

# Cognitive Vulnerability, Stress Generation, and Anxiety: Symptom Clusters and Gender Differences

Randy P. Auerbach, Sarah Richardt, and Sarah Kertz  
*Harvard Medical School*

Nicole K. Eberhart  
*RAND Corporation*

The aim of the present study was to examine whether low perceived control, a cognitive vulnerability factor, contributes to stress generation. We examined whether low perceived control contributed to greater dependent interpersonal, but not noninterpersonal, stressors, and whether such stressors then contributed to higher levels of anxious symptoms. As research has indicated that adolescent girls and boys report different patterns of anxious symptoms, we hypothesized that the stress generation effect would vary as a function of gender. We utilized a 6-month, multi-wave longitudinal design, and results indicated that dependent interpersonal stress mediated the relationship between low perceived control and higher levels of social anxious symptoms in girls. Conversely, boys who exhibited low perceived control experienced a greater occurrence of dependent interpersonal stressors, which then triggered higher levels of physical anxious symptoms. Additionally, the stress generation effect emerged when examining total anxious symptoms in girls but not boys.

Stress generation provides a theoretical and empirical understanding regarding the complex and reciprocal relationship between stress and depression (Hammen, 1991; Liu & Alloy, 2010). Such an approach differs from stress exposure models which make the implicit assumption that (a) the relationship between stress and depression is unidirectional and (b) individuals are passive recipients of stress. The stress generation framework posits that characteristics, behaviors, or circumstances within an individual's life context contribute to the occurrence of *dependent* stressful events. In contrast to fateful or independent events, these events are thought to be dependent as

---

The research reported in this article was supported by a McGill University Social Sciences and Humanities Student Research Grant Awarded to Randy P. Auerbach.

Correspondence concerning this article should be addressed to: Randy Auerbach, 115 Mill Street, de Marnette, Room 240, Belmont, MA 02478; rauerbach@harvard.mclean.edu.

an individual may be partially responsible for their occurrence, and additionally, these dependent events are often interpersonal in nature. Historically, the stress generation framework has examined how a previous history of depression in adult women contributed to greater dependent interpersonal, but not independent, stressful life events and increased their susceptibility for future depressive episodes (Hammen, 1991). In the last 20 years, these results have been replicated with diagnoses of depression in children and adolescents (e.g., Harkness & Steward, 2009; Rudolph, 2008), adult men (Cui & Vaillant, 1997), and adult women (Hammen, Shih, & Brennan, 2004). Further, the stress generation effect has been implicated in research examining depressive symptoms in youth (e.g., Hankin, Mermelstein, & Roesch, 2007; Shih, Abela, & Starrs, 2009), college students (Gibb, Beevers, Andover, & Holleran, 2006), and adults (e.g., Daley, Hammen, Davila, & Burge, 1998). At the same time, there is a relative dearth of research examining cognitive vulnerability predictors of stress generation, especially as it relates to predicting dependent interpersonal stress and subsequent anxious symptoms in adolescents.

## COGNITIVE VULNERABILITY AND STRESS GENERATION

Recent findings highlight the role that depressogenic cognitive styles play in the stress generation process. Specifically, research with university students and adults has identified a number of underlying cognitive predispositions including: dysfunctional attitudes (Safford, Alloy, Abramson, & Crossfield, 2007), negative inferential styles (Safford et al., 2007; Simons, Angell, Monroe, & Thase, 1993), hopelessness (Joiner, Wingate, Gencoz, & Gencoz, 2005; Joiner, Wingate, & Otamendi, 2005), self-perceived interpersonal competence (Sahl, Cohen, & Dasch, 2009), and negative relational schemata (Caldwell, Rudolph, Troop-Gordon, & Kim, 2004; Eberhart, Auerbach, Bigda-Peyton, & Abela, in press). In general, these studies uniformly demonstrated that cognitive vulnerability factors contribute to the occurrence of greater dependent interpersonal as opposed to independent or noninterpersonal stressors. Further, Joiner and colleagues (2005) found that dependent interpersonal stress partially mediated the relationship between hopelessness and subsequent depressive symptoms over the follow-up period. Markedly less research has been conducted with children and adolescents. In a study examining children of affectively ill parents, Shih and colleagues (2009) found that negative inferential styles predicted greater interpersonal as opposed to noninterpersonal and independent stress at the 1 year follow-up. Similarly, Shahar and Priel (2003) found that higher levels of self-criticism predicted a greater occurrence of negative versus positive events among adolescents, and that such events mediated the relationship between self-criticism and distress (i.e., a composite of depressive and anxious symptoms). It is important to note, however, their analyses did not differentiate between dependent interpersonal and independent stressors. More recently, Auerbach, Eberhart, and Abela (2010) found that low perceived control, a belief that one may have limited ability to change views of the self, world, and future, contributed to greater dependent interpersonal stress. Additionally, they found that greater dependent interpersonal stress mediated the relationship between low perceived control and higher levels of depressive symptoms over time. Despite these findings, there remains limited research examining (a) cognitive vulnerability predictors of stress generation and (b) applicability of stress generation to other psychopathology, particularly anxious symptoms and disorders.

## Stress Generation and Anxiety

To date, the vast majority of research has examined stress generation in relation to depression (for a review, see Liu & Alloy, 2010). Indeed, some evidence suggests that stress generation may be specific to depressive symptoms and diagnoses. For example, Joiner and colleagues (2005) found that the stress generation effect was specific to depression as opposed to anxiety when examining university students. Similarly, Rudolph, Hammen, Burge, Lindberg, Herzberg, and Daley (2000) examined patterns of stress generation in clinically referred children, and results indicated that there were significant associations between depressive disorders and greater dependent interpersonal stress, but not externalizing disorders. In contrast, Harkness and Luther (2001) indicated that adult women with comorbid anxiety and dysthymia reported a greater occurrence of dependent events as compared to those with either depression alone or comorbid depression and anxiety. Similarly, Hankin, Kassel, and Abela (2005) found that insecure attachment in adults contributed to greater interpersonal stress and subsequent anxious symptoms. More recently, Connolly, Eberhart, Hammen, and Brennan (2010) found evidence that while stress generation may be more strongly associated with depression than anxiety diagnoses in adolescence, it is also associated with anxiety disorders. While they did not examine anxiety diagnoses, Riskind, Black, and Shahar (2010) found that cognitive vulnerabilities to anxiety contribute to stress generation in young adults. These mixed results provide tacit evidence that the stress generation process may be nonspecific, and it may vary as a function of underlying vulnerability factors.

