

Developmental Antecedents of Sadness and Anger Rumination: Examining the Roles of Attachment and Affect Regulation

by

Tania Bartolo

M.A., Simon Fraser University, 2010
B.Sc. (Hons.), McMaster University, 2007

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Approval

Name: Tania Bartolo
Degree: Doctor of Philosophy
Title: *Developmental Antecedents of Sadness and Anger
Rumination: Examining the Roles of Attachment and
Affect Regulation*

Examining Committee: **Chair:** Robert McMahon
Professor

Marlene M. Moretti
Senior Supervisor
Professor

Kathleen L. Slaney
Supervisor
Associate Professor

Alexander L. Chapman
Supervisor
Associate Professor

Jennifer S. Wong
Internal Examiner
Associate Professor
School of Criminology

Kimberly A. Schonert-Reichl
External Examiner
Professor
Department of Educational and
Counselling Psychology and Special
Education
University of British Columbia

Date Defended/Approved: December 1, 2016

Ethics Statement



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Abstract

The role of rumination in the development and maintenance of psychopathology has been well established. Far less is known however, about possible precursors to this repetitive thinking style. The current study examined two potential developmental antecedents of rumination: insecure attachment and affect regulation. Reports of attachment anxiety and avoidance with maternal figures were examined as predictors of both sadness and anger rumination in a sample of high-risk youth. Affect dysregulation and suppression were also assessed as potential mediators of these associations. Participants completed questionnaires at three time points within a five-year period, with the current study examining associations concurrently at Time 1 and prospectively across Time 2 and 3. Gender differences in these relationships were also assessed. Participants at Time 1 were 159 adolescents (84 males, 75 females) between the ages of 12 and 18 years ($M = 15.41$, $SD = 1.52$). Concurrent and prospective associations were tested within a path analysis framework. With respect to concurrent relationships at Time 1, statistically significant associations were found between affect dysregulation and anger rumination for females and males. The association between anger rumination and attachment anxiety was small to moderate, and not statistically significant. Associations between sadness rumination and both attachment avoidance and affect suppression were also not statistically significant for either gender. When examining relationships across time, attachment anxiety significantly predicted increased anger rumination only in females. Affect dysregulation was significantly associated with higher levels of anger rumination for both females and males. Despite this, affect dysregulation did not mediate the association between attachment anxiety and anger rumination. With respect to sadness rumination, attachment avoidance was found to be a significant predictor in females. Implications of these findings for preventative and intervention efforts are discussed.

Keywords: Rumination; attachment; affect regulation; youth; high-risk

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Chapter 1. Introduction

An extensive body of research has confirmed associations between rumination and a host of negative outcomes, most notably depression (Lyubomirsky, Layous, Chancellor, & Nelson, 2015) and aggressive behaviour (Anestis, Anestis, Selby & Joiner, 2009; Denson, 2012). Despite this, relatively little attention has been given to possible developmental antecedents to ruminative thinking. Some have suggested one's early family environment may play a role (Hilt, Armstrong, & Essex, 2012), but only a small number of studies have explicitly examined attachment with primary caregivers as a possible mechanism through which ruminative thinking develops (Margolese, Markiewicz, & Doyle, 2005; Ruijten, Roelofs, & Rood, 2011; Van de Walle, Bijttebier, Braet, & Bosmans). Attachment theory argues that a sense of comfort and security in one's relationships with primary caregivers provides the conditions necessary to foster the development of adaptive coping skills and the regulation of emotional states (Bowlby 1969/1982, 1973). Attachment styles characterized by insecurity concerning one's relationship, exhibited by either anxious or avoidant approaches to caregivers, are related to a host of psychological difficulties involving impairments in affect regulation (Mikulincer & Shaver, 2007). In addition to its association with insecure attachment, difficulty regulating one's emotions is considered central to ruminative thinking, and the role of rumination as a maladaptive affect regulation strategy has been strongly established (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Nolen-Hoeksema, Gilbert, & Hilt, 2015).

The current study examines the role of attachment anxiety and avoidance as possible predictors of rumination both in adolescence and early adulthood. In addition, affect regulation is examined as a possible mechanism through which insecure attachment patterns are associated with ruminative thought. No study to date has explicitly examined the associations between these three factors, and extant studies of attachment and rumination or affect regulation have used cross-sectional methods and normative samples. The purpose of the current study is, therefore, to explore the roles of both

insecure attachment and affect regulation in predicting rumination in a sample of high-risk youth over time. Clarifying how these processes influence rumination during adolescence, as well as the transition to adulthood, may assist in the development of appropriate intervention programs for at-risk youth.

