

Negative Attachment Cognitions and Emotional Distress in Mainland Chinese Adolescents: A Prospective Multiwave Test of Vulnerability-Stress and Stress Generation Models

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The present study examined the relation between attachment cognitions, stressors, and emotional distress in a sample of Chinese adolescents. Specifically, it was examined whether negative attachment cognitions predicted depression and anxiety symptoms, and if a *vulnerability-stress* or *stress generation* model best explained the relation between negative attachment cognitions and internalizing symptoms. Participants included 558 adolescents (310 females and 248 males) from an urban school in Changsha and 592 adolescents (287 female, 305 male) from a rural school in Liuyang, both in Hunan province located in mainland China. Participants completed self-report measures of negative attachment cognitions at baseline, and self-report measures of negative events, depression symptoms, and anxiety symptoms at baseline and at regular 1-month intervals for an overall 6-month follow-up (i.e., six follow-up assessments). Higher levels of

The research reported in this article was supported, in part, by a research grant from the Canadian Psychiatric Research Foundation awarded to John R. Z. Abela.

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negative attachment cognitions predicted prospective depression and anxiety symptoms. Furthermore, support was found for a stress generation model that partially mediated this longitudinal association. No support was found for a vulnerability-stress model. Overall, these findings highlight new developmental pathways for development of depression and anxiety symptoms in mainland Chinese adolescents.

As with North American and European populations (Avenevoli, Knight, Kessler, & Merikangas, 2008), adolescence marks a critical period with regard to the development of depression in mainland China (Wu et al., 2010). Recent research conducted with adolescents (ages 13–22) in Shandong province reported that 16.9% of youth reported severe symptoms of depression (X. C. Liu, Ma, Kurita, & Tang, 1999), whereas other research conducted with adolescents (ages 13–16) in the Zhejiang province reported that 33% of youth exhibited a history of severe depressive symptoms (Hesketh, Ding, & Jenkins, 2002). These rates are dramatically higher than prevalence rates in adults from similar regions (Zhang, Zhang, & Weng, 2001; Zhou, Zhang, Jiang, & Wang, 2000). In addition, similar to other adolescent cultural groups, Chinese adolescents with elevated depressive symptoms are more likely to suffer from low self competence (Chan, 1997), depleted social support (Chen, Chen, Kaspar, & Noh, 2000), substance abuse (Jessor et al., 2003), somatic complaints, and suicidal ideation (Sun, Hui, & Watkins, 2006) compared to Chinese adolescents not experiencing emotional distress. However, despite such alarming statistics, little is known about risk factors for the prospective development of depression in Chinese adolescents (Bush, 2003).

Similar to depressive symptoms, elevated symptoms of anxiety are also prevalent and problematic for Chinese youth. Past epidemiological studies have suggested that anxiety disorders are the most common psychiatric diagnoses in Chinese adolescents and that adolescents experience anxiety symptoms more than any other age group in China (Xin, Zhang, & Liu, 2010). Prior research estimated that one third of Chinese adolescents experience clinically significant anxiety symptoms (Lu, Daleiden, & Lu, 2007). Furthermore, anxiety symptoms in Chinese youth are related to various maladaptive cognitive processes, stress, and depressive symptoms (Essau, Leung, Conradt, Cheng, & Wong, 2008; Leung & Poon, 2001; Yao et al., 2007). As with depression, however, few studies have examined vulnerabilities for anxiety symptoms within an Asian cultural group (Matsudaira & Kitamura, 2006).

The primary goal of the present study was to test an attachment-based model for the development of depressive and anxiety symptoms in mainland Chinese adolescents (Davila, Ramsay, Stroud, & Steinberg, 2005), a framework often used to understand the development of internalizing disorders in North American youth (DeKlyen & Greenberg, 2008). This research was

motivated not only by the dearth of prospective research on emotional distress in mainland China (Bush, 2003) but also because important differences between cultural groups may exist in the development and manifestation of depression (Ryder et al., 2008), anxiety (Essau et al., 2008; J. J. Hong & Woody, 2007), and attachment related processes (van Ijzendoorn & Kroonenberg, 1988). Several studies have investigated other vulnerabilities to depression in Chinese youth (e.g., Abela et al., 2011; Auerbach, Eberhart, & Abela, 2010; W. Hong et al., 2010), and to a lesser extent anxiety (Dong, Yang, & Ollendick, 1994), yet relatively few studies have utilized interpersonal theories (see Greenberger, Chen, Talley, & Dong, 2000; X. Liu, Tein, & Zhao, 2004, for examples), such as attachment theory, to understand emotional distress among Chinese adolescents.

ATTACHMENT THEORY AND DEPENDENT STRESSORS

According to attachment theory (Bowlby, 1969; Cassidy & Shaver, 2008), the quality of the first human relationship that infants form serves as a foundation that shapes ensuing personality development and future social interactions. Specifically, children who are exposed to responsive and consistent care giving may develop an expectation (i.e., working model) that others will be available and supportive in future times of need and that they are worthy of this support. Conversely, when a child's caregiver is not accessible, aware of, or responsive to the child's needs, the child may develop *negative attachment cognitions*¹ in which she or he believes that people are incapable of providing support and that the child is unworthy of being cared for and loved (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969; Bretherton & Munholland, 2008). Although

¹Although negative attachment cognitions have been called *insecure attachment cognitions* in prior research, we refer to them as *negative* because of the methods used to test the present study's hypotheses that were self-report. Although self-report measures have been shown to be a reliable and valid assessment tool for cognitions and perceptions concerning attachment, they may not be able to capture other facets of attachment (see Brumariu & Kerns, 2010, for a review). Therefore, others have suggested to not refer to cognitions/perceptions assessed through self-report measures using the word *insecure*, as this describes an overall style that, although correlated to cognitions, is more encompassing in nature (West, Rose, Spreng, Sheldon-Keller, & Adam, 1998).