Given the gap in the extant stress generation literature regarding specificity and underlying cognitive vulnerability predictors in adolescents, the present study we sought to examine an underlying cognitive vulnerability factor that may be a predictor of both dependent interpersonal stress and prospective anxious symptoms. To date, low perceived control has been implicated in both stress generation models (Auerbach et al., 2010) as well as an array of anxiety disorders (for review, see Weems & Silverman, 2006), and thus it is a strong candidate for stress generation models examining anxiety. More specifically, perceived control is operationalized as the capacity to influence important outcomes in one's life, and researchers have consistently indicated that a diminished perception of control plays a profound role in the development of anxious symptoms and disorders in youth (e.g., Capps, Sigman, Sena, Henker, & Whalen, 1996; Chorpita & Barlow, 1998). Thus, consistent with Auerbach and colleagues, we hypothesized that a low perception of control may contribute to greater dependent interpersonal stressors, as individuals who possess a low perception of control may feel hopeless or helpless to manage difficult interpersonal relationships. Further, greater dependent interpersonal stress may contribute to higher levels of anxious symptoms. Meaning, individuals who maintain the perception that they lack control may not feel as though they possess the tools and strategies to effectively navigate these situations, which potentially exacerbates general worry about these relationships as well as compromises self-confidence in other relationships. As indicated previously, findings examining the applicability of stress generation to anxiety have been mixed. One potential limitation of past research has been the examination of total anxious symptoms as opposed to specific subscales or clusters of symptoms. Anxiety clusters may represent different diagnostic categories, albeit clinically subthreshold, and the examination of

subscales or clusters may provide a more stringent examination of stress generation in the context of anxiety.

## GOALS OF THE CURRENT STUDY

The goal was to address an empirical and theoretical gap in the existing stress generation research. Specifically, our aim was to examine cognitive vulnerability predictors of stress generation in the context of anxiety. We utilized a 6-month, multi-wave, longitudinal design in a sample of adolescents as such an approach allows one to better examine the time-lagged relationship between underlying cognitive predispositions, dependent interpersonal stress, and subsequent anxious symptoms. In recent years, several self-report measures have been designed to assess anxiety symptoms in youth. March, Parker, Sullivan, and Stallings (1997) suggest that *DSM-IV* structure may not completely account for anxiety symptoms in youth, and as a result developed the Multidimensional Anxiety Scale for Children (MASC; March et al., 1997). The MASC was designed to assess a variety of anxiety symptoms in youth and reflects physical symptoms, harm avoidance, social anxiety, and separation anxiety/panic. The four symptom clusters have been reliably demonstrated in both clinical and community samples of youth (Grills-Taquechel, Ollendick, & Fisak, 2008; March et al., 1997), and both subscale and total scores discriminate youth who meet criteria for a primary anxiety diagnosis from nonanxious youth (Grills-Taquechel et al., 2008).

We were also interested in examining potential gender differences in the role of cognitive vulnerability predictors of stress generation and anxiety. There are several reasons to consider the effect of gender on such associations. First, there is a higher prevalence of anxiety symptoms and disorders in adolescent girls as compared to boys (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Essau, Conrath, & Petermann, 2000; Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998; Kessler et al., 2005), and Lewinsohn and colleagues (1998) indicated that although the mean age of onset for anxiety disorders does not significantly differ as a function of gender, the prevalence of these disorders increases at a more rapid rate in girls as they transition from childhood to adolescence. Adolescent girls report a greater incidence of social anxiety or phobias (Wu et al., 2010), agoraphobia (Wu et al., 2010), and specific environment-related phobias (Essau et al., 2000), and this trend persists with a higher rate of social phobia (Furmark, Tillfors, Everz, Marteinsdottir, Gefvert, & Fredrikson, 1999) and agoraphobia (Grant et al., 2006) in adult women. Similarly, research examining separation anxiety suggests that there may be higher rates of separation anxiety in female adolescents and adults (e.g., Shear, Jin, Ruscio, Walters, & Kessler, 2006). Taken together, these results suggest that adolescent girls may be more inclined to report higher levels of symptoms as it relates to social anxiety/phobias and separation anxiety. Thus, we hypothesized that lower perceived control would contribute to greater dependent interpersonal as opposed to noninterpersonal stressors. Additionally, such stress would mediate the relationship between low perceived control and higher levels of social and separation anxiety symptoms.

Second, the anxious symptom profile for adolescent boys, unfortunately, is less clear. With respect to overanxious disorder and generalized anxiety disorder, which encompasses harm avoidance symptoms, Cohen and colleagues (1993) indicated a greater prevalence in adolescent girls as compared to boys. Conversely, both Wu et

al. (2010) and Masi et al. (2004) reported that there were no differences in the rate of overanxious disorder and generalized anxiety disorder when comparing girls and boys. To date, research has not elaborated on differences with respect to broad-based physical or somatic symptoms of anxiety that may cut across a number of anxiety disorders. However, as many adolescent boys may be reluctant to report social or separation anxiety symptoms given social stigma (e.g., Chandra & Minkovitz, 2006; Garland & Zigler, 1994), they may be more inclined to report higher levels of harm avoidance and physical symptoms, which on the surface, may be more socially acceptable. Further, while boys may not report higher levels of these symptoms as compared to girls, it may be that they report higher levels in these domains in comparison to other types of anxious symptoms. At the same time, given the paucity of research that has examined these symptom-specific clusters within boys, such hypotheses would be exploratory in part. Therefore, in boys we hypothesized that low perceived control would predict higher levels of dependent interpersonal, but not independent, stressors, and further, such stressors would mediate the relationship between low perceived control and prospective physical and harm avoidance symptoms.

Last, as girls tend to report greater total anxious symptoms as compared to boys (Costello et al., 2003; Essau et al., 2000; Kessler, Berglund, Demler, Jin, & Walters, 2005; Lewinsohn et al., 1998), we hypothesized that the stress generation effect and mediation model would emerge in girls but not boys when examining total anxious symptom scores.

## METHOD

### Participants

The current study included 105 adolescents (male,  $n = 42$ ; female,  $n = 63$ ) from Montreal, Canada. Ages ranged between 12 and 18 ( $M = 15.12$ ,  $SD = 1.25$ ), and the demographic distribution was in line with greater Quebec: 79.7% Caucasian, 6.8% Asian, 3.4% Native American, 3.4% East Indian, 2.5% African American, 0.8% Hispanic, and 2.5% reported "Other" as their ethnicity.

### Procedure

Approval for the study was granted by the university ethics board, and the treatment of participants was in accordance with American Psychological Association ethical standards. Prior to the initial assessment, letters were sent home to parents describing the general aims of the project, which included examining factors that influenced one's mood, and requesting consent for their child to participate. In order to participate in the study, all participants needed to provide both parental and personal consent. All assessments occurred on school grounds during the course of the regular school day. During the initial assessment, participants completed the following: (a) demographics form; (b) the Multidimensional Anxiety Scale for Children; (c) the Adolescent Life Event Questionnaire; and (d) Perceived Control Scale for Children. Follow-up assessments occurred every 6 weeks for 6 months (Times 2–5), and participants completed self-report forms assessing anxious symptoms and negative events.

## Measures

*Multidimensional Anxiety Scale for Children (MASC)*. The MASC is a 39-item measure that assesses severity of anxious symptoms in the past week (March, 1997). Examples of questions include “I feel restless or on edge” or “I worry about what other people think of me,” which respondents rate on a 4-point Likert scale ranging from 1 (*never applies to me*) to 4 (*often applies to me*). The MASC included four subscales: (1) physical symptoms, (2) social anxiety, (3) separation anxiety, and (4) harm avoidance. Cronbach’s alphas ranged from .90 to .93 across assessments indicating strong internal consistency.