1.1. Sadness Rumination

Rumination involves the repetitive focus on symptoms of distress and on the meanings of those symptoms (Nolen-Hoeksema, 1998), and has been studied most extensively in relation to the development and maintenance of depressive symptoms. In the case of ruminative thinking about depression, or *sadness rumination*, the Response Styles Theory (Nolen-Hoeksema, 1991) has been most influential in explaining this association. The theory posits that individuals repetitively focus on their depression, their particular symptoms, and the causes of depressed mood, as well as the possible meaning and consequences of those symptoms. When distressed, this response style involves becoming fixated without engaging in any active problem solving to improve the situation or taking action to alleviate symptoms. This therefore serves to prolong the distress, in this case – the duration of depressive episodes (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

There has been considerable empirical support for the association between sadness rumination and depressive symptoms. Among adults, sadness rumination has been found to predict prolonged periods of depression and increased likelihood of developing depressive disorders in prospective studies (Mor & Winquist, 2002; Nolen-Hoeksema, 2000; Sarin, Abela, & Auerbach, 2005; Spasojevic & Alloy, 2001), using several different measures and conceptualizations of ruminative thought (Nolen-Hoeksema et al., 2008). Associations between rumination and depression have also been observed in children and adolescents, with rumination predicting an increase in depressive symptoms (Abela, Aydin, & Auerbach, 2007; Burwell & Shirk, 2007; Hilt, McLaughlin, & Nolen-Hoeksema, 2010; Rood, Roelofs, Bogels, Nolen-Hoeksema, & Schouten, 2009), as well as the onset and duration of depressive episodes (Abela & Hankin, 2011; Nolen-Hoeksema, Stice, Wade, & Bohon, 2007; Wilkinson, Croudace, & Goodyer, 2013).

Sadness rumination (as well as ruminative brooding¹) has been linked to a host of other issues in addition to depression, including anxiety (Aldao et al., 2010;), disordered eating (Hilt, Roberto, & Nolen-Hoeksema, 2013; Nolen-Hoeksema et al., 2007; Rawal, Park, & Williams, 2010), rejection sensitivity (Pearson, Watkins, Mullan, & Moberly, 2010), victimization (McLaughlin & Nolen-Hoeksema, 2012), and alcohol use (Caselli et al., 2010; Nolen-Hoeksema & Harrell, 2002; Willem, Bijttebier, Claes, & Raes, 2011).

With respect to gender differences, women have generally reported higher levels of sadness rumination than men (Johnson & Whisman, 2013; Nolen-Hoeksema & Aldao, 2011; Nolen-Hoeksema & Jackson, 2001; Nolen-Hoeksema, Larson, & Grayson, 1999; Reynolds, Seawright, & Ratwik, 2016), even when levels of sadness are statistically controlled for (Peled & Moretti, 2010). Gender differences have also been observed in adolescence (Cox, Mezulis, & Hyde, 2010; Jose & Brown, 2008), including the current sample (Peled & Moretti, 2007). These higher rates of sadness rumination have been proposed to explain the higher rates of depression observed in females beginning in adolescence (Nolen-Hoeksema et al., 1999; Nolen-Hoeksema & Jackson, 2001). Gender differences have not been consistently observed, however, in the overall association between sadness rumination and depressive symptoms (Abela & Hankin, 2011; Peled & Moretti, 2010; Rood et al., 2009). Nolen-Hoeksema emphasized that it is not the impact of rumination on depressive episodes that differs by gender, but instead that as women are more likely to engage in rumination, and to do so earlier, they are more likely than men to experience depressive episodes (Lyubomirsky et al., 2015).

1.2. Anger Rumination

While rumination has most extensively been researched in the context of depression, more recently, attention has focused on the construct of *anger rumination*. Anger rumination involves repetitive thoughts about one's angry feelings (Sukhodolsky, Golub, & Cromwell, 2001) or about an anger-inducing experience of personal significance (Denson, 2012). This form of rumination both intensifies and prolongs feelings of anger,

¹ Refer to Appendix A for further information regarding self-report measures of rumination and the subtypes and/or components of brooding and reflection.