contextual factors may influence facets of attachment, past research shows that the quality of attachment cognitions and representations formed during childhood are fairly stable as one progresses through adolescence (Ammaniti, van Ijzendoorn, Speranza, & Tambelli, 2000; Fraley, 2002). A large body of research has accumulated in recent years examining the cross-sectional association between negative attachment cognitions and internalizing symptoms during adolescence (Lancaster, 2001; Margolese, Markiewicz, & Doyle, 2005; Muris, Meesters, van Melick, & Zwambag, 2001; Shirk, Gudmundsen, & Burwell, 2005). However, fewer studies have prospectively examined this relation. Among the few studies that have, negative attachment cognitions were found to predict increases in depressive and anxiety symptoms over time in late adolescents (Burge et al., 1997; Lee & Hankin, 2009).

An important limitation of research examining the impact of negative attachment cognitions is the lack of studies that have examined how stressors may influence the relation between the cognitions and psychopathology. Literature on attachment theory (Bowlby, 1969; Mikulincer, Shaver, & Pereg, 2003) has postulated that humans of all ages seek attachment during times of need and experience distress when separated from one's attachment figure (*proximity maintenance*). In addition, attachment figures serve as *safe havens* protecting one from significant challenges, and a *secure base* allowing one to feel confident as one explores his or her world. Thus, individuals with negative attachment cognitions may be at risk for developing internalizing symptoms when faced with negative events because they do not have sufficient resiliency that may come from having secure attachment figures in one's life.

The present study attempted to utilize a comprehensive interpersonal framework to understand the development of internalizing symptoms by specifically focusing on the role dependent interpersonal stressors may play in the relation between attachment cognitions and internalizing symptoms. Dependent interpersonal stressors are defined as negative events that may be the consequence of the individual's own actions (Kessler, 1997), such as a conflict with a parent or breaking up with a boyfriend or girlfriend. During adolescence, new interpersonal tasks and events emerge and provide an important developmental context in which to understand the onset of depression and anxiety symptoms at this age (Rudolph, 2009; Spinhoven et al., 2010). When an adolescent struggles with certain social demands it may interfere with the development of a healthy identity, lead to hopelessness, or promote maladaptive coping mechanisms, all of which may predispose one to emotional distress (Rudolph, 2002). However, oftentimes these important dynamic, interpersonal processes are not accounted for in psychological research (see Gotlib &

Hammen, 1992, for further explanation), despite interpersonal conflict being a strong predictor of depression and anxiety symptoms during adolescence (Eberhart & Hammen, 2010; Rudolph, 2009). As past research has shown adolescence in mainland China comes with similar dependent, interpersonal stressors as found in the United States (X. C. Liu et al., 2000), an emphasis on these conflicts is important in developing a better understanding of the etiology of internalizing symptoms in this population.

VULNERABILITY-STRESS AND STRESS GENERATION MODELS

There are at least two models that may capture the interplay among negative attachment cognitions, stressors, and emotional distress. First, much research in developmental psychopathology has conceptualized the relation between a given vulnerability and stressors from a *vulnerability-stress model* (Hankin & Abela, 2005). From this perspective, a preexisting vulnerability, such as negative attachment cognitions, is hypothesized to increase risk for symptoms only when individuals are exposed to life stressors (Gibb & Coles, 2005). Within the context of the present study, it may be that individuals with negative attachment cognitions are unable to cope with interpersonal conflict when it arises because they avoid negative emotions or lack the ability to effectively regulate them (see Davila et al., 2005, for further explanation and theoretical examples), and therefore are more likely to experience prolonged emotional distress following interpersonal stressors. To our knowledge, no study has explicitly tested a vulnerability-stress hypothesis within the context of attachment cognitions in an adolescent sample. This said, there is evidence that adult women with higher levels of negative attachment cognitions report greater increases in depression and anxiety symptoms following the occurrence of negative interpersonal events than did individuals with secure attachment cognitions (Hammen et al., 1995). In addition, although not directly testing a vulnerability-stress model, Costa, Weems, and Pina (2009) found that youth with more positive attachment cognitions were less likely to develop anxiety symptoms following Hurricane Katrina.

Second, the relations among negative attachment cognitions, dependent stressors, and internalizing symptoms can also be conceptualized from a *stress generation model* (Hammen, 1991). This model posits that certain individuals possess characteristics that lead them to contribute to the generation of additional stressors, specifically dependent interpersonal stressors (Hammen, 2006), which, in turn, are hypothesized to predict elevations of later symptoms. Heavily influenced by early attachment theories (Bowlby, 1969), stress generation

models posit that internalizing disorders are in part developed and maintained within the context of reciprocal and dynamic interpersonal conflicts (Hammen, 2006). Furthermore, both attachment (Bowlby, 1969; Dozier, Stovall-McClough, & Albus, 2008) and stress generation (Hammen, 2006) theories indicate that individuals with maladaptive schemas or coping patterns generate, at least to some extent, the occurrence of additional interpersonal negative events. Yet, despite this shared theoretical framework, no study to date has explicitly tested a stress generation model as it relates to attachment related facets during adolescence. As past research has shown that individuals with negative attachment cognitions are more likely to experience discomfort in intimate settings, seek the approval of others, and have an intense preoccupation with relationships (Burge et al., 1997), it may be that adolescents are generating interpersonal conflict among loved ones and peers, and this influx in interpersonal stressors leads to emotional distress. With regard to negative attachment cognitions in adulthood, past research found that interpersonal stressors, but not achievement-related events, mediated the relation between insecure attachment cognitions and prospective emotional distress (Bottonari, Roberts, Kelly, Kashdan, & Ciesla, 2007; Eberhart & Hammen, 2009; Hankin, Kassel, & Abela, 2005).

