



Published in final edited form as:

*J Adolesc.* 2015 June ; 41: 162–174. doi:10.1016/j.adolescence.2015.03.007.

## Self-evaluative and emotion processes linked with brooding rumination among adolescents

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### Abstract

Rumination has been linked with a number of deleterious outcomes, though relatively little is known about self-evaluative and emotion processes by which it develops. The current investigation uses a prospective, longitudinal design and self-report measures to examine the role of contingent self-worth, perfectionism, negative emotion beliefs, and suppression of negative emotion in predicting the development of brooding and reflective forms of rumination among 168 adolescents (98 girls, 79.6% European-American) undergoing the transition to high school ( $M_{age} = 13.58$ ). Results of structural equation modeling indicate that self-evaluative vulnerability (i.e., self-worth contingencies, perfectionism) and negative emotion beliefs, but not the suppression of negative emotion, predict brooding (but not reflective) rumination. The current study demonstrates how brooding is intertwined with views of self and core assumptions about emotion.

### Keywords

Rumination; Self-worth contingencies; Perfectionism; Emotion beliefs; Emotion suppression

### Literature review

Depressive rumination – defined as “focusing on the causes and consequences of one’s depressive symptoms” (Nolen-Hoeksema & Morrow, 1991, p. 569) – has been linked to the onset and maintenance of depression among children, adolescents, and adults (e.g., Abela, Brozina, & Haigh, 2002; Borelli, Hilt, West, Weekes, & Gonzalez, 2014; Hankin, 2008; Nolen-Hoeksema, Wisco, & Lybomirsky, 2008) and with an exacerbation of anger, shame, and negative affectivity (Brans, Koval, Verduyn, Lim, & Kuppens, 2013; Peters, Geiger, Smart, & Baer, 2014). Despite its clear *effects*, we know relatively less about *risks* for this repetitive form of thinking or about processes linking known vulnerabilities. Established predictors include low self-worth, self-criticism and neediness (Kuster, Orth, & Meier, 2012), temperament (Mezulis, Simonson, McCauley, & Vander Stoep, 2011), stressful life events (e.g., Michl, McLaughlin, Shepherd, & Nolen-Hoeksema, 2013), childhood abuse (Raes & Hermans, 2008), and family factors (Hilt, Armstrong, & Essex, 2012; Ruijten, Roelofs, & Rood, 2011), though only a subset of these studies assessed adolescents. The current study examines specific self-evaluative and emotion-related risks for rumination – and their mediated relationships – not previously studied as a whole or examined in this age group (see proposed model, Fig. 1).

It is important to study rumination in adolescence because it is during this stage of life that adolescent egocentrism emerges, enabling adolescents' increased ability for meta-cognition, including self-consciousness and self-reflection (Elkind, 1967); these abilities, in turn, confer risk for rumination. Additionally, adolescents experience social, academic, and biological changes (Fenzel & Blyth, 1986; Stroud et al., 2009) that may involve considerable fodder for rumination. Finally, rumination is a risk for depression, rates of which increase dramatically around age 15, and gender differences in depression emerges at this time (Hankin et al., 1998).

Two subtypes of rumination – brooding and reflection – have been empirically established in adolescent and adult samples (Burwell & Shirk, 2007; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Studies have shown brooding (passively dwelling on one's symptoms) but not reflection (attempting to understand one's symptoms), confers risk for negative outcomes such as depression, maladaptive disengagement coping, and negative affectivity (Burwell & Shirk, 2007; Lopez, Driscoll, & Kistner, 2009; Mezulis et al., 2011; Treynor et al., 2003) whereas reflection is linked with more active and adaptive coping (Burwell & Shirk, 2007). The current study proposes that self-evaluative and emotion vulnerabilities will predict brooding, but not reflective, forms of rumination.

Rumination has been conceptualized both as a maladaptive emotion regulation strategy (e.g., an attempt to gain insight into one's dysphoric mood, yet void of active problem solving) (Nolen-Hoeksema, 2004) and as a meta-cognitive process (Liverant, Kamholz, Sloan, & Brown, 2011), with a focus on the *process* more than the *content* of repetitive thinking. In addition to exploring the underpinnings of this repetitive form of thinking among adolescents, the current study examines mechanisms by which brooding rumination develops. Specifically, the current study extends empirical work to propose a model linking several established – though previously unconnected – risks for rumination and examines them among adolescents. Specifically, self-evaluative vulnerability (perfectionism and an over-reliance on external feedback to maintain self-worth) and emotion processes (i.e., negative beliefs about emotion and the suppression of negative emotion) are proposed as risks for the development of brooding rumination, and mediational processes are evaluated.

### **Self-evaluative vulnerability**

It is hypothesized that brooding – but not reflection – develops out of self-evaluative and emotion vulnerabilities (see Fig. 1). One such self-evaluative vulnerability involves over-reliance on external validation and approval for self-worth maintenance, or self-worth contingencies (Burwell & Shirk, 2006; Crocker, 2002; Kuiper & Olinger, 1986), conceptually similar to “sociotropy” (Beck, Epstein, Harrison, & Emery, 1983), “dependency” (Blatt, D’Afflitti, & Quinlan, 1976), and “need for approval” (Weissman & Beck, 1978). Research has shown that individuals high in self-worth contingencies and need for approval are at risk for ruminating about shortcomings that might threaten acceptance from others (Pearson, Watkins, Mullan, & Moberly, 2010; Simonson, Mezulis, & Davis, 2011; Wade, Vogel, Liao, & Goldman, 2008), though little is known about this connection among adolescents and how these may be mediated by emotion vulnerabilities in this age group.

Perfectionism is another self-evaluative vulnerability empirically linked with rumination among youth and adults (Hankin, 2008). Olinger, Kuiper, & Shaw (1987) found adults scoring high on the Dysfunctional Attitudes Scale (DAS), comprising need for approval and perfectionism subscales, thought more about and rated stressful events more distressing than did those scoring low, a finding replicated among youth using the Child-Adolescent Perfectionism Scale (Flett, Coulter, Hewitt, & Nepon, 2011). However, little research has examined these links among adolescents or has addressed whether emotion processes serves as a mechanism linking self-evaluative vulnerability and brooding rumination.

