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Cognitive reappraisal and secondary control coping: associations with working memory, positive and negative affect, and symptoms of anxiety/depression

Charissa Andreotti[a], Jennifer E. Thigpen[a], Madeleine J. Dunn[a], Kelly Watson[a], Jennifer Potts[a], Michelle M. Reising[a], Kristen E. Robinson[a], Erin M. Rodriguez[a], Danielle Roubinov[b], Linda Luecken[b] and Bruce E. Compas[a]*

[a]*Department of Psychology and Human Development, Vanderbilt University, Peabody 512, 230 Appleton Place, Nashville, TN 37203, USA;* [b]*Department of Psychology, Arizona State University, Tempe, AZ, USA*

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The current study examined the relations of measures of cognitive reappraisal and secondary control coping with working memory abilities, positive and negative affect, and symptoms of anxiety and depression in young adults ($N = 124$). Results indicate significant relations between working memory abilities and reports of secondary control coping and between reports of secondary control coping and cognitive reappraisal. Associations were also found between measures of secondary control coping and cognitive reappraisal and positive and negative affect and symptoms of depression and anxiety. Further, the findings suggest that reports of cognitive reappraisal may be more strongly predictive of positive affect whereas secondary control coping may be more strongly predictive of negative affect and symptoms of depression and anxiety. Overall, the results suggest that current measures of secondary control coping and cognitive reappraisal capture related but distinct constructs and suggest that the assessment of working memory may be more strongly related to secondary control coping in predicting individual differences in distress.

Keywords: secondary control coping; cognitive reappraisal; working memory; positive affect; negative affect; anxiety/depression

Introduction

Processes of adaptation to stress and adversity have been the focus of two lines of research, one concerned with coping and a second focused on emotion regulation. In spite of the importance of both coping and emotion regulation for understanding the effects of stress on emotional and physical health, this work has been pursued in separate and generally unrelated research literatures (e.g., Gross, 2002; Compas, Jaser & Benson, 2008). An important and potentially unifying link between coping and emotion regulation may lie in the cognitive process of reappraising or reframing a stressful situation by thinking about it in ways that are less distressing and the executive functions, specifically working memory abilities, that individuals draw upon to accomplish this task (e.g., Campbell et al., 2009; Ochsner & Gross, 2007).

*Corresponding author. Email: Bruce.Compas@vanderbilt.edu

However, reappraisal and reframing strategies, as well as their links with working memory, have been measured separately in terms of cognitive reappraisal as a form of emotion regulation and similar processes as a component of secondary control coping. To address these gaps, the current study analyzed the association of working memory abilities (as an example of executive functioning that may play a role in the reappraisal process) with the use of secondary control coping and cognitive reappraisal as a form of emotion regulation in young adults.

Emotion regulation has been characterized as individuals' efforts to affect the type and timing of their own emotions as well as their personal experience and expression of these internal states (e.g., Gross & Thompson, 2007; Joorman & Gotlib, 2010). It consists of the set of processes that allow for the increase, decrease, or maintenance of affective states (Davidson, Putman, & Larson, 2000). Conscious, controlled, effortful strategies dominate the literature, and studies have shown that individuals are able to report their own use of such strategies in daily activities (e.g., Gross & Thompson, 2007). Emotion regulation also includes both the up-regulation of positive emotions and the down-regulation of negative emotions (Davidson et al., 2000). The current study focused on participants' self-reported efforts to manage negative and positive emotions using cognitive reappraisal. Cognitive reappraisal is defined as the "a form of cognitive change that involves construing a potentially emotion-eliciting situation in a way that changes its emotional impact" (Gross & John, 2003, p. 349).

Coping refers to both cognitive and behavioral efforts to manage stress and adversity (Lazarus & Folkman, 1984). Coping involves processes of regulation, including the regulation of emotions, in response to stress (e.g., Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Eisenberg, Fabes, & Guthrie, 1997). For example, Compas et al. (2001), p. 89) define coping as, "conscious volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances." This definition makes explicit links between coping and emotion regulation, and includes the purposeful regulation of emotions in response to stress (Compas, 2009).