Taken together, findings concerning vulnerability-stress and stress generation models suggest that stressors play an important role in the relation between negative attachment cognitions and internalizing symptoms. However, several important questions remain. First, the majority available research concerning attachment cognitions (Hammen et al., 1995; Hankin, Fraley, & Abela, 2005) used adult samples to investigate vulnerability-stress or stress generation models, so the extent to which results from either model apply to youth is unknown. Second, what model best represents the interplay among negative attachment cognitions, stressors, and emotional distress? Surprisingly little research has directly examined both vulnerability-stress and stress generation models simultaneously (see Auerbach, Bigda-Peyton, Eberhart, Webb, & Ho, 2011; Eberhart, Auerbach, Bigda-Peyton, & Abela, 2011; Eberhart & Hammen, 2010, for examples that investigated both models). Investigating competing models concerning the etiology of a disorder is important for developing more effective clinical interventions. For instance, support for a vulnerability-stress model may suggest the need to teach the patient to better cope with a stressful life event, whereas support for a stress-generation model may suggest the need to show the patient how a particular vulnerability leads to the proliferation of interpersonal stressors in their lives (Eberhart et al., 2011).

Last, to what extent does a vulnerability-stress or stress-generation theory differentially predict

depression/anxiety symptoms? To our knowledge, only one study to date has tested simultaneous models for both forms of internalizing symptoms. This is important, as high comorbidity rates between depression and anxiety (Angold, Costello, & Erklani, 1999) may lead to misleading findings if one does not account for one disorder when testing the other. Auerbach and colleagues (2011) found evidence for both vulnerability-stress and stress generation models for explaining the relation between social support and depression symptoms but no significance for either model with regard to anxiety symptoms. However, given extensive research which has found support for a stress generation (Rudolph, 2002) and vulnerability-stress (Gibb & Coles, 2005) models for anxiety, future replication for these findings from this type of study design is needed.

NEGATIVE ATTACHMENT COGNITIONS IN CHINA

Most of the studies in the current literature on negative attachment cognitions, and all those previously reviewed, have used only North American or European samples. Little research, however, has examined the association between facets of attachment and internalizing symptoms in a Chinese cultural group. Because attachment processes may differ as a function of culture, results from studies conducted using North American or European samples may not generalize to a Chinese cultural group (Rothbaum, Kakinuma, Nagaoka, & Azuma, 2007; van Ijzendoorn & Kroonenberg, 1988). For instance, past interaction task research has shown that Chinese youth may be more likely to develop an *ambivalent/restrictive* (Type C) insecure attachment style, whereas their American counterparts more commonly exhibit behaviors related to an *avoidant* (Type A) style of insecure attachment (Ding, Xu, Wang, Li, & Wang, 2011). In a recent review on attachment patterns in youth, Brumariu and Kerns (2010) found that adolescents who were *ambivalently*, as opposed to *avoidantly*, attached were especially vulnerable to the onset of anxiety symptoms. Therefore, as attachment cognitions are formed based on early attachment behavioural patterns (Bretherton & Munholland, 2008), mainland Chinese adolescents with negative attachment cognitions may be especially vulnerable to anxiety symptoms.

Although past research has investigated Ainsworth's Strange Situation (Ainsworth et al., 1978) paradigm in mainland Chinese children (Ding et al., 2011), to our knowledge, only one cross-sectional study has examined the association between attachment cognitions and emotional distress within a Chinese cultural group. In an East Taiwan sample of youth, Y. L. Liu (2008) demonstrated that insecure attachment related cognitions

were associated with depressive symptoms. To our knowledge, no study has examined the relation between negative attachment cognitions and anxiety symptoms, nor has any prospective study examined the relation between negative attachment cognitions and internalizing symptoms in Chinese adolescents. In addition, no study in mainland China has examined whether the association between negative attachment cognitions and internalizing symptoms is moderated by the occurrence of negative life events, or whether the relation between negative attachment cognitions and internalizing symptoms is mediated by elevated levels of stressors.

THE CURRENT STUDY

There were two primary objectives of the current study. First, we examined the prospective association between negative attachment cognitions and depressive and anxiety symptoms in Chinese adolescents. Past research has shown that attachment cognitions are a vulnerability for anxiety and depressive symptoms in North American and Western European adolescents (Brumariu & Kerns, 2010), but it is currently unknown whether attachment cognitions are a predictor for prospective adolescent internalizing symptoms as well. Second, it was tested whether a vulnerability-stress or a stress generation framework best captured the relations among attachment, stressors, and internalizing symptoms. To date, no study has simultaneously tested a vulnerability-stress and stress generation hypothesis within an attachment perspective (Davila et al., 2005) in adolescence. Consistent with past cross-sectional research in a Chinese adolescent cultural group (Y. L. Liu, 2008), it was predicted that negative attachment cognitions would predict anxiety and depressive symptoms in the present study. Furthermore, because of the theoretical overlap between an attachment perspective (Davila et al., 2005) and the stress-generation theory (Hammen, 1991), it was predicted that a stress-generation, as opposed to a vulnerability-stress, model would best explain the mechanism for which negative attachment cognitions lead to emotional distress.