### Emotion beliefs

The current study additionally proposes emotion processes – particularly negative beliefs about emotion and the suppression of negative emotion – serve as a risk for brooding (but not reflection) among adolescents. There is theoretical support for the role of negative emotion beliefs to both relationships (e.g., “Others will reject me if I express my sadness”) and the self (e.g., “I am concerned my anger could overwhelm me”) in brooding (Williams, Teasdale, Segal, & Kabat-Zinn, 2007). Interventions targeting rumination result in fewer negative emotion beliefs (i.e., less aversion towards negative emotions) among adults (Robins, Keng, Ekblad, & Brantley, 2012), though we know little about emotion processes and brooding in adolescents.

Just as perceiving that emotions may threaten the *self*, believing emotions are dangerous to one’s *relationships* (e.g., “I fear others might not like me if I tell them how worried I feel”) may contribute to brooding. Among undergraduates and adults, ambivalence towards emotion expression (i.e., not wanting to express an emotion, but doing so; wishing one had not expressed emotion after having done so; or wishing one had been able to express an emotion) has been correlated with rumination (King, Emmons, & Woodley, 1992). Similarly, ambivalence towards emotion expression, controlling for both emotion expression and neuroticism, has been correlated with obsessive/compulsive symptoms, phobic anxiety, and guilt (King & Emmons, 1990) which all share an obsessional style with brooding. Despite the conceptual and empirical overlap between ambivalence towards emotion expression and negative beliefs about emotion (King et al., 1992), they remain distinct (with moderate correlations) and thus little is known about whether negative emotion beliefs will similarly predict brooding rumination, particularly among adolescents for whom these constructs have not been assessed previously.

### Suppression of negative emotion

Another proposed risk for brooding that has been implicated in mental health (Gross & Munoz, 1995) involves the suppression of negative emotion – that is, when negative emotions are pent up and suppressed from outwards expression and even disallowed from one’s own internal experience. Suppression theory (Wegner, 1989) proposes rumination stems from efforts to suppress one’s unwanted thoughts and has been supported empirically through the *white bear* studies in which undergraduates and adults who actively attempt to suppress thoughts report more preoccupation about those thoughts (Liverant et al., 2011; Roemer & Borkovec, 1994). These studies support a conceptualization of brooding as an

attempt at emotional (Borkovec & Lyonfields, 1993) and experiential (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996) avoidance.

In addition to dampening down one's *internal experience* of emotion, studies among adults have found suppressing *outward expression* of negative emotion is ineffective in inhibiting unwanted thoughts and feelings and has cognitive and physiological repercussions, including impaired memory and increased cardiovascular activity (Gross, John, & Richards, 2000). In contrast, expressive writing has been linked with fewer intrusive thoughts (Klein & Boals, 2001) and decreased brooding (but not reflective) rumination for those high in the suppression of negative emotion (Gortner, Rude, & Pennebaker, 2006).

Despite these findings, little is known whether the suppression of negative emotion predicts brooding among adolescents. During this developmental period, adolescents confront threats to their emerging autonomy, as well as learn to regulate emotions independently. The resulting emotion dysregulation may necessitate effortful attempts to regulate outbursts, and thus some level of suppression of negative emotion may be adaptive. Given the lack of empirical work among youth, current study predictions are drawn from the adult literature.

### Proposed mediation

In addition to these individual self-evaluative and emotion vulnerability predictors of brooding, the current study examines two mediational models (see Fig. 1) linking them that have not, to our knowledge, been examined previously. Such mediational models offer a more nuanced understanding of the distal and proximal risk factors for brooding and may offer several points of intervention when working with adolescents. Research has shown undergraduates who rely excessively on external validation (i.e., who are high in self-evaluative vulnerability) hold more negative emotion beliefs and are more likely to suppress negative emotions that might threaten sources of self-worth (Krause, Robins, & Lynch, 2000; Mongrain & Zuroff, 1994). However, little is known about these associations in mid-adolescence or about mediational processes linking these vulnerabilities.

Our first model predicts negative emotion beliefs and the suppression of negative emotion will mediate the association between self-evaluative vulnerability and brooding. Specifically, because individuals with self-evaluative vulnerability (i.e., who rely excessively on external approval and perfectionism) report more fear of negative emotion, it is expected that they will suppress their negative feelings and consequently brood more. The second proposed mediational model predicts the suppression of negative emotion will explain the process by which the association (established among adults) between emotion beliefs and brooding are linked among adolescents. Attachment theory (Cassidy, 1994) suggests and empirical research (Shipman, Zeman, Penza, & Champion, 2000) supports that a history of rejection or retaliation by a caregiver in response to negative emotional expression may lead a child to view negative emotions as unacceptable and threatening to relationships, and the child may learn to distance from emotions and their expression. In support of this link, Oldershaw et al. (2012) found that negative emotion beliefs were related to emotional avoidance among a sample of women recovering from anorexia nervosa and among healthy adult controls. The current study examines these links – as well as mediated

pathways – between self-evaluative vulnerability, negative emotion beliefs, suppression of negative emotion, and brooding among adolescents.

### The current study

The purpose of the current study was to evaluate risks for brooding among adolescents as well as identify mechanisms by which brooding develops. It was predicted that self-evaluative vulnerability (i.e., contingent self-worth and perfectionism) and emotion vulnerability (i.e., negative emotion beliefs and suppression of negative emotion) would predict brooding – but not reflection – among adolescents. Additionally, negative emotion beliefs were expected to mediate the association between self-evaluative vulnerability and brooding, and suppression of negative emotion was predicted to mediate the link between negative emotion beliefs and brooding (see Fig. 1). To address these questions, structural equation modeling was used, with separate models predicting brooding and reflection. To control for the possibility that links between constructs were an artifact of depression, time 1 depressive symptoms were included in all models.

## Methods

### Participants

Participants were recruited from three metropolitan public schools. At time 1, 168 adolescents participated, 158 (94%) returned for time 2 and 127 (80%) participated at time 3. Due to a change in study protocol, a small number of participants did not complete emotion beliefs measures at time 2; however, there were no significant differences in demographics or study outcomes between those who did and did not complete these measures. Multiple data imputation (see below) resulted in 158 participants with complete data across all time points.

The sample was comprised of 98 girls (58.3%) and 70 boys (41.7%) ( $M_{age} = 13.58$ ,  $SD = .52$ ); 79.6% of the sample identified as European-American and the remainder was made up of approximately equal numbers of African-American, Hispanic-American, and biracial youth. Only 2.4% of the sample was Asian-American. This distribution corresponds to the racial and ethnic makeup of the metropolitan area in which participants were living. Hollingshead index (1976) of social status was computed with average occupation and education of two-parent families (occupation was weighted by a factor of 5; education by 3). For single parent and single-income families, the working individuals' education and occupation scores were used. The sample was comprised primarily of middle class families ( $M = 4.26$ ;  $SD = .68$ ), although scores ranged from social strata ratings of 2 (e.g. machine operators, semiskilled workers) to 5 (e.g., major businessmen/women and professionals).