In a comprehensive review of the literature, Skinner, Edge, Altman, and Sherwood (2003) identified over 400 categories or types of coping that have been represented in research on this construct. While consensus is still lacking regarding the various dimensions and overall structure of coping, Skinner et al. (2003) highlight recent top-down models of coping that have been tested using confirmatory factor analysis to capture higher order factors or categories of coping responses (Ayers, Sandler, West, & Roosa, 1996; Connor-Smith, Compas, Wadsworth, Thomsen, & Salzman, 2000; Tobin, Holroyd, Reynolds, & Wigal, 1989; Walker, Smith, Garber, & Van Slyke, 1997). One such model is a three-factor model of coping that has been validated using confirmatory factor analyses in several studies of culturally diverse samples of adolescents and adults coping with a wide range of different types of stressors (Calvete & Connor-Smith, 2005; Compas et al., 2006; Connor-Smith et al., 2000; Yao et al., 2010; Wadsworth, Rieckmann, Benson, & Compas, 2004). Specifically, coping can be broken down into three domains (Rudolph, Dennig, & Weisz, 1995), each encompassing several subtypes: primary control engagement coping (efforts to act directly on the source of stress or one's emotions, including problem solving, emotional expression, and emotional modulation); secondary control engagement coping (efforts to adapt to the source of stress,

including cognitive restructuring, positive thinking, acceptance, and distraction); and disengagement coping (efforts to cognitively or behaviorally withdraw from the source of stress, including wishful thinking, avoidance, and denial). The current study focused on secondary control coping because of its potential links to cognitive reappraisal as an emotion regulation strategy.

Although coping and emotion regulation overlap significantly in that both involve volitional efforts to reduce negative emotions associated with stressful experiences and circumstances, there have traditionally been some differences between these two constructs. Whereas coping typically refers to the down-regulation of a negative emotion, emotion regulation also includes the maintenance or augmentation of a positive emotion (Eisenberg, Fabes, & Guthrie, 1997). However, recent research has begun to reconcile this distinction between coping that is directed towards down-regulating negative emotions and up-regulating positive emotions (Folkman & Moskowitz, 2000). For example, Austenfeld and Stanton (2004) have used the term "emotional approach coping," to describe coping that involves acknowledging, expressing, and understanding emotions in response to stressors. Their conceptualization of emotional approach coping provides an alternative to emotion-focused coping, which has been previously associated with poorer psychological and health-related outcomes. In addition, Jaser, Champion, Dharamsi, Reising, and Compas (2011) found that secondary control coping is related to both the down-regulation of negative affect (sadness) and up-regulation of positive affect, and Hasking and colleagues (2010) found that the relation between personality traits and nonsuicidal self injury was moderated by self-reported use of both coping and emotion regulation strategies, lending further support to construct overlap in forms of coping and emotion regulation.

The current study examined the use of secondary control coping strategies, including responses related to cognitive restructuring (efforts to actively reinterpret stressful or negative events in more neutral or positive terms). Cognitive restructuring, as viewed in the context of coping, overlaps heavily with the concept of cognitive reappraisal. Deficits in the use of these strategies in response to stress have been tied to significant emotional and behavioral problems including mood and anxiety disorders in adults (e.g., Campbell-Sills & Barlow, 2007), as well as depressive symptoms and disorders in children and adolescents (Compas et al., 2010).

One avenue for greater integration of secondary control coping and cognitive reappraisal may lie in their shared linkages with working memory, an aspect of executive function. Executive functions are a group of higher-order cognitive processes that regulate an individual's ability to organize thoughts and activities, prioritize tasks, manage time efficiently, and make decisions (e.g., Lezak, Howieson, & Loring, 2004). Of these higher-level thought processes, working memory is one that has particular relevance for coping and emotion regulation. It has been defined as the short-term integration, processing, and retrieval of information (Baddeley & Hitch, 1974) and is utilized when information from the environment must be manipulated while being held in short-term memory stores. Deficits in working memory may be related to difficulties in secondary control coping (Campbell et al., 2009; Hocking et al., 2011) and emotion regulation (Schmeichel, Volokhov, & Demaree, 2008; Schmeichel & Demaree, 2010). For example, Campbell et al. (2009) used neurocognitive and psychological measures to analyze psychosocial outcomes in survivors of childhood cancer. Several aspects of executive function, including