To provide a powerful test of hypotheses, the current study utilized a multiwave longitudinal design in which (a) negative attachment cognitions, stressors, and depressive/anxiety symptoms were assessed during an initial assessment and (b) depressive/anxiety symptoms and the occurrence of negative events were assessed in a series of follow-up assessments occurring once a month for the subsequent 6 months. Such a design allowed for an idiographic approach toward analysis (see Abela & Hankin, 2008), where higher levels of symptoms and stressors were subjective (i.e., high or low compared to an individual's average levels) as opposed to objective

(high or low compared to a group average). Past research has suggested that this is an optimal approach for testing vulnerability-stress and stress generation models (Abela, Aydin, & Auerbach, 2006; Hammen, 2006).

METHOD

Participants

The participants in the current study were 558 adolescents (310 female, 248 male) from an urban school in Changsha, and 592 adolescents (287 female, 305 male) from a rural school in Liuyang, both in Hunan province located in mainland China. These cities were chosen because we wanted to test for differences between urban and rural sites in mainland China, as research found differences regarding internalizing symptoms in the past (Fan, Zhang, Yang, Mo, & Liu, 2011; Yip, Callanan, & Yuen, 2000). Both schools are ranked as average in terms of academic standards. The final sample consisted of 1150 adolescents ranging in age from 14 to 19 ($M = 16.26$) years. The median annual family income was in the range of 18,000 to 24,000 Ren Min Bi (RMB) per year (\$2,250 to \$3,000 USD). In relation to annual gross domestic product, Hunan province ranks 23rd (10,336 RMB) out of the 34 provinces in China and therefore falls below the national provincial average ($M = 29,719$ RMB; $SD = 47,462$ RMB; see Abela et al., 2011, for further demographic information regarding this sample). Last, the sample was 99.2% Han, the predominant ethnic group in China. Schools were compensated for their participation. The adolescents were fully debriefed following their participation in the study.

Measures

The Chinese version of all self-report measures was developed using the back-translation method. First, the original English versions were translated into Chinese by a bilingual translator from the psychology department of Central South University (Changsha, Hunan). Afterward, the Chinese version was back-translated into English by another bilingual translator from the psychology department at McGill University. When inconsistencies emerged in the back-translation, translators worked cooperatively to make the appropriate corrections to the final Chinese versions until the final versions were agreed upon. No items from any of the measures were removed or significantly altered by the translation process.

Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item self-report questionnaire designed to assess

depressive symptoms in the general population. For each item, participants are asked to indicate how frequent they have experienced the given symptom in the past week. Responses ranged from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). Total scores range from 0 to 60, with higher scores indicating elevated levels of depressive symptoms. The CES-D has been shown to be an appropriate measure for depression research in China (Greenberger et al., 2000; Yao et al., 2007). In the current study, the Cronbach alpha ranged from 0.88 to 0.91 across administrations, indicating strong internal consistency.

The Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings, & Connors, 1997). The MASC is a 39-item scale that assesses a broad range of anxiety symptoms. Participants rate on a 4-point Likert scale ranging from 0 (*never applies to me*) to 3 (*often applies to me*) how much a statement applies to them. The MASC consists of four subscales: physical symptoms (12 items), social anxiety (9 items), separation anxiety/panic (9 items), and harm avoidance (9 items). However, because past research posited harm avoidance as a personality predisposition rather than a symptom of anxiety (Cloninger, 1987; Ettelt et al., 2008; Starcevic, Uhlenhuth, Fallon, & Pathak, 1996), this subscale was dropped for the present study. Thus, the total scores for the present study could range from 0 to 90, with higher scores representing higher levels of anxiety symptoms. Example items from the MASC include “I have pains in my chest” (physical symptoms), “I’m afraid other people will think I’m stupid” (social anxiety), and “I try to stay near my mom and dad” (separation anxiety/panic). The Chinese version of MASC has high levels of reliability and validity making it an appropriate measure to use in Chinese samples (Abela et al., 2011; Yao et al., 2007). In the current study, the Cronbach alpha ranged from 0.81 to 0.91 across administrations, indicating strong internal consistency.

Adolescent Life Events Questionnaire (ALEQ; Hankin & Abramson, 2002). The ALEQ is a measure that assesses a wide range of negative life events that typically occur in the lives of adolescents. Items include school/achievement problems, friendship and romantic difficulties, and family problems. Consistent with other studies, the present study focused on the dependent interpersonal stressors items (ALEQ-DEP; Eberhart et al., 2011; Hankin, Stone, & Wright, 2010; see Hankin et al., 2010, for description of how the items for the ALEQ-DEP were chosen). The ALEQ-DEP contains 26 items, such as “had an argument with a close friend” and “boy-friend/girlfriend broke up with you but you still want to go out with them.” Participants were asked to indicate

on a 5-point Likert scale (from A = *never* to E = *always*) how often these negative events happened over the past month. We asked them to report only on events that happened in the past month, so this should prevent participants from reporting on the same event more than once during the follow-up assessments. Past research has found the ALEQ to be a reliable and valid measure when used with North American (Hankin, 2008; Hankin et al., 2010; Skitch & Abela, 2008) and Chinese adolescents (Abela et al., 2011; Auerbach, Abela, Zhu, & Yao, 2007).