### Procedure

Following IRB approval, research assistants visited three metropolitan public schools to provide information about the study and gather contact information for those interested. These individuals were subsequently called and scheduled, and they visited the lab with their parent for time 1, at which point parent consent and adolescent assent were obtained. Participants were assessed within three months prior to the end of eighth grade, again within

three months of the start of the ninth grade, and in the spring of ninth grade. Participants came to the lab for times 1 and 2. At time 3, participants self-selected whether to complete questionnaires via mail (63.8%) or internet (36.2%). There were no differences in demographics or on any study variables between those who completed time 3 measures by mail or via the internet.

Participants completed the following self-report questionnaires: the Self-Worth Contingency Questionnaire (SWCQ) and Dysfunctional Attitudes Scale (DAS) at time 1, the emotion beliefs (EBSR, EBSS) and the suppression of negative emotion (IEOUT, IEIN) scales, as well as the adapted Ruminative Response Scale (RRS) at time 2, and the RRS again at time 3. In addition, the semi-structured Child Depression Rating Scale – Revised interview (CDRS-R) was gathered at time 1.

## Measures

### Self-evaluative vulnerability

**Self-Worth Contingency Questionnaire (SWCQ; Burwell & Shirk, 2006):** The SCWQ is a 32-item questionnaire assessing the extent to which adolescents rely on external feedback for self-worth maintenance. The SWCQ comprises four domains relevant to adolescent self-concept (Harter, 1999): school performance, social acceptance, physical appearance, and activity performance (e.g., “If other people’s feelings about me change, my feelings of self-worth change too”). Factor analysis has resulted in a coherent, one-factor solution, though sub-scales have been delineated for conceptual reasons (Burwell & Shirk, 2006). Participants rate their level of agreement from 1 (“not at all true”) to 6 (“extremely true”). Half the items are reversed coded; higher scores reflect more self-worth contingencies. The SWCQ has shown good internal consistency ( $\alpha = .93$  in the current sample) and temporal stability over six months (Burwell & Shirk, 2006).

**Dysfunctional Attitudes Scale (DAS; Weissman & Beck, 1978):** Factor analysis of Form A of the DAS has supported a multidimensional structure, with subscales related to perfectionism and dependency (Beevers, Strong, Meyer, Pilkonis, & Miller, 2007; de Graaf, Roelofs, & Huibers, 2009). Forty items are rated from 1 (fully agree) to 7 (fully disagree); higher scores reflect greater levels of dysfunctional attitudes. The measure has demonstrated adequate internal consistency and reliability (de Graaf et al., 2009). In the current study, participants completed an adapted form of the DAS designed for use with adolescents that has demonstrated adequate test–retest reliability and internal consistency (Andrews, Lewinsohn, Hops, & Roberts, 1993). The perfectionism subscale used in the current study showed adequate internal consistency ( $\alpha = .66$ ).

### Emotion beliefs

**Emotion Beliefs Scale: Relationships (EBSR) (Burwell & Shirk, 2003):** The EBSR is a 48-item questionnaire in which participants rate on a 5-point Likert scale (1 = not at all to 5 = very much) the extent to which beliefs about emotion are true (e.g., “If I showed my *parents* I was *angry*, they would be upset with me”). Four emotions (anger, sadness, worry, and happiness/excitement), and three targets (parents, classmates, close friends) are assessed. Angry, sad, and worried items are averaged across all targets; higher scores reflect



more negative emotion beliefs about relationships. For the purposes of the current study, happy items were excluded. The EBSR has demonstrated good internal consistency ( $\alpha = .94$  in the current study) and strong convergent validity, correlating positively with the Ambivalence Towards Emotion Expression Questionnaire (King et al., 1992) and negatively with the emotional expression subscale of the Responses to Stress Questionnaire (RSQ; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000).

**Emotion Beliefs Scale: Self (EBSS) (Burwell & Shirk, 2003):** The EBSS is comprised of 16 items, rated on a 5-point Likert scale, assessing agreement with statements about the danger of four emotions (anger, sadness, worry, and happiness/excitement) to the self (e.g., “I am concerned that my feelings of *sadness* could overwhelm me”). Angry, sad, and worried items are averaged; higher scores reflect more negative emotion beliefs related to the self. For theoretical reasons, happy items were excluded. This measure has demonstrated good internal consistency ( $\alpha = .84$  in the current sample) and validity, correlating moderately with the avoidance subscale of the RSQ (Connor-Smith et al., 2000).

### Suppression of negative emotion

**Inhibition of Emotion Expression (IEOUT) Scale (Burwell & Shirk, 2003):** The IEOUT contains 48 items assessing four emotions (anger, sadness, worry and happiness/excitement), across three targets (parents, close friends, classmates), using four stems presented in an alternative response format (Harter, 1988). Participants first choose with which adolescent they most identify, then indicate if they’re “really” or “somewhat like that” (e.g., “Some teenagers hide their feelings when *worried* BUT other teenagers show their feelings when *worried*”). Item responses range from 1 to 4; items (excluding “happy” in the current study) are averaged to create a negative emotion expression composite, with higher scores reflecting more suppression of negative emotion. The IEOUT shows excellent internal consistency ( $\alpha = .94$  in the current study), and strong test–retest reliability over six months, and demonstrates good convergent validity, correlating negatively with the RSQ’s emotion expression subscale (Connor-Smith et al., 2000).

**Inhibition of Emotion Experience (IEIN) Scale (Burwell & Shirk, 2003):** The IEIN assessed the degree to which individuals attempt to suppress their internal experience (versus outward expression) of emotion (e.g., “Some kids try to keep their distance from their anger BUT other kids are very comfortable feeling their anger”). Sixteen items, presented in an alternative response format, assess four emotions (anger, sadness, worry and happiness/excitement) and are averaged across negative items (excluding “happy” in the current study), with higher scores reflecting more suppression of negative emotional experience. The IEIN has demonstrated good internal consistency (current study  $\alpha = .88$ ) and is correlated with the RSQ’s avoidance and emotional numbing subscales (Connor-Smith et al., 2000).