specifically working memory, were significantly, positively correlated with the use of secondary control coping strategies, which in turn were negatively correlated with emotional problems. Further, secondary control coping accounted for the relationship between working memory and emotional problems. Similarly, Schmeichel and colleagues (2008) found that working memory capacity was related to neutral appraisals and decreased experience of negative emotion on a viewing task of emotionally valenced stimuli. A review of neuroimaging studies of brain regions involved in emotion regulation processes also suggests significant overlap between prefrontal areas that underlie working memory abilities and those activated during tasks of cognitive reappraisal in the scanner (Ochsner & Gross, 2008). This research suggests cognitive deficits in working memory may underlie impaired use of secondary control coping and cognitive reappraisal strategies leading to poorer psychosocial functioning.

The current study investigated the relations of working memory abilities with measures of secondary control coping and cognitive reappraisal in a sample of young adult college students. As previous research has indicated a role for working memory in secondary control coping and cognitive reappraisal, both standardized tests and self-report measures of working memory were collected to gain a multimodal assessment of these specific abilities. It was hypothesized that individuals with greater working memory abilities would be better able to use cognitive reframing strategies, as indicated by measures of secondary control coping and cognitive reappraisal, to regulate positive and negative emotions and have lower levels of affective symptoms. This study also examined the relation between measures of secondary control coping and cognitive reappraisal strategies by administering widely used self-report assessments of these constructs. While significant overlap clearly exists between these two constructs, no studies have explored the relation between widely used measures of cognitive reappraisal and secondary control coping processes and their predictive values for affective symptoms. It was hypothesized that the use of secondary control engagement coping strategies would be related to use of cognitive reappraisal as an emotion-regulation strategy on the measures administered. However, measures of self-reported use of secondary control coping strategies and efforts to regulate emotions through cognitive reappraisal and may be differentially related to experiences of positive affect and distress. Specifically, cognitive reappraisal may better predict positive affect, and secondary control coping may be more strongly related to measures of emotional distress.

Method

Participants

Participants for this study included 124 undergraduate students currently enrolled at a university in the southeastern USA. All participants were recruited through an online subject pool management system that allows students to receive credits for completing on-campus research studies. The mean age of the sample was 19.25 years (SD = 1.19; range = 18–24 years), and consisted of 96 females (77.4%) and 28 males (22.6%). The sample was 65.3% Caucasian, 12.9% African-American, 4.8% Asian-American, 4.0% Hispanic-American, 10.9% reported mixed race/ethnicity, and 2.0% reported other.

Measures

Working memory

The Wechsler Adult Intelligence Scale 4th Edition (WAIS-IV; Wechsler, 2008) is a standardized measure of cognitive ability for adolescents and adults between the age of 16 and 89 years. The IQ and index scores are both presented as age-based standard scores with a mean of 100 and a standard deviation of 15. The range for each individual subtest scaled score is from 1 to 19 with a mean of 10 and a standard deviation of 3; scores from 8 to 12 are considered average. The Digit Span and Arithmetic subtests of the WAIS-IV were administered to obtain an index of working memory abilities. The Digit Span subtest measures auditory short-term memory and sequential processing. The Arithmetic subtest requires participants to solve, without the use of paper and pencil, numerical reasoning problems that are read aloud by the test administrator. The working memory index (WMI) is the composite of these two subtest scores.

Participants also completed the Behavior Rating Inventory of Executive Function – Adult Version (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000), a 75-item assessment of impairment in several domains of executive functioning. Participants, aged 18–90 years, rate their own behavior frequency on a three-point Likert scale (0–2) on 75 items covering nine nonoverlapping clinical scales and three validity scales. The clinical scales comprise two broader indices of Behavioral Regulation (Inhibit, Shift, Emotional Control) and Metacognition (Initiate, Working Memory, Plan/Organize, Organization of Materials, Self-Monitor, Task Monitor). The BRIEF has demonstrated satisfactory internal consistency reliability and has been normed on appropriate census populations in the USA (Roth, Isquith, & Gioia, 2005). In the current sample, the alpha for the Metacognition Index was .80.