*Adolescent Life Events Questionnaire–Revised (ALEQ)*. The ALEQ is a 57-item self-report questionnaire that was developed to assess a broad range of negative life events occurring in the past month (Hankin & Abramson, 2002). A consensus team consisting of three advanced doctoral students and one postdoctoral fellow rated whether each item was (a) dependent (i.e., at least in part dependent on the actions of the individual), (b) interpersonal, and (c) noninterpersonal in nature. Items that were unanimously agreed on were retained, and items in which disagreement arose were excluded. A total of 29 items were rated as both dependent and interpersonal, and thus were included in the present analyses. Examples of items include: “You fought with your parents over your personal goals, desires, or choice of friends” and “You had an argument with a close friend.” The consensus team also rated 13 items as noninterpersonal, including: “A close family member lost their job” and “You did poorly on or failed a test or class project.” Participants were asked to indicate how often such events occurred on a Likert scale ranging from 0 (*never*) to 4 (*always*), with higher scores reflecting a greater number of negative life events. In the current study, Cronbach’s alphas for dependent interpersonal stressors ranged from .88 to .90 and the internal consistency of noninterpersonal stressors across assessments ranged from .70 to .81.

*Perceived Control Scale (PCS)*. The PCS is a 24-item self-report questionnaire measuring beliefs about one’s perceived ability to exert control over outcomes in the academic, social, and behavioral domains (Weisz, Southam-Gerow, & Sweeney, 1998), and as it is a trait measure it was assessed only at Time 1. Examples of questions include: “I can get good grades if I really try,” “I can make friends with other kids if I really try,” and “I cannot stay out of trouble no matter how hard I try.” Participants are asked to rate items using a Likert scale ranging from 1 (*very false*) to 4 (*very true*), with higher scores reflecting a greater level of perceived control. The PCS has been shown across numerous studies to have strong test-retest reliability (e.g., Magaro & Weisz, 2006). In the current study, the Cronbach’s alpha was .88, indicating high internal consistency.

## Overview of Data Analytic Approach

To examine our proposed mediation models and stress generation perspective, we utilized idiographic, time-lagged multilevel modeling in which time was nested within individuals and followed the guidelines for multilevel mediation analyses set forth by Bauer, Preacher, and Gil (2006). Such an approach is ideal for examining mediation models that include repeated measures, and given that the model is estimated

**TABLE 1. Pearson Correlations, Means and Standard Deviations at the Initial Assessment**

Variables	1.	2.	3.	4.	5.	6.	7.	8.
1. Total Anxious Symptoms	–							
2. Physical Symptoms	.76***	–						
3. Harm Avoidance	.70***	.27**	–					
4. Separation Anxiety	.65***	.31***	.44***	–				
5. Social Anxiety	.83***	.49***	.45***	.45***	–			
6. Dependent Interpersonal Stress	.47***	.56***	.09	.16	.45***	–		
7. Noninterpersonal Stress	.30***	.41***	.07	–.008	.28**	.64***	–	
8. Perceived Control	–.32***	–.40***	.06	–.08	–.40***	–.62***	–.45***	–
Mean	77.02	21.98	22.51	13.18	19.34	54.67	25.02	37.38
Standard Deviation	15.57	6.86	5.29	3.38	6.55	15.22	7.26	9.71

Note. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

in a single equation, one can directly estimate the covariance of the random effects that are encompassed in different Level 1 and Level 2 models. Consequently, Bauer and colleagues' (2006) data analytic approach is preferable to mediation models that utilize a step-by-step process, which makes the implicit assumption that each step is independent (e.g., Baron & Kenny, 1986; Kenny, Korhmaros, & Bolger, 2003). We also examined the mediation effect of dependent interpersonal/noninterpersonal stress (i.e., test of the indirect effect); the mediation effect is given by path  $a*b$ , and the 95% confidence interval (CI) is computed following the formula presented in Bauer et al. (2006). The mediation effect is considered statistically significant if zero is not included in the CI. Specifically, we examined whether dependent interpersonal/noninterpersonal stress<sub>(Time T-1)</sub> mediated the relationship between perceived control and anxious symptoms<sub>(Time T)</sub>. Analyses were carried out using SAS (version 9.2) mixed procedure and maximum likelihood estimation. Our dependent variable was within-subject fluctuations in anxious symptoms<sub>(Time T)</sub>, which is a Level 1 variable. The primary predictor of anxious symptoms<sub>(Time T)</sub> was perceived control, a between-subject and Level 2 variable, and the mediator was within-subject fluctuations of dependent interpersonal/noninterpersonal stress<sub>(Time T-1)</sub>, a Level 1 variable. Each domain of anxious symptoms was examined separately. Four additional effects were included in this initial mean structure. First, to control for individual differences in baseline levels of anxious symptoms, a participant's initial anxious symptoms was included in the model. Second, to account for individual variability in the average level of anxious symptoms at his or her mean level of dependent interpersonal/noninterpersonal stress, a random effect for intercept was included in the model. Third, given that dependent interpersonal/noninterpersonal stress is a within-subject predictor whose effect is expected to vary from participant to participant, a random effect for slope was included in the model. Fourth, age was included as a covariate in all estimated models.

TABLE 2. Independent Samples *t* Test of Anxious Symptoms in Boys and Girls

	Boys Mean $\pm$ SD	Girls Mean $\pm$ SD	<i>t</i> Value
Total Anxious Symptoms			
Initial	73.84 $\pm$ 13.68	79.39 $\pm$ 18.17	-1.81
Follow-Up #1	71.6 $\pm$ 17.14	78.6 $\pm$ 18.91	-2.02*
Follow-Up #2	72.05 $\pm$ 17.91	78.97 $\pm$ 20.64	-1.74
Follow-Up #3	67.53 $\pm$ 16.35	77.42 $\pm$ 19.61	-2.69*
Follow-Up #4	66.69 $\pm$ 13.27	85.42 $\pm$ 17.15	-3.45**
Physical Symptoms			
Initial	21.10 $\pm$ 7.13	22.64 $\pm$ 6.62	-1.21
Follow-Up #1	20.02 $\pm$ 7.70	21.91 $\pm$ 6.89	-1.37
Follow-Up #2	19.78 $\pm$ 7.86	21.55 $\pm$ 6.74	-1.77*
Follow-Up #3	18.72 $\pm$ 6.88	21.88 $\pm$ 8.00	-2.08
Follow-Up #4	18.23 $\pm$ 5.25	24.50 $\pm$ 8.35	-2.47*
Harm Avoidance			
Initial	22.06 $\pm$ 5.34	22.85 $\pm$ 5.26	-0.80
Follow-Up #1	22.26 $\pm$ 6.04	23.42 $\pm$ 5.62	-1.03
Follow-Up #2	22.46 $\pm$ 6.51	23.95 $\pm$ 5.77	-1.20
Follow-Up #3	20.81 $\pm$ 6.47	23.17 $\pm$ 6.12	-1.87
Follow-Up #4	20.08 $\pm$ 4.96	24.46 $\pm$ 5.40	-2.45*
Social Anxiety			
Initial	18.44 $\pm$ 5.36	20.01 $\pm$ 7.28	-1.29
Follow-Up #1	17.98 $\pm$ 6.17	19.85 $\pm$ 7.25	-1.44
Follow-Up #2	17.17 $\pm$ 6.08	20.47 $\pm$ 8.31	-2.17*
Follow-Up #3	16.40 $\pm$ 6.31	19.71 $\pm$ 7.92	-2.27*
Follow-Up #4	17.85 $\pm$ 6.57	23.04 $\pm$ 6.51	-2.34*
Separation Anxiety			
Initial	12.24 $\pm$ 2.80	13.88 $\pm$ 3.62	-0.80**
Follow-Up #1	12.27 $\pm$ 3.09	13.43 $\pm$ 4.09	-1.03
Follow-Up #2	12.63 $\pm$ 3.65	13.40 $\pm$ 4.30	-1.20
Follow-Up #3	11.60 $\pm$ 2.83	13.03 $\pm$ 3.75	-1.87*
Follow-Up #4	10.54 $\pm$ 1.45	13.42 $\pm$ 2.97	-3.30**