### Rumination

**Ruminative Response Scale (RRS; adapted from Nolen-Hoeksema & Morrow, 1991):** The adapted version of Nolen-Hoeksema and Morrow’s (1991) Ruminative Response Scale (RRS) was gathered at times 2 and 3. This 22-item measure assesses, on a 1 to 4 scale (not at

all to always true), how often one engages in various ruminative behaviors when upset. The adapted scale, developed for use with adolescents (Burwell & Shirk, 2007), involves replacing the word *depressed* with *upset*, and anchoring items to specific, memorable stressors that occurred since the transition to high school (Connor-Smith et al., 2000) rather than participants reporting on what they *generally do*. Finally, participants endorsed the extent to which they ruminated about feelings related to these stressors. The original RRS demonstrated good internal consistency (Cronbach's alpha = .89) and validity in adult samples (Nolen-Hoeksema & Morrow, 1991). The modified scale also has good internal consistency (alpha = .88) and factor analysis revealed two distinct subscales, brooding and reflection (Burwell & Shirk, 2007; Treynor et al., 2003). Internal consistency in the current sample was strong (alphas of .80 and .72, respectively).

### Depressive symptoms

#### **Child Depression Rating Scale – Revised (CDRS-R; Poznanski & Mokros, 1999):**

Depression was assessed using the CDRS-R, a semi-structured interview comprising 17 symptom areas; higher scores indicate more depressive symptoms, and a raw score of 40 indicates symptom severity in the clinical range. The CDRS-R has demonstrated reliability and validity among children and adolescents (e.g., Endicott, Wagner, & Wohlberg, 2002), with internal consistency ranging from .74 to .90. In the current study, inter-rater reliability was very good (intraclass  $r = .87$ ).

## Results

### Data imputation

In order to improve power and to provide a more adequate representation of the initial sample (Allison, 2002), multiple data imputation procedures were utilized in SPSS 22.0 (averaging five imputed data sets); missing data (emotion beliefs at time 2 and rumination at time 3) were imputed using matching variables outside the model. Specifically, missing EBSS scores were imputed from time 2 Ambivalence Towards Emotion Expression scores and from time 2 Responses to Stress Questionnaire (RSQ) primary control engagement coping scores. Missing EBSR scores were imputed from time 1 and 2 RSQ primary control engagement coping and from time 2 RSQ disengagement coping scores. Missing time 3 brooding scores were imputed from time 1 and 2 Child Depression Inventory scores and time 1 and 2 RSQ involuntary engagement coping scores. Missing time 3 reflection scores were imputed from time 2 RSQ involuntary engagement and involuntary disengagement scores. Prior to imputation, logistic regression confirmed data due to attrition were missing at random, and covariance and correlation matrices of non-imputed and imputed datasets proved similar. Imputation resulted in  $N = 158$  with complete data across all three time points.

### Correlational analyses

Descriptive statistics and zero-order correlations supported hypothesized relationships (see Table 1): self-worth contingencies, perfectionism, negative emotion beliefs, suppression of negative emotion, and brooding (but not reflection) were significantly correlated.



## Data analytic plan and measurement model

In the initial measurement model, latent variables *self-evaluative vulnerability*, *emotion beliefs*, *emotion suppression*, *brooding/reflection*, and *depression* were specified. Manifest variables Self-Worth Contingencies Questionnaire (SWCQ) and Dysfunctional Attitudes Scale (DAS) perfectionism were specified to load onto the *self-evaluative vulnerability* factor, Emotion Beliefs about Relationships (EBSR) and Emotion Beliefs about Self (EBSS) onto *emotion beliefs*, Inhibition (suppression) of Emotion Expression (IEOUT) and Inhibition (suppression) of Emotion Experience (IEIN) onto *emotion suppression*, and a single indicator, a residual brooding score (the standardized score of time 3 regressed onto time 2 brooding), was specified for the latent variable *brooding*; this residual term was utilized to capture the change in brooding over time and is recommended over simple pre-post change scores (Prochaska, Velicer, Nigg, & Prochaska, 2008). A similar *reflection* latent variable was created using a single indicator created by regressing time 3 onto time 2 reflection scores. Finally, a single indicator, CDRS-R was specified for the latent variable, *depression*. The path from the brooding latent variable to the single indicator (residual brooding) was constrained to 1 and the error variance of this single indicator variable to 0; this process was repeated for the latent variables *reflection* (residual score) and *depression* (time 1). Lisrel (version 8.80) (Jöreskog & Sörbom, 2006) was used to evaluate models. To rule out the possibility that depressive symptoms were responsible for associations among variables, depression was controlled for in all models, though results were comparable whether or not depressive symptoms were included.

The initial measurement model A (see Fig. 2) involving separate beliefs and suppression latent variables showed very good fit,  $\chi^2 (12, N = 158) = 16.05, p = .189, RSMEA = .046$  (90% CI [0.0, 0.0992]) and demonstrated superior fit in relation to an alternative model B (see Table 2) ( $\chi^2/df = 1.34$  versus  $\chi^2/df = 3.36$ ;  $\chi^2$  difference = 37.71 (4 df),  $p < .00001$ ) in which emotion beliefs and emotion suppression comprised a single *emotion* latent variable,  $\chi^2 (16, N = 158) = 53.76, p = .00001, RSMEA = .122$  (90% CI [0.087, 0.159]). Consequently, model A was selected.

## Structural models

Several hybrid structural equation models were tested to evaluate study hypotheses. Model 1 (see Fig. 3) tested the full model in which self-evaluative vulnerability predicted brooding directly, as well as indirectly through emotion beliefs and emotion suppression. This model,  $\chi^2 (15, N = 158) = 23.22, p = .079, RSMEA = .059$  (90% CI [0.0, 0.103]), showed significant paths between self-evaluative vulnerability and emotion beliefs, and between emotion beliefs and emotion suppression. However, the only variable to predict change in brooding was emotion beliefs. This model (#1) (see Fig. 3) was compared to two subsequent models (#2 and #3) (see Table 2 and Figs. 4 and 5) that examined mediation by constraining relevant paths.

The next hypothesis involved emotion beliefs and suppression serving as mediators of the relationship between self-evaluative vulnerability and brooding (models #2 and #3, shown in Figs. 4 and 5, respectively). Demonstrating mediation in SEM entails first establishing a link between the predictor and outcome variables. Next, the mediated model must demonstrate

adequate fit and paths between the predictor and mediator, and between mediator and outcome, must be significant and in the expected directions. Finally, two models are compared: one in which the predictor-outcome path (self-evaluative vulnerability to brooding) is constrained to zero, and one in which this path is free to vary. Mediation is present when the unconstrained model does not improve the fit over the fully mediated model (Holmbeck, 1997).