Adolescent Attachment Questionnaire (AAQ; West et al., 1998). The AAQ is a self-report questionnaire assessing negative attachment cognitions in adolescents. Participants responded to each of the statements (e.g., “I’m confident that my parent will listen to me” and “I enjoy helping my parent whenever I can”) using a 6-point Likert-scale. Scores are combined additively to form an overall attachment cognition dimensional score in which higher scores indicate higher levels of negative attachment cognitions. The AAQ has demonstrated adequate internal reliability in both clinical and community samples of adolescents with alpha coefficients ranging from 0.62 to 0.80 and test-retest reliability coefficients over a 3-month interval ranging from 0.68 to 0.74 (Cawthorpe, West, & Wilkes, 2004; West et al., 1998). The AAQ has also demonstrated strong convergent validity with the Adult Attachment Interview, which is generally considered to be the “gold standard” for assessing attachment cognitions in adolescent and adult samples (West et al., 1998). In the current study, Cronbach alpha was 0.77, indicating adequate internal consistency.

Procedure

Students were recruited from high schools in the collaborating authors’ (Yao and Zhu) province in mainland China. Consent forms were sent to the parents of all students in participating classes. Consent rates were greater than 95% in all classes. After consent forms were collected from the participants, researchers went to each school to meet with participating students. Written consent was obtained from each adolescent at the beginning of the assessment. During the initial assessment, students completed a demographics form and a copy of each of the following questionnaires: (a) CES-D (Radloff, 1977), (b) MASC (March et al., 1997), (c) ALEQ (Hankin & Abramson, 2002), and (d) AAQ (West et al., 1998). Once a month for the subsequent 6 months (for a total of seven assessments), researchers returned to the schools and met with participating students. At each of these follow-up assessments, students were asked to complete the CES-D, MASC, and ALEQ questionnaires.

RESULTS

Preliminary Data Analysis

Preliminary analyses showed that CES-D, MASC, and ALEQ-DEP scores exhibited significant positive skew. These variables were successfully transformed by square rooting each variable (with the exception of the CES-D, which required a logarithm transformation) to satisfy assumptions of normality. Next, we examined if data were missing at random to justify the use of data imputation methods for estimating missing values (Schafer & Graham, 2002). For the present study, 73.8% participants were present at Time 1, and all six follow-ups and only 9.2% of the sample missed more than one follow-up. During the follow-up interval, between 1.8% (Follow-Up 1) and 10.3% (Follow-Up 6) of participants were absent at any given time point. Little's MCAR test (Little & Rubin, 1987), for which the null hypothesis is that the data are missing completely at random, was not significant, $\chi^2(15, 239) = 956.07, p = .99$. In addition, participants with complete data did not differ significantly from those missing one or more time points on any of the Time 1 or demographic variables. Given these results, maximum likelihood estimates of missing data were created and used in all subsequent analyses. Means, standard deviations, and correlations for all Time 1 measures are included in Table 1. In addition, descriptive data for follow-up measures can be found in Table 2. To facilitate comparisons with other studies, means and standard deviations presented in Tables 1 and 2 are those obtained prior to transforming the variables.

TABLE 1
Descriptive Statistics and Correlations Among Baseline Measures

	1	2	3	4	5	6
1. CES-D	—					
2. MASC	.59**	—				
3. ALEQ-DEP	.42**	.35**	—			
4. AAQ	.28**	.15**	.36**	—		
5. Gender	-.06*	-.26**	.11**	.05	—	
6. Site	-.08**	-.07*	-.03	.24**	-.08**	—
<i>M</i>	12.99	31.25	54.61	20.07	—	—
<i>SD</i>	8.97	12.06	13.36	5.79	—	—
<i>N</i>	1,133	1,142	1,136	1,141	—	—

Note: CES-D = Time 1 scores on the Center for Epidemiological Studies Depression Scale; MASC = Time 1 scores on the Multidimensional Anxiety Scale for Children; ALEQ-DEP = Time 1 scores on the Adolescent Life Events Questionnaire, Dependent Stressors subscale; AAQ = Time 1 scores on the Adolescent Attachment Questionnaire; Gender = participant's sex (girl = 0, boy = 1); Site = participant's location (0 = urban, 1 = rural).

* $p < .05$. ** $p < .01$.

TABLE 2
Means and Standard Deviations for All Follow-Up Measures

Measures	<i>M</i>	<i>SD</i>	<i>N</i>
CES-D			
FU1	13.18	9.31	1,129
FU2	12.83	9.59	1,103
FU3	12.45	9.77	1,097
FU4	12.13	10.12	1,043
FU5	11.81	9.56	1,059
FU6	12.24	10.47	1,031
MASC			
FU1	28.58	12.77	1,130
FU2	26.53	13.59	1,103
FU3	25.04	14.19	1,097
FU4	23.54	14.97	1,043
FU5	23.92	14.74	1,059
FU6	22.89	15.35	1,033
ALEQ-DEP			
FU1	48.80	12.98	1,130
FU2	46.21	13.58	1,101
FU3	44.09	14.18	1,094
FU4	42.17	13.91	1,043
FU5	41.60	13.91	1,058
FU6	41.36	13.79	1,034

Note: CES-D = Time 1 scores on the Center for Epidemiological Studies Depression Scale; MASC = Time 1 scores on the Multidimensional Anxiety Scale for Children; ALEQ-DEP = Time 1 scores on the Adolescent Life Events Questionnaire, Dependent Stressors subscale; FU = follow-up assessment.