\*  $p < .05$ ; \*\*  $p < .01$ ; significance values based on 2-tail *t* test.

## RESULTS

### Descriptive Statistics

Means, standard deviations, and Pearson correlations for all baseline measures are presented in Table 1. Independent samples *t* tests of the anxious symptom total score and the subscales (i.e., physical symptoms, harm avoidance, social anxiety, and separation anxiety) in boys and girls were conducted and are included in Table 2. While not statistically significant across all initial and follow-up assessments, the results indicated that girls report higher levels of anxious symptoms, irrespective of domain, over time.



**TABLE 3. Examining the Relationship between Perceived Control and Anxious Symptoms over Follow-Up Period ( $n = 118$ )**

	Total Anxious Symptoms		Physical Symptoms		Harm Avoidance		Social Anxiety		Separation Anxiety	
	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>	<i>b</i>	<i>t</i>
Perceived Control Total	-4.35	2.49*	-2.58	3.87***	0.91	-1.61	-2.18	3.22**	-0.41	1.21
Perceived Control Boys	-3.20	1.37	-3.29	3.33**	1.37	-1.59 <sup>†</sup>	-0.81	0.95	-0.32	0.65
Perceived Control Girls	-6.16	2.56*	-2.23	2.52*	0.39	-0.52	-3.71	4.01***	0.58	0.22

Note. <sup>†</sup> $p = .12$ ; \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ; *b* = beta coefficient; *t* = *t* value

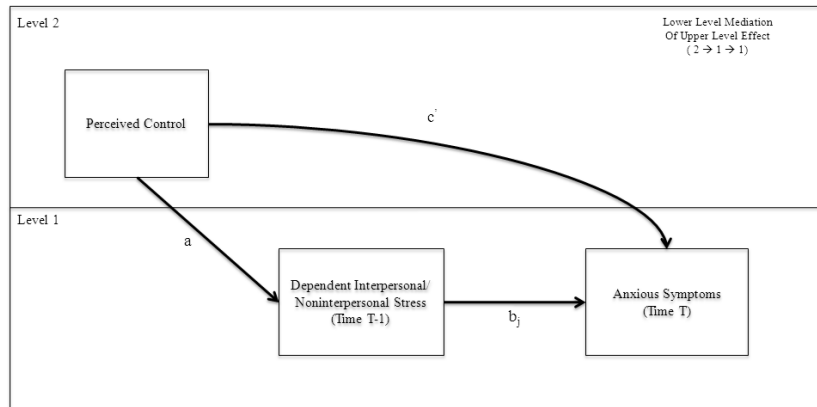
## Perceived Control as Predictors of Anxious Symptoms and Stress

Multilevel modeling was utilized in order to examine whether perceived control predicted changes in anxious symptoms over time. In line with our hypotheses, we conducted analyses to determine whether these main effect models varied as a function of gender. All models included an autoregressive covariance structure and a random intercept (see Table 3). Results of the main effect models suggest that it is important to examine boys and girls separately. Specifically, low perceived control was associated with greater total anxious symptoms over time. However, when examining the main effect separately for boys and girls, the relationship is not significant in boys, suggesting the effect may be driven by the strength of this relationship in girls. These differences were further supported when examining anxious symptom subscales. Specifically, low perceived control was associated with greater physical anxious symptoms in boys and approached significance with greater harm avoidance ( $p = .12$ ), however, perceived control was not associated with changes in the remaining anxious symptom subscales for boys. In contrast, low perceived control was associated with greater total, physical, and social anxiety symptoms in girls.

Similar to the main effects models described above, we also examined whether perceived control was associated with fluctuations in both dependent interpersonal and noninterpersonal stress over time. All models included an autoregressive covariance structure and a random intercept, and we estimated models for the total sample as well as for each gender. Results indicated that low perceived control for the total sample was associated with (a) greater dependent interpersonal stress [ $b = -5.33$ ,  $SE = 1.14$ ,  $t(102) = 4.67$ ,  $p < 0.001$ ] and (b) greater noninterpersonal stress [ $b = -2.22$ ,  $SE = 0.54$ ,  $t(104) = 4.08$ ,  $p < 0.001$ ]. With respect to boys, results indicated that lower perceived control was associated with (a) greater dependent interpersonal stress [ $b = -5.79$ ,  $SE = 1.59$ ,  $t(41) = 3.64$ ,  $p < 0.001$ ] and (b) greater noninterpersonal stress [ $b = -2.35$ ,  $SE = 0.77$ ,  $t(41) = 3.07$ ,  $p < 0.01$ ]. When examining girls, lower perceived control was associated with (a) greater dependent interpersonal stress [ $b = -5.87$ ,  $SE = 1.51$ ,  $t(61) = 3.90$ ,  $p < 0.001$ ] and (b) greater noninterpersonal stress [ $b = -2.23$ ,  $SE = 0.75$ ,  $t(61) = 4.67$ ,  $p < 0.01$ ].

## Stress Generation in Girls

Given the association between (a) perceived control and anxious symptoms and (b) perceived control and dependent interpersonal/noninterpersonal stress, we examined whether dependent interpersonal/noninterpersonal stress<sub>(Time T-1)</sub> mediated the relation-