The first hypothesized mediated pathway was between self-evaluative vulnerability and brooding via emotion beliefs and emotion suppression (model #2, see Fig. 4), and the second was between emotion beliefs and brooding through emotion suppression (model #3, see Fig. 5). In the first set of mediation analyses (model #2, Fig. 4), the initial condition for mediation (i.e., a direct predictor to outcome relationship) was met; self-evaluative vulnerability was associated with brooding in the expected direction (path = .50,  $t = 4.75$  (14),  $p = .000155$ ,  $\chi^2$  (14,  $N = 158$ ) = 23.15,  $p = .057$ , RSMEA = .064 (90% CI [0.0, 0.109])). Next, the second condition for mediation in model #2 was evaluated; the direct path between self-evaluative vulnerability and brooding was constrained to zero,  $\chi^2$  (16,  $N = 158$ ) = 24.48,  $p = .079$ , RSMEA = .058 (90% CI [0.0, 0.101]) (see Table 2 and Fig. 4) and results were compared to the original model (#1) in which it was free to vary (see Table 2 and Fig. 3). There was no significant difference between the models,  $\chi^2/df = 1.26$ ,  $p = .262$ , indicating that allowing the self-evaluative vulnerability to brooding path to vary did not improve model fit, and was thus mediated by emotion processes (emotion beliefs and emotion suppression). Consequently, this path between self-evaluative vulnerability and brooding was constrained to zero in subsequent analyses (shown in model #2, Fig. 4) (Holmbeck, 1997).

The next hypothesis addressed whether emotion suppression mediated the relationship between emotion beliefs and brooding (model #3, see Fig. 5). When the direct path from emotion beliefs to brooding was constrained to zero, emotion suppression was positively associated with brooding,  $\chi^2$  (17,  $N = 158$ ) = 45.29,  $p = .00022$ , RSMEA = .103 (90% CI [0.067, 0.139]). However, constraining this path to zero significantly degraded model fit,  $\chi^2$  difference = 20.81 (1 df),  $p < .00001$  (see Table 2) and was thus rejected in favor of model #2 (Fig. 4) which retained the path between emotion beliefs and brooding. Model (#2) (see Fig. 4) thus represented the best fitting model.

Because emotion suppression did not predict brooding in structural models with acceptable fit, an alternative measurement model C, omitting the emotion suppression construct, was evaluated,  $\chi^2$  (5,  $N = 158$ ) = 4.50,  $p = .481$ , RSMEA = .00 (90% CI [0.0, 0.105]). However, this model included several out of range fit indices (see Table 2), suggesting poor model specification and was thus rejected. Thus, SEM model #2 – in which emotion beliefs partially mediated the relationship between self-evaluative vulnerability and brooding, with emotion suppression present in the model – was the best fitting (see Fig. 4).

Finally, analyses were replicated predicting residual reflection, similarly controlling for depression scores. As with prior analyses, we opted to control for depressive symptoms for theoretical reasons, though results were comparable whether or not depressive symptoms were included in the models. After establishing a parallel measurement model as used in

brooding analyses,  $\chi^2 (12, N = 158) = 23.90, p = .021$ , RSMEA = .079 (90% CI [0.0299, 0.125]), the direct relationship between self-evaluative vulnerability and reflection was assessed, indicating no significant link between the two variables (path = .02,  $t (14) = .25, p = .403$ ;  $\chi^2 (14, N = 158) = 27.34, p = .017$ , RSMEA = .078 (90% CI [0.032, 0.121])), thereby precluding tests of mediation.

## Discussion

There has been considerable support for the role of rumination in predicting a number of deleterious outcomes (Nolen-Hoeksema et al., 2008), though less research has examined underpinnings of rumination, particularly among adolescents (for exceptions, see Hilt et al., 2012; Michl et al., 2013; Raes & Hermans, 2008). The current study proposed three risk factors for brooding – but not reflective – subtypes of rumination: self-evaluative vulnerability, negative emotion beliefs, and the suppression of negative emotion. As hypothesized, both self-evaluative vulnerability – in the form of self-worth contingencies and perfectionism – and negative emotion beliefs predicted brooding over time in a community sample of adolescents. These results suggest adolescents whose self-worth is yoked to external feedback and to avoiding failure and who view negative emotions as dangerous are more likely to brood in the face of negative feelings.

Findings also revealed associations between self-evaluative vulnerability, emotion beliefs, and the suppression of negative emotion, which support the view that individuals high in self-worth contingencies and perfectionism – involving the need to garner approval and avoid criticism – seek to maintain relationships in part by suppressing their negative emotions, motivated by fear that expressing such feelings might risk disconnection (Cassidy, 1994). In support of this, the primary reason children report suppressing thoughts, opinions, and negative feelings is to avoid conflict and preserve relationships (Oldershaw et al., 2012; Shipman et al., 2000; Zeman & Garber, 1996).

We also addressed whether negative emotion beliefs and the suppression of negative emotion serve as a *mechanism* by which self-evaluative vulnerability predicts the development of brooding. Results indicate that negative emotion beliefs partially mediate this relationship. Full mediation was not expected given the multiple pathways to rumination, including low self-esteem, self-criticism and neediness (Kuster et al., 2012), stressful life events (e.g., Michl et al., 2013), childhood abuse (Raes & Hermans, 2008) and family factors (Hilt et al., 2012; Ruijten et al., 2011). Future research might address the relative roles of such risk factors. In addition, that self-evaluative and emotion vulnerability predicted only one subtype of rumination attenuates the likelihood that common method bias accounted for results.

As hypothesized, self-evaluative and emotion vulnerability were differentially linked with brooding and reflection, supporting the specificity of this model. A growing body of work has shown brooding, but not reflection, is strongly related to maladaptive outcomes (Burwell & Shirk, 2007; Lopez et al., 2009; Mezulis et al., 2011; Treynor et al., 2003), though we know less about predictors of these subtypes (for an exception, see Raes & Hermans, 2008).

While the majority of hypotheses were supported, several were not. Although the suppression of negative emotion was, as predicted, directly correlated with change in brooding, contrary to hypotheses, this link was no longer significant in SEM models that included negative emotion beliefs and self-evaluative vulnerability constructs. In fact, the direction of association between the suppression of negative emotion and brooding reversed when other variables and paths were accounted for, suggesting a suppression effect, though poor model fit precluded interpreting this path. Past research has found expression of negative affect is linked with decreased rumination (Gortner et al., 2006; Klein & Boals, 2001), though other findings show suppression of negative emotion is favorable in terms of interpersonal relationships (Coyne, 1976).

