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Sex differences in domain-specific depressogenic cognitive responses to negative and positive life events

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ABSTRACT

Maladaptive cognitive responses to stressful life events represent well-replicated risk factors for depression. Research indicates that stressful life events that are dependent on the individual to occur or are interpersonal may generate more maladaptive cognitive responses than those that are independent and/or non-interpersonal. The current study examined the roles of sex and life event domains in eliciting depressogenic cognitive responses. Participants were 212 (71% female) undergraduate students who completed seven weekly questionnaires on participant-identified most negative and most positive life events over the previous 7 days. Additionally, participants reported levels of brooding and cognitive style in response to the most negative event and levels of positive rumination and dampening in response to the most positive event. Data were analyzed using mixed ANOVAs. Results indicated that females engaged in greater brooding regardless of event dependency. In addition, dependent and interpersonal life events generated greater brooding while dependent and non-interpersonal negative events generated greater negative cognitive style. An interaction between sex and domain was observed for dampening positive life events, such that males did not differ between interpersonal and non-interpersonal life events while females were more likely to dampen following interpersonal life events than non-interpersonal events.

1. Introduction

Cognitive vulnerability-stress models of depression suggest that certain cognitive responses to negative and positive stressful life events confer risk for depression (Abramson, Metalsky, & Alloy, 1989; Ciesla, Felton, & Roberts, 2011). Stressful life events may be characterized as any event that requires the individual to adapt and respond (Lazarus, 1990) and can differ in valence, such as whether they are appraised by the individual as positive or negative. Stressful life events can also differ by event domain, such as whether the event's occurrence was dependent on the individual behavior or independent and whether the event is non-interpersonal or interpersonal (Hankin, Stone, & Wright, 2010). There is a growing body of evidence suggesting that the extent to which a stressful life event is dependent on one's actions and/or is interpersonal exert unique effects on mental health outcomes in adolescence (Kendler, Thornton, & Prescott, 2001), and adolescents may be particularly likely to deploy maladaptive cognitive responses that over time predict depressive symptoms (Nicolai, Laney, & Mezulis, 2013). Research also suggests that females and males may respond differently to certain domains of stressful life events, which may partially account for the sex difference in depression among older adolescents (Mezulis, Abramson, & Hyde, 2002). Examining how cognitive responses to negative and positive life events may differ across life event domain and sex may improve understanding of cognitive influences in the emergence of the sex difference in depression prevalence that emerges in adolescence. Therefore, the purpose of the current study was to examine how depressogenic cognitive responses may differ by event domain and sex among older adolescents.

1.1. Stressful life events may elicit maladaptive cognitive responses

Research suggests that maladaptive cognitive responses to stressful life events affect the duration and intensity of the emotional states elicited by such events (Feldman, Joormann, & Johnson, 2008; Nolen-Hoeksema & Morrow, 1991). Maladaptive cognitive responses may include responding to negative life events with cognitive responses that intensify or prolong negative mood states and/or responding to positive life events with cognitive responses that diminish or shorten positive mood states.

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1.1.1. Cognitive responses to negative life events

Maladaptive cognitive responses to negative life events include those that direct attention toward negative stimuli or evaluate the event in ways that intensify negative emotions and predispose individuals to depressive symptoms (Beck, 1967). One maladaptive cognitive response is *brooding*, which describes responding to negative events and mood states with perseverative cognitive focus on negative content about the self, world and future. Brooding represents a maladaptive cognitive process that predicts greater depressive symptoms (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Research demonstrates that brooding in response to negative life events predicts greater depressive symptoms (Mezulis, Simonson, McCauly, & Vander Stoep, 2011). More specifically, brooding in response to events that depend on the person's actions to occur or are interpersonal predicts depressive symptoms. However, no effect of brooding is found for independent and non-interpersonal domains (Nicolai et al., 2013).

Another maladaptive cognitive response to negative life events is *negative cognitive style*. According to hopelessness theory of depression (Abramson et al., 1989), individuals with a negative cognitive style generate negative inferences about themselves, global and stable attributions about the causes of events, and negative expectations of future consequences. Negative cognitive style represents a cognitive vulnerability to depression, with greater negative cognitive style predicting greater depressive symptoms among older adolescents (Hankin, Fraley, & Abela, 2005; Hyde, Mezulis, & Abramson, 2008). Although brooding and negative cognitive style both describe depressogenic cognitive responses, they represent distinct cognitive responses to negative life events that uniquely predict depressive symptoms (Hankin, Lakdawalla, Latchis-Carter, Abela, & Adams, 2007).

