/10.16835/j.cnki.1000-9817.2013.03.013

Cummings, E. M., & Davies, P. T. (1995). The impact of parents on their children: An emotional security perspective. *Annals of Child Development: A Research Annual, 10*, 167–208.

Cummings, E. M., George, M. R. W., McCoy, K., & Davies, P. T. (2012). Interparental conflict in kindergarten and adolescent adjustment: Prospective investigation of emotional security as an explanatory mechanism. *Child Development, 83*, 1703–1715. https://doi.org/10.1111/j.1467-8624.2012.01807.x

Cummings, E. M., Schermerhorn, A. C., Davies, P. T., Goeke-Morey, M. C., & Cummings, J. S. (2006). Interparental discord and child adjustment: Prospective investigations of emotional security as an explanatory mechanism. *Child Development, 77*, 132–152. https://doi.org/10.1111/j.1467-8624.2006.00861.x

Davies, P. T., & Cummings, M. E. (1994). Marital conflict and child adjustment: An emotional security hypothesis. *Psychological Bulletin, 116*, 387–411. https://doi.org/10.1037//0033-2909.116.3.387

Davies, P. T., Forman, E. M., Rasi, J. A., & Stevens, K. I. (2002). Assessing children's emotional security in the interparental relationship: The security in the interparental subsystem scales. *Child Development, 73*, 544–562. https://doi.org/10.1111/1467-8624.00423

Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology, 70*(6), 1327–1343. https://doi.org/10.1037/0022-3514.70.6.1327

Downey, G., Mougios, V., Ayduk, O., London, B. E., & Shoda, Y. (2004). Rejection sensitivity and the defensive motivational system: Insights from the startle response to rejection cues. *Psychological Science, 15*(10), 668–673. https://doi.org/10.1111/j.0956-7976.2004.00738.x

Eaton, N. R., South, S. C., & Krueger, R. F. (2009). The cognitive-affective processing system (caps) approach to personality and the concept of personality disorder: Integrating clinical and social-cognitive research. *Journal of Research in Personality, 43*(2), 208–217. https://doi.org/10.1016/j.jrp.2009.01.016

Flook, L., & Fuligni, A. J. (2008). Family and school spillover in adolescents' daily lives. *Child Development*, *79*(3), 776–787. https://doi.org/10.1111/j.1467-8624.2008.01157.x

Gao, S., Assink, M., Cipriani, A., & Lin, K. (2017). Associations between rejection sensitivity and mental health outcomes: A meta-analytic review. *Clinical Psychology Review, 57*, 59–74. https://doi.org/10.1016/j.cpr.2017.08.007

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*(1), 83–91. https://doi.org/10.1037/a0018441

Gong, X., Xie, X. Y., Xu, R., & Luo, Y. J. (2010). Psychometric properties of the Chinese versions of DASS-21 in Chinese college students. *Chinese Journal of Clinical Psychology, 18*(4), 443–446. https://doi.org/10.16128/j.cnki.1005-3611.2010.04.020

Greco, L. A., Baer, R. A., & Smith, G. T. (2011). Assessing mindfulness in children and adolescents: Development and validation of the Child and Adolescent Mindfulness Measure (CAMM). *Psychological Assessment, 23*(3), 606–614. https://doi.org/10.1037/a0022819

Grossman, P., & Van Dam, N. T. (2011). Mindfulness, by any other name...: trials and tribulations of Sati in Western psychology and science. *Contemporary Buddhism, 12*(1), 219–239.

Hafner, N., Pepping, C. A., & Wertheim, E. H. (2018). Dispositional mindfulness, rejection sensitivity, and behavioural responses to rejection: The role of emotion regulation. *Australian Journal of Psychology, 71*(2), 163–172. https://doi.org/10.1111/ajpy.12224

Harold, G. T., Shelton, K. H., Goeke-Morey, M. C., & Cummings, E. M. (2004). Marital conflict, child emotional security about family relationships and child adjustment. *Social Development, 13*(3), 350–376. https://doi.org/10.1111/j.1467-9507.2004.00272.x

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.

Heppner, W. L., Kernis, M. H., Lakey, C. E., Campbell, W. K., Goldman, B. M., Davis, P. J., & Cascio, E. V. (2008). Mindfulness as a means of reducing aggressive behavior: Dispositional and situational evidence. *Aggressive Behavior, 34*(5), 486–496. https://doi.org/10.1002/ab.20258

Jobe, R. L. (2003). *Emotional and physiological reactions to social rejection: the development and validation of the tendency to expect rejection scale and the relationship between rejection expectancy and responses to exclusion* (Doctorial dissertation). The University of Tennessee.

Levy, S. R., Ayduk, O., & Downey, G. (2001). The role of rejection sensitivity in people's relationships with significant others and valued social groups. In M. R. Leary (Ed.), *Interpersonal rejection* (pp. 251–289). Oxford University Press.