Scores from the WMI and the BRIEF were standardized (z-scores) and the mean of these z-scores was used as a composite index of working memory ability taking into account self-report and behavioral data on working memory abilities ($\alpha = .77$) in some analyses in addition to the separate scores for the two measures.

Cognitive reappraisal

All participants completed the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), a 10-item self-report measure of emotion regulation strategies pertaining to cognitive reappraisal and suppression of emotions with items scored from 1 to 7 (e.g., I control my emotions by *changing the way I think* about the situation I am in). The ERQ has shown adequate internal consistency and test–retest reliability. Further, it has demonstrated adequate convergent and discriminant validity against measures of mood state, rumination, and personality (Gross & John, 2003). Because of our interest in cognitive reappraisal processes, the six-item Reappraisal scale of the ERQ was analyzed ($\alpha = .85$).

Secondary control coping

Coping responses were assessed with a revised version of the Responses to Stress Questionnaire (Connor-Smith et al., 2000). The RSQ has been validated in several confirmatory factor analytic studies with samples of adolescents (e.g., Connor-Smith

et al., 2000), college-age young adults (Connor-Smith & Calvete, 2004; Yao et al., 2010), and adults (Compas et al., 2006). This study analyzed responses to 12 secondary control engagement coping items (including 6 items that were added to the current version of the RSQ), which included cognitive restructuring (e.g., I tell myself that things could be worse), acceptance (e.g., I just take things the way they are, I go with the flow), and distraction (e.g., I imagine something really fun or exciting happening in my life) (12 items; $\alpha = .78$). As the conceptualization of coping utilized in this study regards cognitive restructuring as a component of a larger factor, analyses used the factor as a whole. Internal consistency reliabilities for the six items assessing cognitive restructuring from the Secondary Control Coping scale (6 items; $\alpha = .77$) are also included separately as a direct and more specific comparison to the functioning of the items in the ERQ Reappraisal scale. The RSQ uses proportional scoring. Proportion scores are thus reported for the RSQ Secondary Control Coping scale and restructuring parcel. These scores take into account the total number of items endorsed when reporting the factor statistics (e.g., Connor-Smith et al., 2000).

Symptoms of anxiety and depression

Symptoms of anxiety and depression were assessed by the Adult Self Report (ASR; Achenbach & Rescorla, 2003), a self-report measure assessing emotional and behavioral problems and social competence that has been normed on a nationally representative sample of adults. The ASR includes 113 items scored on a three-point scale indicating how descriptive the items are of the individual during the preceding six months and includes empirically based syndromes as well as DSM-oriented scales. The ASR has high test–retest reliability and internal consistency. The current analyses utilized the DSM Depression scale as an index of DSM depressive symptoms (items include lack of enjoyment, sleep disruption, appetite disturbance, sadness, suicidal ideation, underactivity, and feelings of worthlessness) and DSM Anxiety scale (general fears, nervousness, worries, feeling fearful, and fear of school). Internal consistency of the DSM Depression and DSM Anxiety for the current sample was $\alpha = .77$ and .66, respectively.

Positive and negative affect

All participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegan, 1988), a standard 20-item measure of both positive and negative emotions rated on a 1–5 scale describing affect of the individual "most of the time." High internal consistency and independence for positive and negative emotions have been demonstrated for the scale (Watson et al., 1988). Internal consistency of the PANAS positive and negative affect scales was $\alpha = .83$ and .81, respectively.

Demographics

All participants also completed a demographics questionnaire to collect information on family structure, annual family income, parent education level, and level of involvement in nonacademic extracurricular or work activities.

Procedure

The university Institutional Review Board approved the protocol for this study. Participants signed up for an assessment session by responding to an announcement on the website, and participation credits were awarded via the website once a participant had successfully completed the study. A graduate research assistant obtained written informed consent from all participants at the beginning of each assessment session. Participants were then given a packet of self-report questionnaires to fill out in a quiet, well-lit room monitored by a graduate research assistant. Participants were also individually escorted to a separate room, where a research assistant conducted the neurocognitive assessment. The entire session lasted approximately 90 minutes per participant.