1.1.2. Cognitive responses to positive life events

Similar to negative life events, positive life events also may elicit cognitive responses that predispose individuals to depressive symptoms by diminishing positive emotions elicited by events (Fredrickson, 2001). One cognitive response to positive life events is *positive rumination*, which describes responding to positive events and mood states with perseverative cognitive focus on positive content. Positive rumination represents an adaptive cognitive process that predicts fewer depressive symptoms distinctly from rumination in response to negative life events (Feldman et al., 2008).

Another cognitive response to positive life events is *dampening*, which describes responding to positive events and mood states by suppressing positive emotions or distracting attention from positive events (Quoidbach, Berry, Hansenne, & Mikolajczak, 2010). Dampening predicts greater depressive symptoms independently of brooding and positive rumination (Feldman et al., 2008; Raes, Smets, Nelis, & Schoofs, 2012). Positive rumination represents an adaptive cognitive response, while dampening represents a maladaptive cognitive response to stressful life events. While the emerging research on cognitive responses to positive life events demonstrates the differential effects of positive rumination and dampening on depressive symptoms (Feldman et al., 2008; Quoidbach et al., 2010; Raes et al., 2012); however, no research has investigated the effect of these responses by event domain.

1.2. Examining life events by valence and domain

Literature investigating the relationship between life events and depression has predominantly focused on stressful negative life events and how individuals cognitively respond in ways that increase or decrease negative emotions elicited by events. However, researchers have recently begun investigating the effects of responses to positive life events and how individuals may cognitively respond in ways that increase or decrease positive emotions elicited by events (Feldman et al., 2008; Larsen & Prizmic, 2004). Research demonstrates that cognitive responses that increase negative emotions and diminish positive emotions predict depressive symptoms, indicating that responses to both negative and positive life events may be critical to understanding depression in adolescence (Raes et al., 2012).

In addition to varying by emotional valence, stressful life events can be differentiated by domain. Much of the extant research on stress has relied on global measures of stress exposure that address stress as a unitary construct (Ge, Conger, & Elder, 2001). More recently, however, researchers have identified domains of life events which may have differential effects on depressive symptoms (Kendler et al., 2001; Nicolai et al., 2013). One event domain is the extent to which the event occurrence is dependent on the individual's actions, characteristics, or mood. For example, doing poorly on a test or school assignment likely was dependent upon the individual's actions and characteristics, whereas a death in the family likely was independent of the individual's actions and characteristics (Hankin et al., 2010). Several studies have documented a unique association between dependent negative life events and depressive symptoms (Hankin et al., 2010; Kercher & Rapee, 2009), supporting the argument that different domains of stressful life events exert differential effects in the prediction of depressive symptoms.

Another salient event domain, particularly in adolescence, is interpersonal relationships. Interpersonal life events involve interactions with others. For example, doing poorly on a test would be considered a non-interpersonal event, whereas an argument with a friend or parent would be considered an interpersonal event. Several studies found a unique influence of interpersonal stressors on mental health during adolescence (Cohen & Wills, 1985; Cyranowski, Frank, Young, & Shear, 2000). For instance, increases in stress within friendships have been linked to lower self-esteem and greater depressive symptoms (Cambron, Acitelli, & Pettit, 2009). It may be that individuals are more likely to engage in maladaptive cognitive responses to interpersonal events, in turn increasing depressive symptoms. However, no research to our knowledge has investigated cognitive responses to positive life events by domain.

1.3. Sex differences in maladaptive cognitive responses to life events

In adolescence, females report significantly more depressive symptoms than males (Mezulis, Funasaki, Charbonneau, & Hyde, 2010; Wade, Cairney, & Pevalin, 2002). One reason for this sex difference may be that females are more likely to engage in maladaptive cognitive responses to life events and less likely to engage in adaptive cognitive responses. Research indicates that females display greater brooding (Mezulis et al., 2002) and greater cognitive style (Hankin & Abramson, 2002) in response to negative life events. In the emerging literature on domain-specific cognitive responses, research suggests that females exhibit greater brooding in response to interpersonal and achievement stressors domains (Mezulis et al., 2002) and greater negative cognitive style in response to stressors regarding physical appearance or body-image domains (Rood, Roelofs, Bögels, & Meesters, 2012). Sex differences in cognitive responses to positive life events may additionally contribute to the sex difference in depression. However, as noted above, there is little research examining which domains of positive life events are most likely to elicit maladaptive cognitive responses or whether event-specific cognitive responding differs by event domain for females and males.