It is possible that the current lack of association between the suppression of negative emotion and brooding is related to limitations of self-report, such as response bias, and/or the measures tapped into emotion *dysregulation* more than emotion *suppression*. Dysregulated adolescents, who generally inhibit, but when stress accumulates occasionally express in a disinhibited manner, may respond inconsistently to the questionnaire. Indeed, Keenan, Hipwell, Hinze, and Babinski (2009) found the suppression of negative emotion is an important component of disinhibition among children – that is, children who generally inhibit their negative feelings are more likely to occasionally express their emotions in a disinhibited manner. On the other hand, it is possible that the lack of connection between the suppression of negative emotion and rumination was not a methodological limitation; rather, the extent to which adolescents suppress negative emotion is simply not as influential in predicting brooding as whether or not they view these negative emotions as dangerous. Observational designs, physiological measures of emotion suppression and/or experimentally testing the effects of emotion expression (through writing or verbal disclosure) on brooding is recommended.

In addition, the second proposed mediational model was not confirmed; the suppression of negative emotion did not explain the *process* by which negative emotion beliefs were associated with the development of brooding. Interestingly, removal of this emotion suppression construct from the model (measurement model C) resulted in a significant deterioration in fit. Thus, emotion suppression was important in the model; it was directly and positively related to negative emotion beliefs – those who held negative beliefs towards emotions were more likely to suppress them. However, beliefs about – not suppression of – emotion predicted brooding. Thus, while the current findings do not support experiential avoidance and suppression theories (Hayes et al., 1996; Wegner, 1989, respectively), they do support the view of brooding as a meta-cognitive process (Nolen-Hoeksema, 2004) and point to *beliefs about* rather than the self-reported *suppression of* negative emotion as maladaptive (Leahy, 1985).

The current findings shed theoretical light on the topic of emotion regulation, which involves “the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998, p. 275)”. The current results suggest that emotion regulation research might further address negative emotion beliefs that underpin the behavioral inhibition (or self-reported suppression) of

emotion and the self-evaluative processes by which adolescents come to develop maladaptive negative emotion beliefs that place them at risk for brooding rumination.

What are the practical and therapeutic implications of the current findings? That beliefs about, rather than the suppression of, emotion are linked with brooding suggest that encouraging adolescents to tamper down their emotion will not affect their level of brooding. Rather, helping adolescents address negative *beliefs* about emotions is more fruitful in reducing brooding than intervening in their behavioral *expression* or *experience* of them (Williams et al., 2007). Current findings are consistent with Williams et al.'s (2007) established intervention for brooding, which involves simply noting, non-judgmentally, aversion to and negative beliefs about emotion *as a process* (e.g., “This sadness is dangerous; noticing heaviness in chest”) as a means of diminishing negative emotion beliefs. This intervention contrasts with those maintaining either an analytical focus on the *content* of the emotion (e.g., “I am sad about X because of Y”) (e.g., found in CBT) or an expressive focus involving venting emotions (e.g., found in expressive therapies) (Watkins & Teasdale, 2004; Williams et al., 2007). Mindfulness-based therapies –which rely on this process, rather than content, focus –have resulted in reductions not only in brooding and fear of negative emotions, consistent with the current findings, but also in depression and anxiety (Chiesa & Serretti, 2011; Fjorback, Arendt, Ørnbøl, Fink & Walach, 2011; Robins et al., 2012).

In addition to intervening proximally at the level of emotion beliefs, prevention and interventions may also address the more distal source of rumination, namely self-evaluative vulnerability. Specifically, parents, teachers, counselors, and adolescents themselves may be educated about the deleterious links between self-worth contingencies, perfectionism and brooding. This knowledge may help adolescents challenge such beliefs and work towards developing a sense of self that is anchored internally (e.g., through mindfulness-based cognitive therapies) (Williams et al., 2007).

The current study utilized self-report given that many of the constructs gauge internal experiences best captured by participants themselves. Using alternative methods, such as semi-structured interview, observation of interactions on a frustrating task, or physiological measures, is recommended to assess the suppression of negative emotion. Experimental studies manipulating the suppression of negative emotion might also complement the current longitudinal design. Another limitation of the current study involved the modest sample size, precluding examination of sex differences. However, sex differences were not predicted; insofar as individuals endorse high levels of self-evaluative vulnerability, the hypothesized pattern of associations among variables was expected. In addition, although rumination was not assessed at time 1, we nonetheless found sufficient variability in rumination between times 2 and 3 to predict change in brooding rumination over time. Finally, given that this was a homogenous, primarily European-American, middle to upper-middle class group, findings may not generalize to more diverse samples.

Strengths of the current study including its drawing from a community sample, assessing adolescents – an age group about which we know relatively little in terms of brooding, the use of a longitudinal design, and SEM to simultaneously assess these constructs and error

terms. It is noteworthy that we were able to predict the *development* of rumination rather than simply time 3 rumination scores given the relative stability of rumination. Furthermore controlling for depression ruled out the possibility that brooding and or self-evaluative and emotion vulnerabilities were an artifact of depression.

In sum, the current study shows self-evaluative vulnerability, in the form of self-worth contingencies and perfectionism, as well as negative emotion beliefs, predict the development of brooding, but not reflection, in adolescence. Cognitive and interpersonal interventions may be used to challenge self-evaluative and emotion vulnerabilities for brooding among at-risk youth. In addition, evidenced-based mindfulness practices may be implemented to experientially address individuals' negative beliefs about emotions (Williams et al., 2007).

## Acknowledgments

This research was supported by a National Institute of Mental Health grant awarded to Rebecca A. Burwell (5F31-MH66446-01) and a National Institute of Mental Health grant awarded to Stephen R. Shirk (R03-MH60106-01A1).