and includes thoughts about the event that evoked feelings of anger, as well as thoughts of revenge on the person who has angered you (Denson, 2009). Anger rumination in adults has been associated with increased feelings of anger (Bushman, 2002; Peled & Moretti, 2010; Ray, Wilhelm, & Gross, 2008; Rusting & Nolen-Hoeksema, 1998) and aggressive behaviour (Anestis et al., 2009; Bushman, 2002; Bushman, Bonacci, Pedersen, Vasquez, & Miller, 2005; Denson, Pedersen, Friese, Hahm, & Roberts, 2011; Maxwell, 2004; White & Turner, 2014). This association between anger rumination and aggression has been observed even when angry affect is statistically controlled (Peled & Moretti, 2010). Links between anger rumination and aggression have also been demonstrated in children (Smith, Stephens, Repper, & Kistner, 2016) and adolescents (Vasquez, Osman, & Wood, 2012), including a sample of high-risk adolescent males (Smith et al., 2016). Positive associations between anger rumination, anger, and aggressive behaviour were also previously confirmed in the current sample during adolescence (Peled & Moretti, 2007). In addition to aggression, the role of rumination in Borderline Personality Disorder (BPD) symptomatology has also been established (Selby, Anestis, Bender, & Joiner, 2009; Selby & Joiner, 2009; 2013), with some suggesting anger rumination may be particularly relevant to BPD features (Baer & Sauer, 2011).

Similar levels of anger rumination have generally been observed across gender in previous studies (Burnette, Taylor, Worthington, & Forsyth, 2007; Maxwell, 2004; Peled & Moretti, 2010; Rusting & Nolen-Hoeksema, 1998; White & Turner, 2014), with a few exceptions. Two studies using undergraduate samples found males (Guerra & White, 2016; Maxwell, Sukhodolsky, Chow, & Wong, 2005) reported higher levels of anger rumination than females². In addition, in the current sample, Peled & Moretti (2007) found that high-risk adolescent females reported higher levels of anger rumination. Gender differences in the association between anger rumination and aggression, however, were not observed in the current sample during adolescence.

To date, the majority of research on ruminative thinking has focused on general theories of rumination and its role in psychopathology. Links between both types of rumination and negative outcomes have been well-established, with rumination serving as

² Both studies used the Anger Rumination Scale (ARS; Sukhodolsky et al., 2001) to assess anger rumination.

a risk factor across a number of disorders. Given its prominent role in psychopathology, it is somewhat surprising that far less attention has been given to potential antecedents of ruminative thought, as identifying relevant precursors could have important implications for both prevention and intervention. In studies that have examined possible predictors of ruminative thinking, the role of early family context has been emphasized (Hilt et al., 2012). The quality of attachment relationships with primary caregivers (Margolese et al., 2005; Ruijten et al., 2011; Van de Walle et al., 2016) in particular, has been proposed as an important factor in understanding why certain individuals adopt a ruminative coping style in response to distress.

1.3. Attachment Theory

A central tenet of attachment theory is that the quality of the relationship between caregiver and child is crucial in later social and emotional development (Bowlby 1969/1982, 1973). Bowlby argued that humans have an innate *attachment system*, composed of biologically based behaviours that serve to maintain proximity to attachment figures in times of threat or distress. When attachment figures are sensitive to their child's needs and are able to adequately attend and respond to them, the child learns that the world is a safe place and to place trust in others when distressed. This forms the basis of a secure attachment, where individuals develop a positive sense of self and others. This sense of self and others is then internalized into an *internal working model*, a set of emotions and cognitions regarding past attachment experiences, that continues to influence one's approach to relationships across the lifespan.

Attachment styles, which are systematic patterns of expectations, emotions, and behaviours resulting from earlier experiences with attachment figures (Shaver & Mikulincer, 2008) have been used to assess the role of attachment in predicting later behaviour. Early research on infant-parent attachment focused on three styles – secure, ambivalent and avoidant attachment (Ainsworth, Blehar, Waters, & Wall, 1978). Some later research adopted a dimensional approach; suggesting attachment styles are better understood as the product of two overarching dimensions – attachment anxiety and attachment avoidance (Bartholomew & Horowitz, 1991; Brennan, Clark, & Shaver, 1998). *Attachment anxiety* refers to the degree to which an individual worries that their

attachment figure will be unavailable in times of distress. *Attachment avoidance* refers to the degree to which an individual distrusts the level of support received from their attachment figure and attempts to remain independent and create emotional distance from them (Mikulincer & Shaver, 2005). A four-category typology has also been argued using these dimensions and views of self and others (Bartholomew & Horowitz, 1991). They consist of secure (low anxiety, low avoidance; positive self and other), preoccupied (high anxiety, low avoidance; negative self, positive other), dismissing (high avoidance, low anxiety; positive self, negative other), and fearful attachment (high anxiety and avoidance; negative self and other).