1.4. The current study

Research has demonstrated the depressogenic effects of several cognitive responses to stressful life events. However, few studies have investigated whether certain domains of life events elicit different cognitive responses. As a result, the relationships between cognitive responses, sex, and event domains are poorly understood. While there is mounting evidence for domain-specific responses to negative life events and mood, no research to our knowledge has assessed domain-specific responses to positive life events. Characterizing these relationships may result in a richer portrait of the processes linking both negative and positive life events to depressive symptoms. To address this empirical gap, the current study uses a seven-week prospective diary design to investigate whether depressogenic cognitive responses to life events (brooding, negative cognitive style, positive rumination, and dampening) vary by life event domain (dependent/independent and interpersonal/non-interpersonal) and sex. Due to the salience of dependent and interpersonal domains in adolescence, we hypothesized that dependent and interpersonal life events would elicit greater brooding, negative cognitive style, and dampening, and less positive rumination. Additionally, we expected females to report greater brooding, negative cognitive style and dampening but less positive rumination than males, particularly in response to interpersonal life events.

2. Method

2.1. Participants

Participants were 212 (71.2% female) undergraduate students recruited from a university in the Pacific Northwest. Participants were at least 18 years old, with a mean age of 18.92 years (SD = 2.32 years). Approximately 71.1% were Caucasian, 13.7% were Asian, 5.2% were Hispanic/Latino, 2.8% were African American, 0.9% were Native American, and 6.2% identified as another ethnicity.

2.2. Procedure

Participants were recruited from undergraduate psychology courses to complete a baseline questionnaire followed by weekly questionnaires for seven consecutive weeks. Each week participants completed online questionnaires in which they provided their most negative life event and most positive life event of the preceding week. Participants were then asked to report on their degree of brooding and negative cognitive style for the negative life event and their degree of positive rumination and dampening for the positive life event. Participants completed each weekly assessment during a 48 h window to maintain an interval of approximately 1 week between assessments. The average number of weekly assessments completed was 6.59 out of a possible 7. In total, 75.00% of participants completed all seven weekly assessments, 17.90% completed six assessments, 3.80% completed five assessments, 1.40% completed four assessments, and 1.90% completed three or fewer assessments. Participants received course credit for their participation in the study.

2.3. Measures

2.3.1. Weekly negative and positive life events

After each participant identified their most negative life event and most positive life event that occurred during the preceding week, each event was coded for dependence or independence (Hankin & Abramson, 2002; Kercher & Rapee, 2009) by two raters. An event was coded as dependent if it was contingent on the participant to occur, such as, "I received a bad grade on an exam." Conversely, an event was coded as independent if it was not contingent on the participant to occur, such as "A relative was diagnosed with cancer." In addition, each event was coded as non-interpersonal or interpersonal (Cambron et al., 2009). An event was coded as non-interpersonal if it did not involve others, such as "I received an A on an exam." Conversely, an event was coded as interpersonal if it involved others, such as "Had an argument with my father." Inter-rater reliability across domain and valence ranged between κ = .74 and .82.

2.3.2. Brooding

Weekly brooding on the reported negative life event was assessed using the five item brooding subscale of the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991), which was anchored to the most negative weekly event. Participants rated to what extent they brooded in response to their most negative weekly event on a four-point scale ranging from 1 (*Almost never*) to 4 (*Almost always*). Higher scores indicated greater brooding. A mean domain-specific brooding score was calculated across 7 weeks for each of the four event domains (e.g., mean brooding for independent events). Cronbach's alpha coefficients for the brooding subscale ranged from .72 to .78 across nonclinical samples (Treynor et al., 2003). In our study, the internal consistency for the brooding subscale averaged α = .83 across 7 weeks (range of .81–.86).