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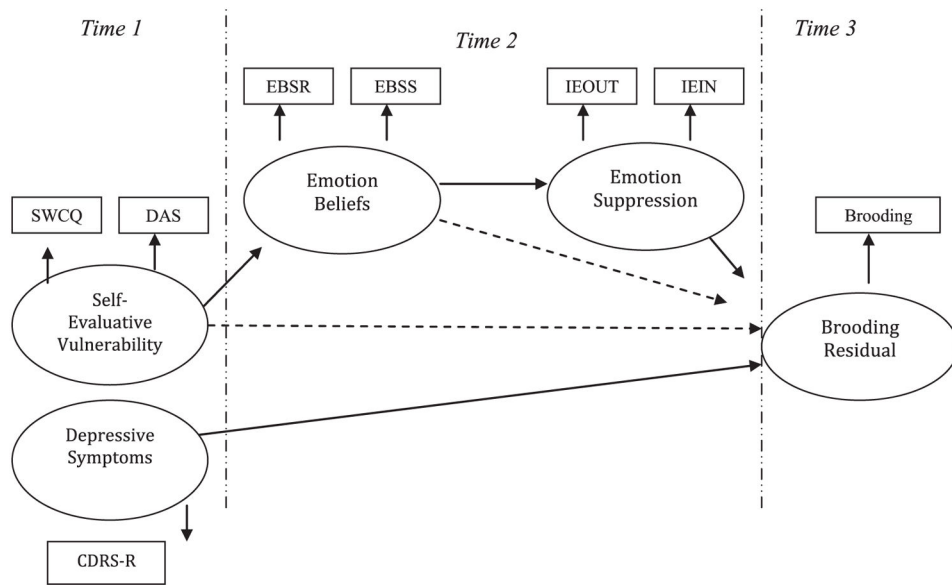


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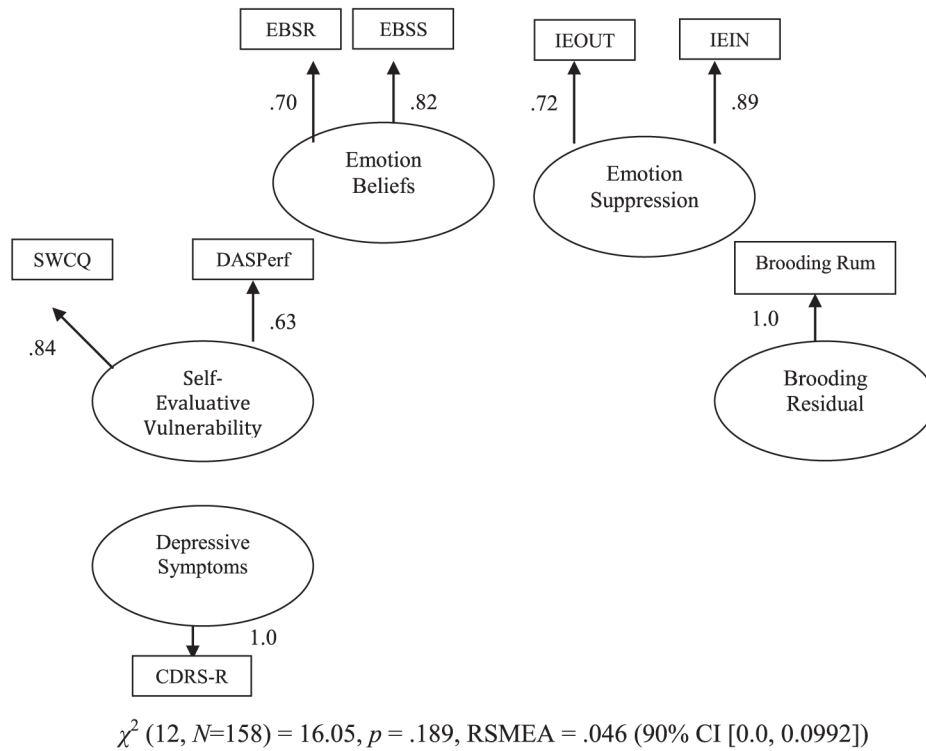
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**Fig. 1.**

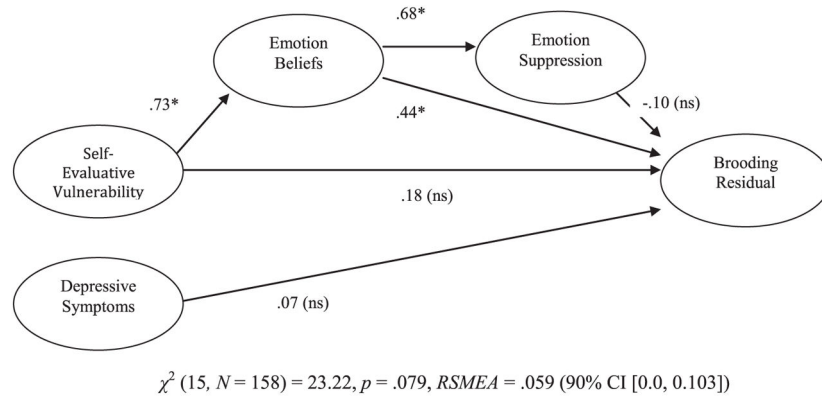
Proposed model: prediction of brooding.

Note: SWCQ = Self-Worth Contingency Questionnaire; DASPerf = Dysfunctional Attitudes Scale (Perfectionism subscale); EBSS = Emotion Beliefs about Self Scale; EBSR = Emotion Beliefs about Relationships Scale; IEIN = Inhibition (Suppression) of Emotion Experience Scale; IEOUT = Inhibition (Suppression) of Emotion Expression Scale; Brooding = Brooding subscale of the adapted Nolen-Hoeksema’s Rumination Scale (residual score); Depressive symptoms = Time 1 Child Depression Rating Scale-Revised (CDRS-R)

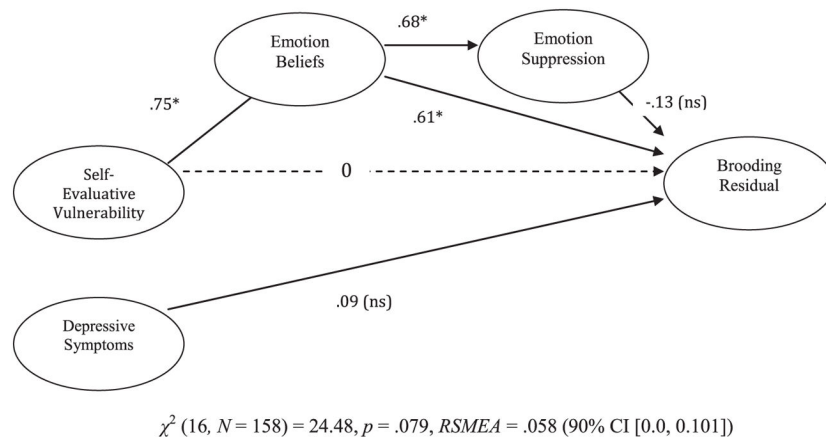


**Fig. 2.** Measurement model A predicting brooding: emotion beliefs distinct from emotion suppression.  
 Note: SWCQ = Self-Worth Contingency Questionnaire; DASPerf = Dysfunctional Attitudes Scale (Perfectionism subscale); EBSS = Emotion Beliefs about Self Scale; EBSR = Emotion Beliefs about Relationships Scale; IEIN = Inhibition (Suppression) of Emotion Experience Scale; IEOUT = Inhibition (Suppression) of Emotion Expression Scale; Brooding = Brooding subscale of the adapted Nolen-Hoeksema’s Rumination Scale (residual score); Depressive symptoms = Time 1 Child Depression Rating Scale-Revised (CDRS-R)