Data analyses

Data analyses first focused on using descriptive statistics to analyze the demographics of the current sample. All data for a participant were removed from analyses if scores on either self-report or behavioral working memory measures were outside the range of three standard deviations from the mean. A total of three participants were found to have scores outside this range and their data were dropped from all analyses. Pearson correlations were used to examine the relations among measures of working memory, secondary control coping strategies, cognitive reappraisal emotion regulation abilities, and symptoms of anxiety and depression. Finally, hierarchical linear regression analyses were used to ascertain the individual and total contributions to variance in symptoms of anxiety and depression accounted for by working memory, secondary control coping, and cognitive reappraisal.

Results

Descriptive statistics

Descriptive statistics including means, standard deviations, and minimum and maximum scores for participants' self-reported emotion regulation and coping strategies as well as working memory abilities are presented in Table 1. Scores for the ERQ Reappraisal scale represent an average of the responses given on the six reappraisal items of the ERQ and are similar to those reported by Gross and John (2003). Descriptive statistics for participants' levels of positive and negative emotions as well as depressive and anxiety symptoms are also presented in Table 1. Scores obtained on the PANAS indicate that participants in the current study had higher levels of positive emotions than negative emotions, $t\ (120) = 24.57$, $p < .001$, and are similar to those found by Watson et al. (1988). The *T* scores for symptoms on the DSM Depression scale and DSM Anxiety scale on the ASR reflect a moderate elevation of approximately one-half standard deviation above the normative mean for symptoms of depression and anxiety. The WMI scores indicate that the sample is significantly above the normative mean and exhibits decreased variability on this cognitive measure. However, results on the metacognition index (MI) of the BRIEF, which includes items related to working memory ability, indicate that this sample is similar to the normative sample, and the WMI/MI composite indicates adequate variability.

Table 1. Descriptive statistics for secondary control coping, cognitive reappraisal, working memory, affect, and psychopathology measures.

	Mean (SD)	Min	Max
RSQ-II secondary control coping	.19 (.04)	.04	.28
RSQ-II restructuring parcel	.10 (.02)	.02	.16
ERQ reappraisal	5.00 (1.05)	2.00	7.00
ERQ total	42.58 (7.59)	20.00	61.00
PANAS positive emotionality	36.35 (6.13)	18.00	50.00
PANAS negative emotionality	16.10 (5.30)	10.00	40.00
ASR DSM depression (*T* scores)	54.52 (6.69)	50.00	85.00
ASR anxiety (*T* scores)	54.50 (5.96)	50.00	73.00
WAIS-IV WMI	109.15 (10.42)	80.00	133.00
BRIEF MI (*T* scores)	51.01 (9.80)	36.00	79.00
WMI+ MI composite index	.00 (1.30)	−2.72	2.72

Note: Scores on the RSQ-II are proportion scores reflecting the percentage of the total score on the measure that fell in secondary control coping.

Correlational analyses

Pearson correlations among all measures used in this study are reported in Table 2. The first set of correlations that are important to examine are those related to measures of coping and emotion regulation, as seen in the upper left corner of the matrix. The Secondary Control Coping scale of the RSQ-II was significantly related to the ERQ Reappraisal scale, and the cognitive restructuring parcel of the RSQ-II was significantly related to the ERQ Reappraisal scale.

The next set of correlations in the center portion of the matrix reflects the correlations of measures of coping and emotion regulation with working memory. Both the WAIS-IV WMI and the BRIEF MI were significantly positively correlated with the Secondary Control Coping Scale of the RSQ-II and the cognitive restructuring parcel of the RSQ-II. The WMI/BRIEF MI composite was significantly related to the Secondary Control Coping Scale of the RSQ-II as well as the cognitive restructuring parcel of the RSQ-II. The correlation of the ERQ cognitive reappraisal scale and the RSQ secondary control coping scale and the RSQ cognitive restructuring scale remained significant and did not change in magnitude when working memory was partialled out.