**FIGURE 1.** Sample lower level mediation model examining the relationship between perceived control, dependent interpersonal/noninterpersonal stress<sub>(Time T-1)</sub> and anxious symptoms<sub>(Time T)</sub>

ship between perceived control and subsequent anxious symptoms<sub>(Time T)</sub> (for an example, see Figure 1). The association between perceived control and changes in anxious symptoms is an essential first step in mediation, and thus we only examined domains in which this relationship was significant. Specifically, we examined total, physical, and social anxiety symptoms. Each model included an autoregressive covariance structure and random effects for slope and intercept. First, in line with our preliminary main effect analyses, lower levels of perceived control predicted higher levels of dependent interpersonal stress over time [*path a*:  $b = -5.06$ ,  $SE = 1.52$ ,  $t(200) = 3.33$ ,  $p < 0.01$ ]. When controlling for the proportion of variance accounted for by dependent interpersonal stress<sub>(Time T-1)</sub> in predicting changes in follow-up total anxious symptoms<sub>(Time T)</sub> [*path bj*:  $b = 0.40$ ,  $SE = 0.08$ ,  $t(200) = 4.83$ ,  $p < 0.001$ ], high levels of dependent interpersonal stress<sub>(Time T-1)</sub> fully mediated the relationship between low levels of perceived control and high levels of anxious symptoms<sub>(Time T)</sub> [*path c'*:  $b = -0.95$ ,  $SE = 1.59$ ,  $t(200) = 0.60$ , *ns*]. The 95% CI suggests that the mediation effect is significant as the interval does not include zero [*path a\*bj*:  $b = 2.02$ ,  $SE = 0.75$ ; 0.55, 3.49]. Second, consistent with our preliminary analysis, low perceived control predicted a greater occurrence of dependent interpersonal stress [*path a*:  $b = -5.43$ ,  $SE = 1.54$ ,  $t(200) = 3.53$ ,  $p < 0.001$ ]. Dependent interpersonal stress<sub>(Time T-1)</sub> predicted changes in physical symptoms<sub>(Time T)</sub> [*path bj*:  $b = 0.08$ ,  $SE = 0.02$ ,  $t(200) = 3.25$ ,  $p < 0.01$ ] and low perceived control predicted changes in physical anxious symptoms during the course of the follow-up interval [*path c'*:  $b = -1.25$ ,  $SE = 0.62$ ,  $t(200) = 2.01$ ,  $p < 0.05$ ]. However, the test of the indirect effect indicated that the mediation model was not significant as the 95% CI included zero [*path a\*bj*:  $b = 0.50$ ,  $SE = 0.26$ ; -0.001, 1.00]. Last, lower levels of perceived control predicted higher levels of dependent interpersonal stress [*path a*:  $b = -4.59$ ,  $SE = 1.59$ ,  $t(200) = 2.88$ ,  $p < 0.01$ ]. After controlling for the proportion of variance accounted for by dependent interpersonal stress<sub>(Time T-1)</sub> in predicting changes in follow-up social anxiety symptoms<sub>(Time T)</sub> [*path bj*:  $b = 0.13$ ,  $SE = 0.03$ ,  $t(200) = 5.06$ ,  $p < 0.001$ ], high levels of interpersonal stress<sub>(Time T-1)</sub> fully mediated the relationship between low levels of perceived control and high levels of social anxiety symptoms<sub>(Time T)</sub> [*path c'*:  $b = -0.59$ ,  $SE = 0.53$ ,  $t(200) = 1.12$ , *ns*]. Again, the 95% CI indicates that the mediation effect is significant [*path a\*bj*:  $b = 0.74$ ,  $SE = 0.26$ ; 0.23, 1.25].

In order to provide a strong test of stress generation, we also examined mediation in the context of noninterpersonal stress. Results indicated the following. First, in the context of the single simultaneous model, low perceived control predicted higher levels of noninterpersonal stress [*path a*:  $b = -2.38$ ,  $SE = 0.77$ ,  $t(200) = 3.10$ ,  $p < 0.01$ ]. At the same time, noninterpersonal stress<sub>(Time T-1)</sub> did not predict changes in total anxious symptoms<sub>(Time T)</sub> over time [*path bj*:  $b = 0.29$ ,  $SE = 0.18$ ,  $t(200) = 1.57$ , *ns*]. Further, a test of the indirect effect indicated that the interval included zero, suggesting that the mediation model was not significant [*path a\*bj*:  $b = 0.70$ ,  $SE = 0.49$ ;  $-0.27, 1.66$ ]. Second, while lower levels of perceived control predicted higher levels of noninterpersonal stress over time [*path a*:  $b = -2.44$ ,  $SE = 0.76$ ,  $t(200) = 3.21$ ,  $p < 0.01$ ], noninterpersonal stress<sub>(Time T-1)</sub> did not predict changes in physical anxious symptoms<sub>(Time T)</sub> over time [*path bj*:  $b = 0.01$ ,  $SE = 0.08$ ,  $t(200) = 0.07$ , *ns*]. Additionally, the test of the indirect effect was not significant as the 95% CI included zero [*path a\*bj*:  $b = 0.01$ ,  $SE = 0.20$ ;  $-0.38, 0.41$ ]. Taken together, it suggests that the mediation model was not significant. Last, results indicated low perceived control was associated with higher levels of noninterpersonal stress over time [*path a*:  $b = -2.05$ ,  $SE = 0.78$ ,  $t(200) = 2.61$ ,  $p < 0.01$ ]. Additionally, noninterpersonal stress<sub>(Time T-1)</sub> predicted changes in social anxiety symptoms<sub>(Time T)</sub> [*path bj*:  $b = 0.16$ ,  $SE = 0.06$ ,  $t(200) = 2.50$ ,  $p < 0.05$ ], and low perceived control did not predict changes in social anxiety symptoms [*path c'*:  $b = -0.87$ ,  $SE = 0.51$ ,  $t(200) = 1.71$ , *ns*]. However, the test of the indirect effect indicated that the mediation model was not significant as the 95% CI included zero [*path a\*bj*:  $b = 0.33$ ,  $SE = 0.19$ ;  $-0.04, 0.70$ ].

## Stress Generation in Boys

Using the same data analytic approach outlined above, we examined whether dependent interpersonal/noninterpersonal stress<sub>(Time T-1)</sub> mediated the relationship between perceived control and subsequent anxious symptoms<sub>(Time T)</sub> in boys. Similar to our approach above, the association between perceived control and fluctuations in anxious symptoms over time is critical to mediation. Thus, we examined physical symptoms in the context of our stress generation mediation model, but we did not examine harm avoidance, separation anxiety, or social anxiety symptoms or total anxious symptoms. All models included an autoregressive heterogeneous covariance structure as well as random intercepts for slope and intercept. The following mediation model emerged. Consistent with our preliminary main effect analyses, lower levels of perceived control predicted higher levels of physical symptoms [*path c'*:  $b = -5.87$ ,  $SE = 1.89$ ,  $t(117) = 3.11$ ,  $p < 0.01$ ]. When controlling for the proportion of variance accounted for by dependent interpersonal stress<sub>(Time T-1)</sub> in predicting changes in follow-up physical anxious symptoms<sub>(Time T)</sub> [*path bj*:  $b = 0.14$ ,  $SE = 0.06$ ,  $t(117) = 2.45$ ,  $p < 0.05$ ], high levels of dependent interpersonal stress<sub>(Time T-1)</sub> fully mediated the relationship between low levels of perceived control and high levels of anxious symptoms<sub>(Time T)</sub> [*path a*:  $b = 0.32$ ,  $SE = 0.87$ ,  $t(117) = -0.37$ , *ns*]. The 95% CI suggests that the mediation effect is significant as the interval does not include zero [*path a\*bj*:  $b = 0.89$ ,  $SE = 0.45$ ;  $0.001, 1.77$ ].