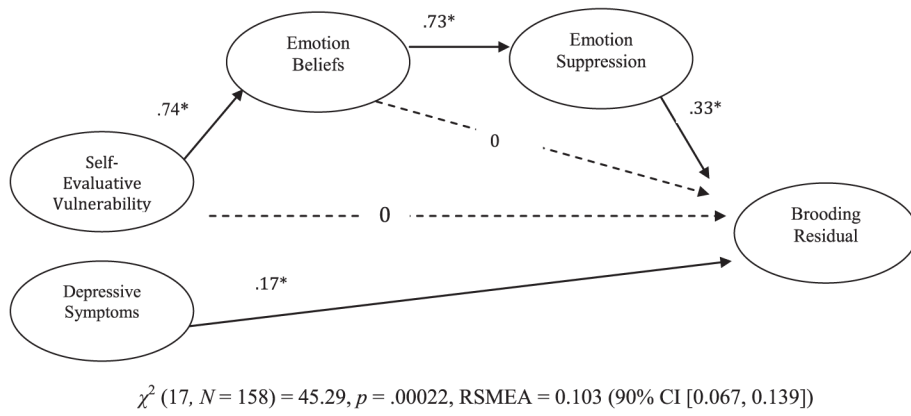




**Fig. 3.** Model 1: a full (non-constrained, non-mediated) model of brooding.



**Fig. 4.** Model 2 (self-evaluative vulnerability to brooding constrained to zero): best fitting model.



**Fig. 5.** Model 3 (emotion beliefs to brooding constrained to zero).

**Table 1**

Descriptives and zero-order correlations among model variables.

	Contingen.	Perfect.	Emotion beliefs – others	Emotion beliefs – self	Suppression – outward	Suppression – inward	T2 brooding	T2 reflection	T3 brooding	T3 reflection	T1 depression
Contingencies	1.0	.53***	.36***	.47***	.24**	.27**	.39***	.02	.43***	.11	.31***
Perfectionism	-	1.0	.22**	.39***	.24**	.32***	.28***	.04	.36***	.18*	.12
Emotion beliefs – others	-	-	1.0	.56***	.47***	.34***	.35***	-.01	.32***	.04	.26**
Emotion beliefs – self	-	-	-	1.0	.48***	.39***	.45***	.14+	.44***	.12	.36***
Suppression – outward	-	-	-	-	1.0	.62***	.28**	-.01	.25**	-.02	.30***
Suppression – inward	-	-	-	-	-	1.0	.23**	-.13	.28**	.07	.25**
T2 brooding	-	-	-	-	-	-	1.0	.23**	.59***	.19*	.27***
T2 reflection	-	-	-	-	-	-	-	1.0	.21*	.46***	.07
T3 brooding	-	-	-	-	-	-	-	-	1.0	.33***	.41***
T3 reflection	-	-	-	-	-	-	-	-	-	1.0	.10
T1 depression	-	-	-	-	-	-	-	-	-	-	1.0
<i>Mean (SD)</i>	26.45 (6.47)	16.71 (5.12)	1.79 (0.49)	2.14 (0.69)	2.22 (0.54)	2.30 (0.53)	1.82 (0.53)	1.81 (0.63)	1.71 (0.59)	1.74 (0.55)	27.21 (7.43)

Note:

\*\*\*  
*p* < .001;

\*\*  
*p* < .01;

\*  
*p* < .05;

+  
*p* < .10.

Note: above constructs measured by the following: Contingencies = Self-Worth Contingency Questionnaire (SWCQ); Perfectionism = Dysfunctional Attitudes Scale (Perfectionism subscale) (DAS); Emotion Beliefs about Others and Self = Emotion Beliefs about Others (IEOUT) and Emotion Beliefs about Self (IEIN) Scales; Suppression = Inhibition (Suppression) of Emotion Expression (outward expression) (IEOUT) and Inhibition (Suppression) of Emotion Experience (inward experience) (IEIN) Scales; Brooding and Reflection = Brooding and Reflection subscale of the adapted Nolen-Hoeksema's Rumination Scale (residual score); Depressive symptoms = Time 1 Child Depression Rating Scale-Revised (CDRS-R).

**Table 2**

Model fit indices.

	$\chi^2$	df	$\chi^2/df$	p-value	RSMEA	GFI	NNFI	CFI	IFI
<b>Measurement models</b>									
Measurement model A (separate emotion beliefs, emotion suppression)	16.05	12	1.34	.189	.046	.976	.984	.993	.993
Measurement model B (collapsed emotion beliefs, emotion suppression)	53.76	16	3.36	.00001	.122	.919	.888	.936	.937
Measurement model C (omitting emotion suppression)	4.50	5	0.90	.481	.000	.991	1.005	1.000	1.002
<b>Structural models</b>									
SEM: model 1: full model (non-constrained, non-mediated)	23.22	15	1.54	.079	.059	.966	.974	.986	.986
SEM: constrained model 2 (self-evaluative vulnerability to brooding path set to 0)	24.48	16	1.53	.079	.058	.963	.975	.986	.986
SEM: constrained model 3 (beliefs to brooding path set to zero)	45.29	17	2.66	.00022	.103	.933	.921	.952	.953

Note: comparison of measurement models A and B:  $\chi^2$  difference = 37.71 (4 df),  $p < .00001$ .

Note: measurement model C includes out of bounds NNFI and IFI fit indices and was consequently rejected.

Note: comparison of SEM models 1 and 2:  $\chi^2$  difference = 1.26 (1 df),  $p = 0.262$ ; Comparison of SEM models 2 and 3:  $\chi^2$  difference = 20.81 (1 df),  $p < .00001$ .