Finally, a number of significant correlations were found among measures of secondary control coping, cognitive reappraisal, working memory, measures of positive and negative affect, and symptoms of anxiety and depression; these can be found at the bottom of the matrix in Table 2. Levels of positive and negative emotions on the PANAS were significantly positively related to the Secondary Control Coping scale of the RSQ-II as well as the Reappraisal scale of the ERQ. The ASR scales of DSM Depression and Anxiety scores were significantly negatively related to the Secondary Control Coping scale of the RSQ-II and the ERQ Reappraisal scale. Of note, the correlation between the Secondary Control Coping scale of the RSQ-II and the measure of DSM Anxiety was significantly greater than the correlation between the ERQ Reappraisal scale and this symptom measure ($z = 3.1$, $p < .01$). Finally, the WMI/MI composite was significantly correlated with positive and negative affect and the depression and anxiety scales on the ASR.

Table 2. Correlations among measures of secondary control coping, cognitive reappraisal, working memory, affect, and psychopathology.

	1	2	3	4	5	6	7	8	9
1. RSQ-II secondary control coping	–								
2. RSQ-II restructuring parcel	.93***	–							
3. ERQ reappraisal	.33***	.32***	–						
4. WAIS WMI	.20*	.20*	−.087	–					
5. BRIEF MI	.30**	.34***	.087	.19*	–				
6. WMI+ MI composite	.40***	.40***	.008	.65***	.60***	–			
7. PANAS positive emotionality	.30**	.34***	.32***	−.12	.42***	.22*	–		
8. PANAS negative emotionality	−.46***	−.42***	−.29**	−.071	−.41***	−.35***	−.27**	–	
9. ASR DSM depression	−.48***	−.52***	−.29**	.032	−.50***	−.34***	−.44***	.67***	–
10. ASR DSM anxiety	−.54***	−.51***	−.20*	−.085	−.42***	−.38***	−.37***	.62***	.63***

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

Hierarchical linear multiple regression analyses

Hierarchical linear multiple regression analyses were conducted to predict positive and negative emotions on the PANAS as well as the ASR DSM Depression and Anxiety scales using the working memory composite score from the WAIS-IV WMI and BRIEF MI, Secondary Control Coping score from the RSQ-II, and the ERQ Reappraisal scale. We constructed regression models in which the ERQ Reappraisal score was added to the model before the RSQ-II (step 2a) and when the RSQ-II was entered before the ERQ (step 2b) to assess the unique and shared contribution of each measure in the prediction of affect and symptoms. We then report the total contributions of the RSQ-II and the ERQ in step 3. Thus, we examined how both the ERQ and RSQ-II function separately as well as together in predicting emotions and symptoms of anxiety and depression.

As shown in Table 3, the WMI/MI composite was significant in predicting all four of the dependent measures. The WMI/MI composite remained significant in three of the four regression models, specifically negative affect, depression, and anxiety symptoms, after the ERQ positive reappraisal and the RSQ secondary control coping scales were entered. When entered along with the WMI/MI in the step 2a of the regression models, the ERQ Reappraisal score was a significant predictor of all four dependent variables. Similarly, secondary control coping was a significant predictor in step 2b in all four regression equations. Finally, when the ERQ cognitive reappraisal scale and the RSQ secondary control scale were entered together along with the WMI/MI composite in the third step of the regression equations, secondary control coping was a significant predictor in three of four models when added alongside working memory and cognitive reappraisal (negative affect, depression, and anxiety). Secondary control coping was not a significant predictor of positive affect in the full model. Cognitive reappraisal was a significant predictor in three of the equations; however, cognitive reappraisal was not a significant predictor of anxiety symptoms when examined along with the WMI/MI composite and secondary control coping. The effect size (sr^2; the unique variance accounted for by each predictor) for secondary control coping was approximately one and a half times as large as the effect for cognitive reappraisal in the model predicting negative affect, approximately three times greater in predicting depressive symptoms, and 14 times greater in predicting anxiety symptoms. Conversely, the effect size for cognitive reappraisal was around four times as large as the effect for secondary control coping in the equation predicting positive affect.