With regards to noninterpersonal stress, when examining the single, simultaneous model, lower perceived control predicted higher levels of noninterpersonal stress over time [*path c'*:  $b = -2.32$ ,  $SE = 0.94$ ,  $t(117) = 2.46$ ,  $p < 0.05$ ]. Additionally, while noninterpersonal stress<sub>(Time T-1)</sub> predicted changes in anxious symptoms<sub>(Time T)</sub> [*path bj*:

$b = 0.19$ ,  $SE = 0.98$ ,  $t(117) = 1.99$ ,  $p < 0.05$ ], low perceived control did not predict changes in physical anxious symptoms over time [*path a*:  $b = -0.03$ ,  $SE = 0.90$ ,  $t(117) = -0.03$ , *ns*]. Further, the test of the indirect effect was not significant as the 95% CI included zero [*path a\*bj*:  $b = 0.45$ ,  $SE = 0.31$ ;  $-0.15, 1.05$ ]. Consequently, the mediation model including perceived control, noninterpersonal stress, and physical symptoms was not significant.

## DISCUSSION

In order to address existing theoretical and empirical gaps in the stress generation literature, we examined cognitive vulnerability models of stress generation in the context of anxious symptoms. The examination of anxious symptoms as opposed to disorders is important given that a larger percentage of the population suffers from subclinical anxiety (Kessler et al., 1994) and, further, subthreshold symptoms are associated with a multitude of short- and long-term negative consequences (see Williams, Reardon, Murray, & Cole, 2005). Overall, our results indicated that in girls, low perceived control contributed to a greater occurrence of dependent interpersonal but not noninterpersonal stressors, which then triggered higher levels of both social anxiety as well as total anxious symptoms. In contrast, for boys, the stress generation pattern only emerged when examining physical anxious symptoms. Several of these findings warrant additional attention.

### An Examination of Stress Generation Patterns in Adolescent Girls

When examining patterns of anxious symptoms throughout the course of the study, adolescent girls reported higher levels of anxious symptoms across domains as compared to boys. Yet, it is important to note that while overall scores in each domain were higher for girls across follow-up assessments, these differences were not uniformly statistically significant (see Table 2). Further, an examination of the main effect models across domains suggests that there may be different underlying vulnerability factors that are driving these effects. Specifically, in girls, lower perceived control was associated with higher levels of social, physical, and total anxious symptoms over time, but not anxiety symptoms related to harm avoidance or separation anxiety. Based on these preliminary analyses, we examined our proposed hypotheses. In line with our hypotheses, we found that low perceived control contributed to greater dependent interpersonal but not noninterpersonal stress, and such stress mediated the relationship between both perceived control and subsequent social anxiety and total anxious symptoms. With respect to social anxiety symptoms, the results suggest that lack of control generates dependent interpersonal stressors. That is, for girls who feel powerless to exert influence over relationships and social situations, this perception may influence how they approach these social contexts. For example, individuals may neglect certain individuals, socially inhibit, and/or isolate entirely from social environments (e.g., Heimberg, Holt, Schneier, Spitzer, & Liebowitz, 1993); in such cases, this may cause interpersonal tension or feuding with friends and family. Furthermore, over time, this may contribute to general worry as well as fear of performance and negative evaluation in social situations. Thus, consistent with the stress generation model, a diminished

perception of control contributes to greater dependent interpersonal stressors, which then triggers higher levels of social anxiety symptoms.

Given the disparity regarding the prevalence of anxiety disorders, it is not surprising that the stress generation pattern was significant in girls as opposed to boys. Specifically, epidemiological data suggests that anxiety disorders occur nearly twice as frequently in females as opposed to males (Costello & Angold, 1995). Our results indicated that low perceived control was associated with higher anxious symptoms over time, and the findings suggest that one pathway that perceived control exerts its impact is through dependent interpersonal, but not noninterpersonal, stressors. The stress generation pattern that emerged in girls (as opposed to boys) is consistent with initial research that surfaced regarding stress generation in adult women (i.e., Hammen, 1991). At the same time, the examination of symptom clusters suggests that it is important to look beyond total scores.

In contrast to our hypothesis, the stress generation effect did not predict changes in separation anxiety symptoms over time. The null findings suggest that there are likely other vulnerability factors and pathways that contribute to such symptoms. More specifically, an array of research has indicated that youth, particularly children, are susceptible to elevated levels of separation anxiety as a result of information processing biases, heightened anxiety sensitivity, and enhanced interoception for physical cues. For example, some individuals have a tendency to interpret ambiguous or marginally aversive situations as threatening (Waters, Craske, Bergman, & Treanor, 2008). As a result, these individuals view the world as being more dangerous while at the same time underestimating their capacity to effectively cope and navigate these situations (e.g., Creswell, Schniering, & Rapee, 2005). Thus, future research would benefit from investigating other cognitive vulnerability factors associated with such biases using approaches such as the Modified Stroop Task or the Dot-Probe Task (for review of cognitive biases in interpretation and attention, see Joormann, 2009) to determine if other cognitive vulnerability factors produce the stress generation pattern.

### **Deconstructing the Stress Generation Effect in Boys**

As indicated previously, our examination of gender specific differences regarding the stress generation pattern in boys was, in part, exploratory. While it was believed that girls would report higher levels of anxious symptoms across domains, we hypothesized that boys would report more physical and harm avoidance symptoms in comparison to social and separation anxiety symptoms. Further, we suspected that such symptoms would be triggered by low perceived control and a greater occurrence of dependent interpersonal stressors. Results indicated mixed findings. Specifically, lower perceived control did not predict changes in total anxious symptoms over time, which substantiated our belief about the need to examine specific symptoms clusters. However, the stress generation effect held for physical but not harm avoidance symptoms.

In line with our hypothesis, the results of time-lagged idiographic multilevel modeling indicated that a greater number of dependent interpersonal stressors mediated the relationship between low perceived control and subsequent physical anxious symptoms. These findings are consistent with the cognitive-behavioral framework, which underscores the importance of establishing a link between thoughts and behaviors, including physiological responses, in the context of overcoming anxiety. Thus, for boys, a perceived lack of control contributes to a greater occurrence of relational stres-

sors, and these stressors seem to trigger symptoms such as jitteriness, increased heart rate, and stomach queasiness. Further, while adolescent boys, by and large, experience less anxiety as compared to girls (e.g., Costello et al., 2003; Kessler et al., 2005), these findings suggest that there are subtle differences in terms of the constellation of symptoms that boys and girls endorse. As physical symptoms cut across a number of anxiety disorders, it suggests that it may be important to target different types of symptoms when treating boys versus girls.

In contrast to our hypothesis, dependent interpersonal stress did not mediate the relationship between low perceived control and higher levels of harm avoidance symptoms. When examining the relationship between low perceived control and harm avoidance over time in boys, the relationship approached significance. As the relationship was not significant in boys or girls, it suggests that the perception of control may not drive this type of anxious symptoms. Alternatively, it seems plausible that more avoidant-based strategies, including interpersonal inhibition or social withdrawal, may contribute to higher levels of harm avoidance symptoms. Thus, future research should explore whether vulnerability factors that may have more overlap with harm avoidance trigger the stress generation process.