2.3.3. Negative cognitive style

Weekly negative cognitive style was measured using the Cognitive Style Questionnaire (CSQ; Haeffel et al., 2008), which was anchored to the most negative weekly event. The CSQ assesses inferences about causes (internality; stability; and globality; 3 items); consequences (1 item); and self (1 item) following events, so participants rated on a 7-point Likert scale the causes, consequences, and self-inferences related to their most negative weekly event. Higher scores indicated greater negative cognitive style. A mean domain-specific negative cognitive style score was calculated across the 7 weeks for each of the four event domains (e.g., mean negative cognitive style for non-interpersonal events). Cronbach's alpha coefficients for the CSQ ranged from .88 to .96 across numerous clinical and nonclinical samples (Haeffel et al., 2008). In our study, the internal consistency for the CSQ averaged α = .79 across 7 weeks (range of .75–.80).

2.3.4. Positive rumination

Weekly positive rumination was assessed using the Reponses to Positive Affect (RPA; Feldman et al., 2008), which was anchored to the most positive weekly event. Participants rated to what extent they positively ruminated (i.e., 'Think about how proud you are of yourself') in response to their most positive weekly event on a 4-point scale ranging from 1 (*Almost never*) to 4 (*Almost always*). Higher scores indicated greater positive rumination. A mean domain-specific positive rumination score was calculated across the 7 weeks for each of the four event domains. Cronbach's alpha coefficients for positive rumination ranged from .73 to .76 across previous nonclinical samples (Feldman et al., 2008). In our study, the internal consistency for positive rumination averaged α = .86 across 7 weeks (range of .80–.89).

2.3.5. Dampening

Weekly dampening was also assessed using the RPA (Feldman et al., 2008), which was anchored to the most positive weekly event. Participants rated to what extent they dampened (i.e., 'Think about the things that have not gone well for you') in response to their most positive weekly event on a 4-point scale ranging from

1 (*Almost never*) to 4 (*Almost always*). A mean domain-specific dampening score was calculated across the 7 weeks for each of the four event domains. The Cronbach's alpha coefficient for dampening was reported as .79 in a previous nonclinical sample (Feldman et al., 2008). In our study, the internal consistency for dampening averaged $\alpha = .75$ across 7 weeks (range of .70–.82).

2.4. Data analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) 21.0 to examine differences in domain-specific cognitive responses to negative and positive life events by sex. Mixed Analyses of Variance (ANOVAs) were performed with event domain as the within-subjects variable and sex as the between-subjects variable. Two ANOVAs were performed for each of the four cognitive responses, one examining dependent vs. independent domains and one examining non-interpersonal vs. interpersonal domains, for a total of eight analyses. To control for family-wise error, we utilized Holm's sequential Bonferroni corrections (Holm, 1979).

3. Results

Descriptive statistics and ANOVA results are presented in Table 1 and effect sizes for significant analyses are provided in text. Across weeks, the correlations between brooding and negative cognitive style ranged from .11 to .52, the correlations between brooding and positive rumination ranged from .02 to .20, and the correlations between brooding and dampening ranged from .20 to .46. Additionally, the correlations between negative cognitive style and positive rumination ranged from .00 to .10 and the correlations between negative cognitive style and dampening ranged from .07 to .35. Finally, the correlations between dampening and positive rumination ranged from .00 to .19.

3.1. Does brooding differ by sex and event domain?

The sex by event domain analyses for all cognitive responses are represented graphically in Fig. 1. Consistent with our hypotheses, results indicated greater brooding in response to dependent negative life events compared to independent negative life events ($r = .30$), and greater brooding in response to interpersonal negative life events compared to non-interpersonal negative life events ($r = .35$). There was a main effect of sex such that females brooded more than males regardless of an event being dependent or independent ($r = .22$). In contrast, there was no sex difference for non-interpersonal and interpersonal event domains. There was no significant sex by event domain interaction.

3.2. Does negative cognitive style differ by sex and event domain?

Also consistent with our hypotheses, results indicated greater negative cognitive style in response to dependent negative life events compared to independent negative life events ($r = .56$). Contrary to our hypotheses, however, negative cognitive style was greater in response to non-interpersonal negative life events compared to interpersonal negative life events ($r = .28$). There were no main effects of sex, and there was no significant sex by event domain interaction.

3.3. Does positive rumination differ by sex and event domain?

Contrary to our hypotheses, we found no significant main effects of sex or event domain for positive rumination. Additionally, there was no significant sex by event domain interaction.