Discussion

The current study analyzed the association of working memory abilities, secondary control coping, and cognitive reappraisal in young adults. In addition, this study also examined the relation between measures of self-reported use of secondary control coping strategies and cognitive reappraisal efforts as well as the relative associations of secondary control coping and cognitive reappraisal strategies with positive and negative affect and symptoms of depression and anxiety. Support was found for the hypothesized associations between working memory and secondary control coping and between secondary control coping and cognitive reappraisal. Evidence was also found for the role of secondary control coping and cognitive reappraisal as

Table 3. Step-wise regression predicting positive and negative emotions on the PANAS and DSM depression and anxiety on the ASR with WMI/MI index, ERQ reappraisal score, and secondary control coping score from the RSQ-II.

	B	sr^2
PANAS positive		
Block 1 R^2 Δ = .050*		
WMI/MI	.22*	.050
Block 2a R^2 Δ = .102***		
WMI/MI	.22*	.054
ERQ reappraisal	.32***	.11
Block 2b R^2 Δ = .089**		
WMI/MI	.13	.016
Secondary control coping	.25**	.056
Block 3 R^2 Δ = .016		
WMI/MI	.17	.028
ERQ reappraisal	.27**	.071
Secondary control coping	.15	.019
Block 4 R^2 total = .17*		
PANAS negative		
Block 1 R^2 Δ = .125***		
WMI/MI	−.35***	.13
Block 2a R^2 Δ = .085**		
WMI/MI	−.35***	.14
ERQ reappraisal	−.29**	.097
Block 2b R^2 Δ = .10***		
WMI/MI	−.23*	.054
Secondary control coping	−.34***	.11
Block 3 R^2 Δ = .052**		
WMI/MI	−.25**	.069
ERQ reappraisal	−.21*	.048
Secondary control coping	−.26**	.066
Block 4 R^2 total = .26***		
DSM depression		
Block 1 R^2 Δ = .11***		
WMI/MI	−.34***	.11
Block 2a R^2 Δ = .083**		
WMI/MI	−.34***	.12
ERQ reappraisal	−.29**	.094
Block 2b R^2 Δ = .15***		
WMI/MI	−.19*	.038
Secondary control coping	−.41***	.16
Block 3 R^2 Δ = .089***		
WMI/MI	−.21*	.049

Table 3 (*Continued*)

	B	sr^2
ERQ reappraisal	−.18*	.036
Secondary control coping	−.35***	.11
Block 4 R^2 total = .29***		
DSM anxiety		
Block 1 R^2 Δ = .14***		
WMI/MI	−.38***	.14
Block 2a R^2 Δ = .040*		
WMI/MI	−.38***	.15
ERQ reappraisal	−.20*	.046
Block 2b R^2 Δ = .20***		
WMI/MI	−.21*	.052
Secondary control coping	−.46***	.21
Block 3 R^2 Δ = .15***		
WMI/MI	−.21*	.054
ERQ reappraisal	−.055	.0038
Secondary control coping	−.44***	.18
Block 4 R^2 total = .33***		

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

predictors of positive and negative affect and symptoms of depression and anxiety. Further, the findings support previous work (e.g., Folkman & Moskowitz, 2000; Reich, Zautra, & Hall, 2010) that positive reappraisal may be strongly associated with positive affect, and also suggest that secondary control coping may be more strongly associated with negative affect and symptoms of depression and anxiety. The overall pattern of results is consistent with the view that secondary control coping and cognitive reappraisal are related but distinct constructs.

The measures of working memory, secondary control coping, and cognitive reappraisal, affect, and symptoms of psychopathology used in this study functioned as expected in this sample. While the mean score on the WAIS-IV measure of working memory was somewhat higher than the normative population mean, this elevation is in line with the use of a sample drawn from university undergraduate introductory psychology courses. Further, the variance on the WAIS-IV WMI was more constrained than in the normative population. The BRIEF-MI mean for this sample was, however, similar to the normative population. In addition, scores on measures of cognitive reappraisal were comparable to those described in the literature for college students. Finally, scores on the ASR indicated that the sample was experiencing mild to moderate distress in symptoms of depression and anxiety compared with a normative sample. Therefore, meaningful variation was found for measures of working memory, secondary control coping, cognitive reappraisal, and symptoms of anxiety and depression. Thus, we were able to construct correlation and regression models to examine the links among coping, emotion regulation, and emotional distress, and the role of working memory in these relations.