## Limitations

There are a number of strengths to the current study, including the employment of a multi-wave longitudinal design which allows us to disentangle the time-lagged relationship between vulnerability factors, stress, and subsequent anxious symptoms. At the same time, it is important to note several limitations. First, self-report measures were utilized to assess cognitive vulnerability, stress, and anxious symptoms. While self-report instruments provide a wealth of information, they may be prone to response bias. Future research would benefit from utilizing third-party report, observational techniques, and interviews. Second, while the MASC has demonstrated sufficient capacity to discriminate between the symptom clusters, it cannot assign diagnoses. As the present study demonstrated preliminary support for examining symptom clusters, future research would benefit from examining whether the stress generation effect is applicable when examining related anxiety disorders. Last, Hammen and Shih (2008) indicated that there are a number of methodological problems that arise when using self-report measures of stress including but not limited to difficulties disentangling objective versus subjective threat and potential gender biases regarding women's tendency to report an event as more stressful as compared to men. In light of these limitations, Hammen and Shih suggest using a contextual threat interview as a means of minimizing methodological confounds. Since the present study used a negative event checklist, future research would benefit from using a semistructured interview that adequately discriminates dependent versus independent stressors as well as examines the subjective versus objective consequences of such stressors.

## Summary and Clinical Implications

In sum, the research described in this article addresses an important gap in stress generation research. Specifically, the results indicate that for girls, low perceived control contributed to greater dependent interpersonal stress, and such stress lead to a greater

occurrence of social anxiety and total anxious symptoms. With regards to boys, low perceived control triggered dependent interpersonal stressors and subsequent physical anxious symptoms. Overall, the results suggest that while stress generation may be more predictive of depression, it also predicts anxious symptoms in adolescent samples. Further, the results provide additional support for examining cognitive vulnerability predictors of the stress generation process.

It is also important to place the findings in a clinical context, and the results strongly suggest that underlying cognitive vulnerability may trigger different symptom patterns in girls as opposed to boys. Arguably, cognitive-behavioral therapy is the prevailing approach to treat anxiety disorders. Such an approach teaches patients to both identify and challenge maladaptive cognitions as a means of attenuating painful, negative affect (e.g., Beck, 1995). For girls, negative automatic thoughts about feeling powerless and helpless appear to exacerbate relational stressors and social anxious symptoms. Thus, it may be important for girls who exhibit low perceived control to identify the themes of thoughts associated with these underlying beliefs. Further, it is essential for girls to understand which situations or environmental contexts trigger these patterns of thoughts. Once these patterns are readily identified, there is an opportunity for girls to challenge the negative automatic thoughts and thereby reduce the severity of the social anxiety symptoms. As boys seem to be more susceptible to physical symptoms, it may be important during the initial phases of therapy to furnish a strong understanding of the physical symptoms associated with anxiety. In doing so, it may allow boys to gain more "control" over such symptoms, and thus challenge the thoughts associated with anxious symptoms. As the clinical needs of girls and boys may differ in therapy, it is important to tailor gender sensitive approaches rather than apply a one-size-fits-all model.

## REFERENCES

- Auerbach, R. P., Eberhart, N. K., & Abela, J.R.Z. (2010). Cognitive vulnerability to depression in Canadian and Chinese adolescents. *Journal of Abnormal Child Psychology, 38*, 57-68.
- Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.
- Bauer, D.J., Preacher, K.J., & Gil, K.M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: New procedures and recommendations. *Psychological Methods, 11*, 142-163.
- Beck, J. S. (1995). *Cognitive therapy: Basics and beyond*. New York: Guilford.
- Caldwell, M. S., Rudolph, K. D., Troop-Gordon, W., & Kim, D. Y. (2004). Reciprocal influences among relational self-views, social disengagement, and peer stress during early adolescence. *Child Development, 75*, 1140-1154.
- Capps, L., Sigman, M., Sena, R., Henker, B., & Whalen, C. (1996). Fear, anxiety and perceived control in children of agoraphobic parents. *Journal of Child Psychology and Psychiatry, 37*, 445-452.
- Chandra, A., & Minkovitz, C. (2006). Stigma starts early: Gender differences in teen willingness to use mental health services. *Journal of Adolescent Health, 38*, 754.e1-754.e8.
- Chorpita, B. E., & Barlow, D. H., 1998. The development of anxiety: The role of control in the early environment. *Psychological Bulletin, 124*, 3-21.
- Cohen, P., Cohen, J., & Brook, J. (1993). An epidemiological study of disorders in late childhood and adolescence-II. Persistence of disorders. *Journal of Child Psychology and Psychiatry, 34*, 869-877.
- Connolly, N. P., Eberhart, N. K., Hammen, C. L., & Brennan, P.A. (2010). Specificity of stress generation processes: A comparison of adolescents with depressive disorders, anxiety disorders, and comorbid depression and anxiety. *International Journal of Cognitive Therapy, 3*, 368-379.