3.4. Does dampening differ by sex and event domain?

There were no significant main effects for sex or event domain for dampening. However, there was a significant interaction between sex and event domain. To examine the interaction, we chose to evaluate differences in dampening between domains for males and females separately. The simple slope analysis indicated there were no significant differences between interpersonal and non-interpersonal for males, $F(1, 171) = 2.33$, $p = .129$, $r = .12$. In contrast, there were significant differences for females, $F(1, 171) = 5.63$, $p = .019$, $r = .18$, such that females were more likely to dampen following interpersonal positive life events.

4. Discussion

The purpose of the current study was to examine the extent to which cognitive responses to negative and positive life events vary by sex and event domain. Furthermore, we evaluated whether these relationships were different for females and males. We hypothesized that dependent and interpersonal life events would

Table 1
Means, standard deviations, and ANOVA statistics for cognitive responses by sex and event domain.

Cognitive response	Event domain	Male (SD)	Female (SD)	ANOVA	Main Effect				Interaction	
				df	Sex		Domain		Sex × domain	
					F	*p*	*F*	*p*	*F*	*p*
Brooding	Dependent	8.69 (2.76)	10.22 (3.42)	1, 180	**9.27**	.003	**18.15**	<.001	0.01	.938
	Independent	7.77 (3.20)	9.34 (3.55)							
	Non-interpersonal	8.59 (3.61)	9.59 (3.20)	1, 171	2.47	.118	**23.47**	<.001	0.28	.600
	Interpersonal	9.92 (3.91)	10.66 (3.69)							
Negative cognitive style	Dependent	3.86 (1.10)	4.48 (0.93)	1, 180	5.70	.018	**80.61**	<.001	2.14	.145
	Independent	3.01 (0.95)	3.48 (1.06)							
	Non-interpersonal	3.82 (1.23)	4.06 (1.02)	1, 170	1.50	.222	**13.99**	<.001	0.23	.630
	Interpersonal	3.51 (1.12)	3.66 (1.11)							
Positive rumination	Dependent	12.95 (3.50)	13.93 (3.50)	1, 166	3.96	.048	0.74	.392	0.57	.451
	Independent	12.55 (4.47)	13.90 (3.59)							
	Non-interpersonal	12.65 (3.99)	13.52 (3.88)	1, 171	1.01	.316	3.25	.073	0.96	.328
	Interpersonal	13.42 (3.88)	13.74 (3.65)							
Dampening	Dependent	4.56 (1.38)	4.40 (1.44)	1, 165	0.84	.360	1.89	.171	0.43	.512
	Independent	4.81 (2.22)	4.49 (1.76)							
	Non-interpersonal	4.70 (1.84)	4.28 (1.50)	1, 171	0.30	.588	0.00	.948	**6.45**	.012
	Interpersonal	4.41 (1.59)	4.56 (1.64)							

Note: Bolded values remain significant after Holm-sequential Bonferroni correction.