The correlations among working memory, secondary control coping, and cognitive reappraisal provide some of the first evidence of the associations among these three constructs in the same sample. Consistent with the view that secondary control coping and cognitive reappraisal are related but distinct constructs, the correlations between the RSQ secondary control coping and the ERQ cognitive reappraisal scale were positive and significant, but relatively moderate in magnitude. Although related, secondary control coping and cognitive reappraisal shared only 10% common variance, indicating substantial independence as well.

We found moderate support for the relations between measures of working memory and secondary control coping, as the correlations were all small to medium in magnitude. The magnitude of these associations is similar to those found in two previous studies of working memory and coping with younger samples (Campbell et al., 2009; Hocking et al., 2011). In addition, the results of a study by Schmeichel et al. (2008) indicated that working memory capacity was related to neutral appraisal of negative stimuli as indicated by participants' experience of disgust. In the current study, the correlation between measures of secondary control coping and cognitive reappraisal was significant and did not change in magnitude when working memory was controlled for. As no significant relation was found between measures of working memory and cognitive reappraisal in the current study, it is possible that working memory and secondary control coping/cognitive reappraisal may be more strongly related in clinical samples of individuals who have experienced some level of impairment. For example, Campbell et al. (2009) found associations between several domains of executive function including working memory and secondary control coping in a clinical sample of childhood cancer survivors but not in healthy controls. Although there was variability in the measures of working memory in the current sample, scores were all well above average. These relatively high scores may have constrained the ability to detect associations between working memory and reappraisal. These processes may be better studied in at-risk or clinical samples.

There was some evidence that secondary control coping and cognitive reappraisal account for both unique and shared variance in predicting both positive and negative affect and depression and anxiety symptoms. When entered together on the final step of the four regression equations, the unique percentage of variance accounted for by these two constructs differed for positive affect as compared to the three measures of emotional distress. Only cognitive reappraisal was significant in predicting positive affect. In contrast, secondary control coping accounted for substantially more variance than cognitive reappraisal in the regression models predicting measures of negative affect and depressive and anxious symptoms. Thus, the present findings suggest that there are some differences in the processes captured by the ERQ cognitive reappraisal scale and the RSQ secondary control coping scale. Consistent with previous conceptualizations (Gross & John, 2003), cognitive reappraisal may play a more pronounced role in the ability to regulate positive emotions whereas secondary control coping (Compas, 2009) may be more central in the regulation of negative affect and symptoms of mood disorder in response to stress.

The results of factor analytic studies indicate that individuals may not necessarily use cognitive restructuring in isolation, but rather combine this process with others to deal with stress (e.g., Compas et al., 2006; Connor-Smith et al., 2000; Wadsworth et al., 2004; Yao et al., 2010). However, the cognitive restructuring parcel composed of six individual items was also analyzed in this study as a more direct comparison to

the ERQ Reappraisal scale. Even when this more narrow focus was used, the cognitive restructuring (coping) items were more highly correlated with DSM Anxiety than the ERQ Reappraisal scale. It is likely that this is due to the wider range of examples of restructuring captured by the RSQ-II (e.g., learning from the problem, laughing about the problem) compared with the ERQ, which is focused almost exclusively on thinking about a problem in a different way. The ERQ achieved adequate reliability ($\alpha = .85$) through the inclusion of several similar items all of which focus on alternate ways of thinking about a situation. However, the high reliability of these items, as compared to $\alpha = .77$ for the RSQ-II secondary control coping items, may have been at the expense of a more varied, wider sampling of strategies to reappraise in stressful situations.

Future research could build on the current study by extending it in the following domains. First, this study was cross-sectional with a fairly homogeneous sample of college students from a selective university. In addition, the data analyzed in this study were mainly collected through self-report sources, augmented with behavioral test results. However, in spite of these limitations, this study presents important first data examining relations between current measures of secondary control coping and cognitive reappraisal as well as their differential values for clinical predictions and indications of working memory in an individual's risk for distress.

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