- Costello, E. J., & Angold, A. (1995). Epidemiology. In J. S. March (Ed.), *Anxiety disorders in children and adolescents* (pp. 109–124). New York: Guilford.
- Costello, E., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*, *60*, 837–844.
- Creswell, C., Schniering, C. A., & Rapee, R. M. (2005). Threat interpretation in anxious children and their mothers: Comparison with non-clinical children and the effects of treatment. *Behaviour Research and Therapy*, *43*, 1375–1381.
- Cui, X. J., & Vaillant, G. E. (1997). Does depression generate negative life events? *Journal of Nervous and Mental Disease*, *185*, 145–150.
- Daley, S. E., Hammen, C., Davila, J., & Burge, D. (1998). Axis II symptomatology, depression, and life stress during the transition from adolescence to adulthood. *Journal of Consulting and Clinical Psychology*, *66*, 595–603.
- Eberhart, N. K., Auerbach, R. P., Bigda-Peyton, J., & Abela, J.R.Z. (in press). Maladaptive schemas and depression: Tests of transactional and diathesis-stress models. *Journal of Social and Clinical Psychology*.
- Essau, C. A., Conradt, J., & Petermann, F. (2000). Frequency, comorbidity, and psychosocial impairment of anxiety disorders in German adolescents. *Journal of Anxiety Disorders*, *14*, 263–279.
- Furmark, T., Tillfors, M., Everz, P., Marteinsdottir, I., Gefvert, O., & Fredrikson, M. (1999). Social phobia in the general population: Prevalence and sociodemographic profile. *Social Psychiatry and Psychiatric Epidemiology*, *34*, 416–423.
- Garland, A., & Zigler, E. (1994). Psychological correlates of help-seeking attitudes among children and adolescents. *American Journal of Orthopsychiatry*, *64*, 586–593.
- Gibb, B. E., Beevers, C. G., Andover, M. S., & Holleran, K. (2006). The hopelessness theory of depression: A prospective multi-wave test of the vulnerability-stress hypothesis. *Cognitive Therapy and Research*, *30*, 763–772.
- Grant, B. F., Hasin, D. S., Stinson, F. S., Dawson, D. A., Goldstein, R. B., Smith, S., et al. (2006). The epidemiology of DSM-IV panic disorder and agoraphobia in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry*, *67*, 363–374.
- Grills-Taquechel, A. E., Ollendick, T., & Fisak, B. (2008). Reexamination of the MASC factor structure and discriminant ability in a mixed clinical outpatient sample. *Depression and Anxiety*, *25*, 942–950.
- Hammen, C. (1991). Generation of stress in the course of unipolar depression. *Journal of Abnormal Psychology*, *100*, 555–561.
- Hammen, C., & Shih, J. H. (2008). Stress generation and depression. In K. S. Dobson & D.J.A. Dozois (Eds.), *Risk factors in depression* (pp. 409–428) New York: Elsevier.
- Hammen, C., Shih, J. H., & Brennan, P. A. (2004). Intergenerational transmission of depression: Test of an interpersonal stress model in a community sample. *Journal of Consulting and Clinical Psychology*, *72*, 511–522.
- Hankin, B. L., & Abramson, L. Y. (2002). Measuring cognitive vulnerability to depression in adolescence: Reliability, validity, and gender differences. *Journal of Clinical Child and Adolescent Psychology*, *31*, 491–504.
- Hankin, B. L., Kassel, J. D., & Abela, J.R.Z. (2005). Adult attachment dimensions and specificity of emotional distress symptoms: Prospective investigations of cognitive risk and interpersonal stress generation as mediating mechanisms. *Personality and Social Psychology Bulletin*, *31*, 136–151.
- Hankin, B. L., Mermelstein, R., & Roesch, L. (2007). Sex differences in adolescent depression: Stress exposure and reactivity models. *Child Development*, *78*, 279–295.
- Harkness, K. L., & Luther, J. (2001). Clinical risk factors for the generation of life events in major depression. *Journal of Abnormal Psychology*, *110*, 564–572.
- Harkness, K. L., & Stewart, J. G. (2009). Symptom specificity and the prospective generation of life events in adolescence. *Journal of Abnormal Psychology*, *118*, 278–287.
- Heimberg, R. G., Holt, C. S., Schneier, R. R., Spitzer, R. L., & Liebowitz, M. R. (1993). The issue of subtypes in the diagnosis of social phobia. *Journal of Anxiety Disorders*, *7*, 249–269.
- Joiner, T. E., Jr., Wingate, L. R., Gencoz, T., & Gencoz, F. (2005). Stress generation in depression: Three studies on its resilience, possible mechanism, and symptom specificity. *Journal of Social and Clinical Psychology*, *24*, 236–253.
- Joiner, T. E., Jr., Wingate, L. R., & Otamendi, A. (2005). An interpersonal addendum to the hopelessness theory of depression: Hopelessness as a stress and depression generator. *Journal of Social and Clinical Psychology*, *24*, 649–664.
- Joormann, J. (2009). Cognitive aspects of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (2<sup>nd</sup> ed., pp. 298–321). New York: Guilford.
- Kenny, D.A., Korchmaros, J.D., & Bolger, N. (2003). Lower level mediation in multilevel models. *Psychological Methods*, *8*, 115–128.



- Kessler, R. C., Berglund, P., Demler, O., Jin, R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*, 593–602.
- Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., et al. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry*, *52*, 1048–1060.
- Liu, R. T., & Alloy, L. B. (2010). Stress generation in depression: A systematic review of the empirical literature recommendations for future study. *Clinical Psychology Review*, *30*, 582–593.
- Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Seeley, J. R., & Allen, N. B. (1998). Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology*, *107*, 109–117.
- March, J. S. (1997). *Multidimensional anxiety scale for children: Technical manual*. Toronto, ON: Multi-Health Systems.
- March, J. S., Parker, J.D.A., Sullivan, K., & Stallings, P. (1997). The Multidimensional Anxiety Scale for Children (MASC): Factor structure, reliability, and validity. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*, 554–565.
- Margaro, M.M. & Weisz, J.R. (2006). Perceived control mediates the relation between parental rejection and youth depression. *Journal of Abnormal Child Psychology*, *34*, 867–876.
- Masi, G., Millepiedi, S., Mucci, M., Poli, P., Bertini, N., & Milantoni, L. (2004). Generalized anxiety disorder in clinically referred children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, *43*, 752–760.
- Riskind, J. H., Black, D., & Shahar, G. (2010). Cognitive vulnerability to anxiety in the stress generation process: Interaction between the looming cognitive style and anxiety sensitivity. *Journal of Anxiety Disorders*, *24*, 124–128.
- Rudolph, K. D. (2008). Developmental influences on interpersonal stress generation in depressed youth. *Journal of Abnormal Psychology*, *117*, 673–679.
- Rudolph, K. D., Hammen, C. H., Burge, D., Lindberg, N., Herzberg, D., & Daley, S. E. (2000). Toward an interpersonal life-stress model of depression: The developmental context of stress generation. *Development and Psychopathology*, *12*, 215–234.
- Safford, S. M., Alloy, L. B., Abramson, L. Y., & Crossfield, A. G. (2007). Negative cognitive style as a predictor of negative life events in depression-prone individuals: A test of the stress generation hypothesis. *Journal of Affective Disorders*, *99*, 147–154.
- Sahl, J. C., Cohen, L. H., & Dasch, K. B. (2009). Hostility, interpersonal competence, and daily dependent stress: A daily model of stress generation. *Cognitive Therapy and Research*, *33*, 199–210.
- Shahar, G., & Priel, B. (2003). Active vulnerability, adolescent distress, and the mediating/suppressing role of life events. *Personality and Individual Differences*, *35*, 199–218.
- Shear, K., Jin, R., Ruscio, A. M., Walters, E. E., & Kessler, R. C. (2006) Prevalence and Correlates of estimated DSM-IV child and adult separation anxiety disorder in the National Comorbidity Survey Replication. *American Journal of Psychiatry*, *163*, 1074–1083.
- Shih, J. H., Abela, J.R.Z., & Starrs, C. (2009). Cognitive and interpersonal predictors of stress generation in children of affectively ill parents. *Journal of Abnormal Child Psychology*, *37*, 195–208.
- Simons, A. D., Angell, K. L., Monroe, S. M., & Thase, M. E. (1993). Cognition and life stress in depression: Cognitive factors and the definition, rating, and generation of negative life events. *Journal of Abnormal Psychology*, *102*, 584–591.
- Waters, A. M., Craske, M. G., Bergman, L., & Treanor, M. (2008). Threat interpretation bias as a vulnerability factor for childhood anxiety disorders. *Behaviour Research and Therapy*, *46*, 39–47.
- Weems, C. F., & Silverman, W. K. (2006). An integrative model of control: Implications for understanding emotion regulation and dysregulation in childhood. *Journal of Affective Disorders*, *91*, 113–124.
- Weisz, J. R., Southam-Gerow, M. A., & Sweeney, L. (1998). *The Perceived Control Scale for children*. Los Angeles: University of California Press.
- Williams, N. L., Reardon, J. M., Murray, K. T., & Cole, T. M. (2005). Anxiety disorders: A developmental vulnerability-stress perspective. In B. L. Hankin & J.R.Z. Abela (Eds.), *Development of psychopathology: A vulnerability-stress perspective* (pp. 289–327). Thousand Oaks, CA: Sage.
- Wu, P., Goodwin, R. D., Fuller, C., Lui, X., Comer, J. S., Cohen, P., et al. (2010). The relationship between anxiety disorders and substance use among adolescents in the community: Specificity and gender differences. *Journal of Youth and Adolescence*, *39*, 177–188.