Li, Y. F., Sun, W. X., Sun, X. J., Sun, J., Yang, D. M., Jia, B. L., & Yuan, B. (2020). Effects of mindfulness meditation on anxiety, depression, stress, and mindfulness in nursing students: A meta-analysis and trial sequential analysis of randomized controlled trials. *Frontiers of Nursing, 7*(1), 63–73.

Liu, Q. Q., Zhou, Z. K., Yang, X. J., Kong, F. C., Niu, G. F., & Fan, C. Y. (2017). Mobile phone addiction and sleep quality among Chinese adolescents: A moderated mediation model. *Computers in Human Behavior, 72*, 108–114. https://doi.org/10.1016/j.chb.2017.02.042

Liu, W., Zhang, N., Yu, Z. Y., Zhang, J. Y., & Che, H. B. (2020). Emotion regulation and mental health in children and adolescents: a meta-analysis. *Chinese Journal of Clinical Psychology, 28*(05), 1002–1008. https://doi.org/10.16128/j.cnki.1005-3611.2020.05.029

Liu, X. F., Chi, X. L., Zhang, J. T., Duan, W. J., & Wen, Z. K. (2019). Validation of Child and Adolescent Mindfulness Measure (CAMM) in Chinese Adolescents. *Psychological Exploration, 39*(03), 250–256.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales*. Psychology Foundation.

Ma, J., Yu, S. Y., Liang, S., Ding, J., Feng, Z., Yang, F., Gao, W. J., Lin, J. N., Huang, C. X., Liu, X. J., & Su, L. Y. (2013). An anxious and non-anxious survey among depressive middle school students in Changsha. *Chinese Journal of Clinical Psychology, 21*(5), 708–712. https://doi.org/10.16128/j.cnki.1005-3611.2013.05.041

Maurizi, L. K., Grogan-Kaylor, A., Granillo, M. T., & Delva, J. (2013). The role of social relationships in the association between adolescents' depressive symptoms and academic achievement. *Children & Youth Services Review, 35*(4), 618–625. https://doi.org/10.1016/j.childyouth.2013.01.006

Paoli, T. D., Fuller-Tyszkiewicz, M., Halliwell, E., Puccio, F., & Krug, I. (2017). Social rank and rejection sensitivity as mediators of the relationship between insecure attachment and disordered eating. *European Eating Disorders Review: THe Journal of the Eating Disorders Association, 25*(6), 469–478. https://doi.org/10.1002/erv.2537

Peters, J. R., Eisenlohr-Moul, T. A., & Smart, L. M. (2016). Dispositional mindfulness and rejection sensitivity: The critical role of nonjudgment. *Personality & Individual Differences, 93*, 125–129. https://doi.org/10.1016/j.paid.2015.06.029

Romero-Canyas, R., Downey, G., Berenson, K., Ayduk, O., & Kang, N. J. (2010). Rejection sensitivity and the rejection-hostility link in romantic relationships. *Journal of Personality, 78*(1), 119–148. https://doi.org/10.1111/j.1467-6494.2009.00611.x

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373–386. https://doi.org/10.1002/jclp.20237

Wang, M. Z., Fan, C. Y., Zhou, Z. K., & Chen, W. (2014). Parental conflict affects adolescents' depression and social anxiety: Based on cognitive-contextual and emotional security theories. *Acta*

Psychologica Sinica, 46(01), 90–100. https://doi.org/10.3724/SP.J.1041.2014.00090

Yang, Y. L. (2017). *The analysis on the relationship among rejection sensitivity, friendship quality, self esteem and loneliness of high school students* (Master's thesis). Harbin Normal University.

Zimmer-Gembeck, M. J. (2015). Emotional sensitivity before and after coping with rejection: A longitudinal study. *Journal of Applied Developmental Psychology, 41*, 28–37. https://doi.org/10.1016/j.appdev.2015.05.001

Zimmer-Gembeck, M. J., & Nesdale, D. (2013). Anxious and angry rejection sensitivity, social withdrawal, and retribution in high and low ambiguous situations. *Journal of Personality, 81*(1), 29–38. https://doi.org/10.1111/j.1467-6494.2012.00792.x

Zimmer-Gembeck, M. J., Nesdale, D., Webb, H. J., Khatibi, M., & Downey, G. (2016). A longitudinal rejection sensitivity model of depression and aggression: Unique rules of anxiety, anger, blame, withdrawal, and retribution. *Journal of Abnormal Child Psychology, 44*, 1291–1307. https://doi.org/10.1007/s10802-016-0127-y

Zimmer-Gembeck, M. J., & Skinner, E. A. (2015). Adolescent vulnerability and the distress of rejection: Associations of adjustment problems and gender with control, emotions, and coping. *Journal of Adolescence, 45*, 149–159. https://doi.org/10.1016/j.adolescence.2015.09.004

Zimmer-Gembeck, M. J., Trevaskis, S., Nesdale, D., & Downey, G. (2014). Relational victimization, loneliness, and depressive symptoms: Indirect associations via self and peer reports of rejection sensitivity. *Journal of Youth and Adolescence, 43*, 568–582. https://doi.org/10.1007/s10964-013-9993-6