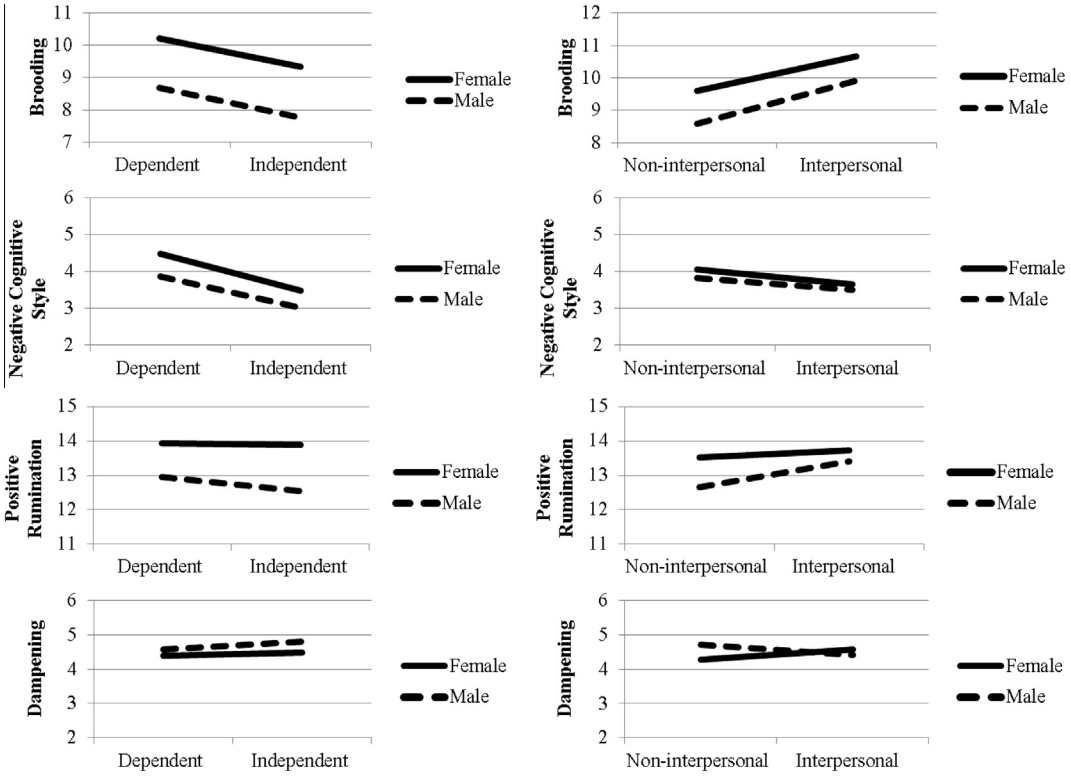

Fig. 1. Sex by event domain interactions for brooding, negative cognitive style, positive rumination and dampening.

elicit the greater brooding, negative cognitive style, and dampening, and less positive rumination. Additionally, we expected females to report greater brooding, negative cognitive style and dampening but less positive rumination than males, particularly in response to interpersonal life events.

Across sex, results indicated that dependent negative life events elicited greater brooding and negative cognitive style compared to independent negative life events, while interpersonal negative life events elicited greater brooding but less negative cognitive style compared to non-interpersonal negative life events. The finding that individuals reported greater brooding following interpersonal stressors is consistent with previous research (Mezulis et al., 2002). However, the finding that non-interpersonal negative life events elicited greater negative cognitive style is a novel finding. One interpretation for this finding is that non-interpersonal events are often characterized as achievement-related (Abela, 2002; Sund, Larsson, & Wichstrøm, 2003), thus, academic achievement events may be a particularly sensitive event domain for our older adolescent sample.

Our study found that females engaged in greater brooding in response to negative life events regardless of whether the event was independent or dependent. Our lack of sex differences in cognitive responses across the social domain contrasts several studies that report a greater tendency for females to deploy greater maladaptive cognitive response following negative life events within the interpersonal domain (Leadbeater, Blatt, & Quinlan, 1995; Mezulis et al., 2002; Shih, Eberhar, Hammen, & Brennan, 2006). Overall, the finding that females report greater brooding across dependent and independent domains suggests an underlying tendency to cognitively respond to life events in ways that are predictive of depressive symptoms in response to negative life events.

Our most notable finding was the interaction between the interpersonal domain and sex in predicting dampening, with females more likely to dampen following interpersonal positive life events. Research suggests that females are evaluated more negatively than males following self-promotion in social settings, which may encourage more modesty through inhibiting positive emotions in interpersonal settings (Heatherington et al., 1993; Rudman, 1998). Applied to dampening, females may be more likely to dampen interpersonal positive life events because female socialization in the United States favors less self-promotion in interpersonal settings.

4.1. Limitations and conclusions

Several study limitations warrant mention and offer opportunities for future research. One limitation was the omission of depressive symptoms as an outcome associated with cognitive responses. Although previous literature supports prospective relationships between each of our variables and depressive symptoms, our study design examined depressogenic cognitive responses without verifying these relationships. Therefore, future research could elaborate on the presented design by examining depressive symptoms as predicted by the cognitive responses discussed. Second, while our supported relationships explain a considerable portion of the variance between constructs, variability across weeks may be further explained by relationships not examine, such as the occurrence of events not reported. Future research may benefit from including a count of stressors experienced in addition to reporting on cognitive responses to a single event. A third limitation was our reliance on an undergraduate sample, which may limit generalizability and overemphasize older adolescent exposure and sensitivity to achievement-related non-interpersonal events, as previously noted. As a result, further research is needed with clinical and community samples to establish a more robust understanding of the effects of event domains and sex across depressogenic cognitive responses. Our results inform the interaction of stress and cognitive vulnerabilities to depression by examining sex differences

across stressful life event domains. While vulnerability-stress interactions remain an ongoing area of empirical investigation, findings suggest that distinguishing cognitive responses by life event domains and considering sex differences in cognitive pathways to depressive symptoms may enhance the effectiveness of existing cognitive interventions for depression.

Conflict of interest

None declared.

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