Overview of Data-Analytic Plan

Analyses were carried out using the SAS (version 9.1) MIXED procedure for maximum likelihood estimation. For both the vulnerability-stress (moderation) hypothesis, and the stress-generation (mediation) hypothesis, the dependent variable was within-subject levels of depressive symptoms or anxiety symptoms.² The primary predictors of these dependent variables were negative attachment cognitions (Level 2) and within-subject changes in dependent stressors over time (Level 1). Because negative attachment cognitions were a Level 2 variable, scores were group mean centered to increase the interpretability of various parameters in our models (Muller, Judd, & Yzerbyt, 2005). Dependent interpersonal negative events were centered at each participant's mean so that scores reflect upwards or downwards fluctuations in an individual's reported occurrence of stressors as compared to his or her mean level. Finally, time-lagged data analyses were used such that symptoms at time *T* were predicted by dependent interpersonal

²For anxiety symptoms, separate models were initially tested for physical symptoms, social anxiety symptoms, and separation anxiety symptoms. However, findings were consistent across symptom types. Therefore, results for the total anxiety score are reported in the manuscript. Findings for the specific anxiety subscales can be obtained by contacting the first author.

TABLE 3

Summary of Stress Generation Results for Depression and Anxiety With Negative Attachment Cognitions as Independent Variable (Standardized β s)

DV	M	Effect of IV on M	Effect of M on DV	Direct Effect	Indirect Effect
Depression	Dependent Stressors	.24**	.09**	.19**	.02**
Anxiety	Dependent Stressors	.24**	.14**	.02**	.23**

Note: $N = 4,577$. DV = dependent variable; IV = independent variable; Anxiety = Level 1 scores on the Multidimensional Anxiety Scale for Children; Depression = Level 1 scores on the Center for Epidemiological Studies Depression Scale; Dependent Stressors = Level 1 scores on the Adolescent Life Events Questionnaire, Dependent Stressors subscale (ALEQ-DEP).

** $p < .01$.

negative events at time $T-1$. This time lagged analysis tests whether dependent interpersonal negative events predicted prospective changes in symptoms from Time $T-1$ to Time T across each of the successive waves of the multi-wave follow-up. Finally, an $r_{effect\ size}$ statistic was calculated when appropriate to provide a greater understanding of the clinical significance of our findings (see Rosnow, Rosenthal, & Rubin, 2000, for an explanation of how to calculate this statistic).

For all analyses, three additional fixed effects and two random effects were included in the statistical models. First, preliminary analyses revealed significant site (urban vs. rural) and gender differences for both depressive, site: $t(1148) = 3.53, p < .01, r_{effect\ size} = .10$; gender: $t(1148) = 2.95, p < .01, r_{effect\ size} = .09$, and anxiety symptoms, site: $t(1148) = 5.24, p < .01, r_{effect\ size} = .15$; gender: $t(1148) = 8.77, p < .01, r_{effect\ size} = .25$, over time, with urban youth reporting greater symptoms than rural youth and adolescent girls reporting greater symptoms than boys. Therefore, site and gender were included as covariates for all analyses. We should note that although we also examined whether site or gender moderated any effects in our models, none of these analyses were significant. In addition, because of the high rates of comorbidity between internalizing symptoms (Angold et al., 1999), it is important to account for anxiety symptoms when utilizing depressive symptoms as an outcome, and depressive symptoms when using anxiety symptoms as an outcome. At the same time, automatically controlling for comorbid symptoms may lead to misleading findings because the constructs are so highly related (Miller & Chapman, 2001; Schwartz & Susser, 2006). Therefore, models for depressive and anxiety symptoms were initially tested independently, and if negative attachment cognition interaction terms (in the case of vulnerability-stress models) or negative attachment cognitions as a main effect (for stress-generation models)

were found significant, analyses were conducted that then also controlled for the comorbid symptoms.

With regards to random effects, we tested symptom intercept and slope in the models. Both the random slope ($p < .01$) and intercept ($p < .01$) were significant in all analyses for depressive and anxiety symptoms, so these random effects were retained in subsequent analyses. Finally, we selected an appropriate covariance structure for analyses by fitting the model with the structure which provided the “best” fit based on Akaike information criterion and Schwarz Bayesian criterion (see Littell, Pendergast, & Natarajan, 2000, for explanation of different covariance structures and selection rules). For all analyses of the vulnerability-stress and stress-generation hypotheses, the heterogeneous autoregressive structure was significant ($p < .01$) and demonstrated the best fit.

Vulnerability-Stress Hypothesis

The present study had adequate power (greater than .80) to detect a small effect size. We first tested whether dependent stressors at Time $T-1$ interacted with negative attachment cognitions to predict depressive symptoms at Time T . This interaction was nonsignificant, $t(4598) = 1.53, p = .13, r_{effect\ size} = .02$. Next, we tested if negative attachment cognitions interacted with dependent stressors to predict anxiety symptoms. Similar to depressive symptoms, the interaction term not significant in predicting anxiety symptoms, $t(4598) = -1.40, p = .16, r_{effect\ size} = .02$.³

Stress Generation Hypothesis

For both depression, $t(1146) = 8.15, p < .01, r_{effect\ size} = .23$, and anxiety symptoms, $t(1146) = 6.13, p < .01, r_{effect\ size} = .18$, we found that negative attachment cognitions exerted a main effect such that higher levels of negative attachment cognitions were associated with elevated levels of internalizing symptoms. Next, we tested our stress generation hypotheses. Specifically, we utilized the multilevel mediation procedure established by Bauer, Preacher, and Gil (2006) to test mediation hypotheses with a Level 2 predictor variable and a Level 1 mediator and dependent variable (e.g., *lower level mediation*). This bootstrap approach is believed to be statistically superior to more traditional approaches which have been used in the social sciences to test mediation hypotheses because it limits the chance of committing a Type I error by generating more reliable standard errors and better tests of the indirect effect (see Bauer, Preacher, & Gil, 2006; Preacher & Hayes, 2008; Zhao, Lynch, &

³These findings were consistent across models that controlled for comorbid symptoms and for those that did not.

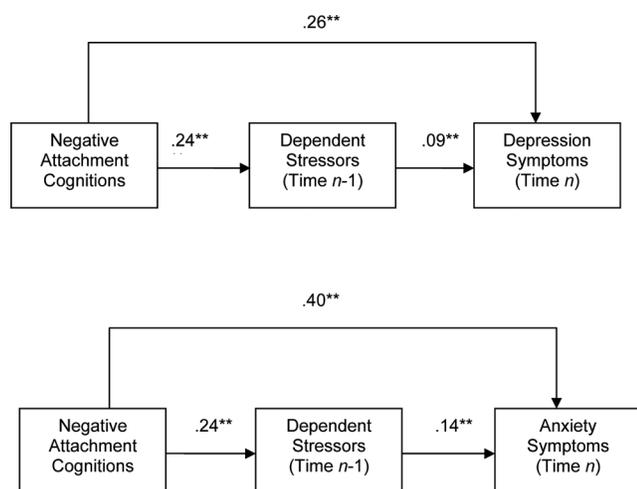


FIGURE 1 Mediation model for associations between negative attachment cognitions and internalizing symptoms as mediated by dependent stressors. *Note:* Values on paths are path coefficients (standardized β s). The path between dependent stressors and internalizing symptoms, includes negative attachment cognitions in the model. ** $p < .01$.

Chen, 2010, for further explanation of the advantages of bootstrapping methods and how to properly run this type of mediation analysis). Furthermore, this approach is superior to other bootstrapping approaches for multilevel data because it nests the resampled data within the individual, allowing for a true idiographic examination of our hypothesis. Regression weights were standardized following the stress generation analyses to facilitate comparisons between the two models.

Estimates for the pathways for stress generation models for both depression and anxiety symptom outcomes can be found in Figure 1. With regard to depression symptoms, the indirect effect of attachment cognitions through dependent stressors at time $T-1$ on changes in depressive symptoms at Time T was significant at $p < .01$ ($b = .02$; 95% BCa⁴ = .01 and .03). Next, we utilized the upper and lower bounds estimated using the Bauer et al. (2006) method to calculate the influence of the indirect effect. Specifically, we used the range of values for the indirect effect and divided it by the range of values for the total effect. For these analyses, we found that dependent stressors explained 4 to 15% of the direct pathway between negative attachment cognitions and depressive symptoms. With regard to anxiety symptoms, the indirect effect of attachment cognitions through dependent stressors at time $T-1$ on change in anxiety symptoms at Time T was also significant at $p < .01$ ($b = .23$; 95% CI, BCa = .22 and .24), with this mediation model explaining 49 to 71% of the direct pathway

between negative attachment cognitions and anxiety symptoms. Consistent with Preacher and Kelley (2011), we utilized the benchmarks put forth by Cohen's (1988) to interpret the effect size for our multilevel mediation models. Overall, we found a small effect size for the indirect effect predicting depressive symptoms (the range of percentage explained does not include 1% but does include 9%) and a large effect size predicting anxiety symptoms (the range exceeds 25%, in the percentage of the total effect the indirect effect explains; Preacher & Kelley, 2011).

DISCUSSION

The present study examined two distinct etiological models (vulnerability-stress and stress generation) for the development of depressive and anxiety symptoms in a sample of Chinese adolescents. Findings from the present study provided support for the stress generation model for both depression and anxiety symptoms; however, no support was obtained for the vulnerability-stress component of the hypothesis. Thus, these findings suggest that negative attachment cognitions play an important role in the development and maintenance of internalizing symptoms in Chinese adolescents and that this relation is mediated by the generation of dependent interpersonal stressors.

The present study's findings are consistent with past research, which found a cross-sectional association between attachment cognitions and depressive symptoms in mainland China (Y. L. Liu, 2008). However, we extended these findings by demonstrating that negative attachment cognitions predicted prospective elevations of depressive *and* anxiety symptoms, as repeatedly assessed monthly over a 6-month follow-up period. Although past research found that poor attachment predicted anxiety symptoms in North American adolescent samples (Brumariu & Kerns, 2010; Lee & Hankin, 2009), no study to date examined the association between anxiety symptoms and attachment cognitions in a Chinese cultural group. Past research has found different etiological pathways between North American and East Asian samples with regards to anxiety, such as *Taijin Kyofushu* (see Kirmayer, 1991, for an explanation). However, the present study is congruent with another body of literature that has identified certain vulnerabilities for anxiety, such as stress (Hesketh et al., 2009) and low social support (Tao, Dong, Pratt, Hunsberger, & Pancer, 2000), that may be consistent across North American and Chinese cultures. Thus, based on the findings of the present study, negative attachment cognitions may be best seen as a predictor of both depression and anxiety symptoms in both North America and mainland China.

⁴BCa stands for the *Biased Corrected and Accelerated Confidence Interval*; see Efron and Tibshirani (1993) for an explanation.

The present study was similar to findings concerning North American adolescents by showing that dependent interpersonal stressors mediated the relation between attachment cognitions and emotional distress (Hankin, Kassel, et al., 2005). One possible reason for this finding is that individuals who are high in negative attachment cognitions may have a fear of becoming close to others, and therefore may feel stress when faced with interpersonal situations (Collins & Feeney, 2000). Experiencing these levels of stress may cause them to generate further stressors by not being able to successfully interact with individuals around them. In addition, past research found that individuals with negative or poor attachment may report satisfaction following an interpersonal conflict, and seek out these experiences (Campbell, Simpson, Boldry, & Kashay, 2005). Therefore, individuals with high levels of negative attachment cognitions may generate stressors because of the “rush” these conflicts produce. Research has yet to examine whether these pathways from negative attachment cognitions to dependent interpersonal stress may generalize to Chinese culture as well.

Interestingly, dependent stressors explained a much higher percentage of the relation between negative attachment cognitions and anxiety, compared to depression. One possible explanation of this is that the relation between attachment cognitions and anxiety, compared to depression, may be characterized by different behavioral patterns. According to attachment theorists, if an individual has negative attachment cognitions, maladaptive coping mechanisms may be activated during times of stress, and interpersonal stress may be compounded (Shaver & Mikulincer, 2002). According to Mikulincer and colleagues (2003), this may take two forms. If the individual believes that attachment figures are possible in his or her given environment they may use *hyperactivating strategies*, in which they are very energetic and make insistent attempts to attain proximity, support, and love. On the other hand, if an individual does not feel that there are viable attachment figures in his or her life, they may use *deactivating strategies*, in which efforts to withdraw and isolate from the environment are made. Past research has shown that hyperactivating strategies are more associated with anxiety symptoms, whereas deactivating strategies are more associated with depressive symptoms (Mikulincer et al., 2003; Shaver & Mikulincer, 2002). Thus, within the context of the present study, it may be that dependent interpersonal stressors explained more of the variance with regard to anxiety because some individuals with negative attachment cognitions are *engaging* others in their environment in a way where they present with attention-seeking behaviors that generate stressors. Meanwhile for depression, it may be that these pathways are marked by withdrawal from individuals, as opposed to conflict, and this isolation

contributes to depressive symptoms. Therefore, poor representations of the self and maladaptive coping mechanisms, which have been found to mediate the relation between negative attachment cognitions and depression in North American samples (Brumariu & Kerns, 2010; Hankin, Kassel, et al., 2005), may help explain the relation between attachment cognitions and depression in mainland Chinese adolescents as well. Future research should test which different cognitive and interpersonal factors, in addition to dependent stressors, may lead to depressive symptoms within this specific cultural group.

The present study was consistent with past research (Eberhart et al., 2011; Eberhart & Hammen, 2010) that simultaneously tested etiological models and found support for the stress-generation model but not the vulnerability-stress perspective. Other research, however, which simultaneously tested vulnerability-stress and stress generation models for cognitive vulnerabilities, found support for a vulnerability-stress approach (Gibb & Alloy, 2006). One possible explanation is that the impact of cognitive vulnerabilities that are more interpersonally related are best explained through a stress-generation framework (Hammen, 2006; Hankin, Kassel, et al., 2005; Hankin et al., 2010). The present study was consistent with this postulation by only finding support for the stress generation model when examining negative attachment cognitions, a cognitive risk factor that is interpersonal in nature.

The distinction between stress generation and vulnerability-stress has important theoretical and clinical implications. For one, a vulnerability that operates through a stress generation model may be more problematic because it does not need anything in the environment to *trigger* consequences. For instance, if high levels of dependent stress never enter an individual's environment, a given vulnerability will lay dormant within a vulnerability-stress context. However, within a stress generation model, the stressors are produced, at least to some extent, by the individual, thus allowing for the pathway to internalizing symptoms. For this reason, others have argued (Rudolph, 2009) that a greater focus on stress generation models is needed as current conceptualizations of developmental psychopathology still predominately focus on vulnerability-stress approaches.

Despite this study's strengths, there were also several limitations that should be noted. First, self-report measures were used to measure both depressive and anxiety symptoms. Although the CES-D and the MASC possess high degrees of reliability and validity, one cannot draw conclusions about clinically diagnosed depression and anxiety based on self-report questionnaires. Second, self-report measures were used to assess negative events. Although past research suggested that self-report measures may be a useful and valid tool in psychological

research (Haefel & Howard, 2010), others have recommended that a contextual interview is needed to understand the impact and quality of stressors (Hammen, 2005). This may be especially important with regard to the present study, as self-report measures may not be as capable in distinguishing between dependent, interpersonal stressors, and other forms of stressors, which may not be as important within a stress-generation framework. However, of note, other studies have tested stress generation theories by measuring dependent interpersonal stressors with the ALEQ (Auerbach et al., 2011; Eberhart et al., 2011; Hankin et al., 2010). Still, future research is needed to demonstrate that the ALEQ is assessing the generation of stressors, as opposed to merely capturing internalizing adolescents who may be more aware of interpersonal stressors when experiencing emotional distress. Third, the current study used measures developed in a North American/Western European cultural context. Future research should aim to replicate the current findings using emic assessment instruments. This may be especially important with regard to our assessment of depression, as past research has found differences concerning the manifestation of depression symptoms when comparing Chinese and North American cultural groups (Ryder et al., 2008). Fourth, the current study did not examine whether certain dimensions of negative attachment cognitions (i.e., anxious or avoidant) are more likely to lead to the development of depressive and anxiety symptoms compared to others. Future research would benefit from assessing both insecure attachment dimensions to evaluate relative strength of prediction of future dependent interpersonal stressors as well as depressive and anxious symptoms in youth over time. Such research may also benefit from utilizing a multi-informant approach toward assessing these constructs.

As future research examining the role of interpersonal factors in the etiology of depression in Chinese youth accumulates, a greater understanding of the mechanisms underlying the onset of depression and anxiety in such youth will emerge. Such research can expand upon the current results and spark insight into developing culturally competent prevention and treatment of depression and anxiety in Chinese adolescents.

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