Of greatest interest to the current study are those who are insecurely attached – individuals high in attachment anxiety, avoidance, or both. In line with Bowlby's earlier theories (1969/1982, 1973), attachment insecurity has been consistently linked to mental health difficulties in adolescents, including both internalizing symptoms, such as depressive symptoms (Brenning & Braet, 2013; Brumariu & Kerns, 2010; Madigan, Brumariu, Villani, Atkinson, & Lyons-Ruth, 2016) and externalizing psychopathology, including aggression and delinquent behaviour (Allen et al., 2002; Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; Madigan et al., 2016). With respect to gender differences, previous research has found females report higher levels of attachment anxiety in both adolescence (Brenning & Braet, 2013) and adulthood (Chopik, Edelstein, & Fraley, 2012; Del Giudice, 2011). Findings for attachment avoidance are less consistent, with some studies finding higher levels of attachment avoidance in males (Brenning & Braet, 2013; Del Giudice, 2011) and others finding higher levels in females (Chopik et al., 2013). Gender differences in associations between attachment styles and outcomes have also not been consistently observed.

1.3.1. Attachment and Rumination

The impact of the parent-child attachment relationship on the development of ruminative thinking has largely been assessed indirectly, examining parenting practices and caregiver maltreatment as potential developmental antecedents. Retrospective reports of over-controlling parenting in particular, have been associated with increased sadness rumination (Spasojevic & Alloy, 2002) and ruminative brooding in adults

(Manfredi et al., 2011). Childhood reports of over-controlling parenting have also been found to predict ruminative brooding in adolescence (Hilt et al., 2012). With respect to maltreatment, retrospective reports of childhood abuse have been found to be associated with higher levels of sadness rumination in adolescence (Heleniak, Jenness, Vander Stoep, McCauley, & McLaughlin, 2016), with emotional abuse appearing to play an especially important role, with associations found in adolescent community (Padilla Paredes & Calvete, 2014) and clinical samples (O'Mahen, Karl, Moberly, & Fedock, 2015), as well as in young adults (Raes & Hermans, 2008; Spasojevic & Alloy, 2002). Some support for the association between childhood sexual abuse and increased sadness rumination has also been found in adults (Conway, Mendelson, Giannopoulos, Csank, & Holm, 2004; Sarin & Nolen-Hoeksema, 2010; Spasojevic & Alloy, 2002). Researchers have suggested parental overcontrol and maltreatment contribute to the child experiencing a loss of control over their environment. Not being able to predictably depend on caregivers for emotional support or openly share their emotions as a means to learn to self-regulate, they instead turn their focus inward and adopt a ruminative coping style in response to distress (Nolen-Hoeksema, 1991; Spasojevic, Alloy, Abramson, MacCoon, & Robinson, 2004).

To date, only a select number of studies have explicitly examined the associations between attachment and rumination. Further, few studies have assessed this relationship in adolescence, often examining rumination as a mediator in the association between attachment and affective outcomes, with various approaches to measuring attachment. In one such study, ruminative coping was assessed as a potential mediator in the association between working models of attachment for parents, peers, and romantic partners (using the Relationship Questionnaire; Bartholomew & Horowitz, 1991) and depressive symptoms (Margolese et al., 2005). Ruminative coping was only found to be significantly associated with working models of attachment with romantic partners, with more negative views of self in relation to their partner correlated with increased ruminative coping. A second study using the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987), found sadness rumination was concurrently associated with reduced parental trust and communication as well as increased alienation (Ruijten et al., 2011). A recent study (Van de Walle et al., 2016) examined both attachment dimensions in relation to ruminative brooding, but in pre-adolescence ($M_{age} = 11.25$ years), finding maternal

attachment anxiety³ was more strongly correlated with ruminative brooding than attachment avoidance.

Remaining studies have used adult samples (often undergraduates), assessing the role of adult attachment dimensions in the use of ruminative thinking. The majority of these studies are cross-sectional and similarly involve examining rumination as a potential mediator between attachment and behavioural outcomes, including depressive symptoms (Beyderman & Young, 2016), trait forgiveness (Burnette et al., 2007; Burnette, Davis, Green, Worthington, & Bradfield, 2009), mindfulness (Caldwell & Shaver, 2013; 2015) and emotional disclosure (Garrison, Kahn, Miller, & Sauer, 2014). Some have found specific links to attachment anxiety, with attachment anxiety being concurrently associated with increased ruminative thinking more generally (Burnette et al., 2009) as well as ruminative brooding (Caldwell & Shaver, 2013; Garrison et al., 2014; Saffrey & Ehrenberg, 2007), and romantic partner-specific rumination (Saffrey & Ehrenberg, 2007). This was seen even when using the three-category attachment measure (TCM; Hazan & Shaver, 1987), with those endorsing an anxious/ambivalent style having significantly higher reports of rumination than those who were avoidant or secure (Reynolds et al., 2016). Others have found concurrent relationships between both attachment dimensions and rumination. This has been observed with measures of general rumination (Caldwell & Shaver, 2012) as well as ruminative brooding (Beyderman & Young, 2016; Lanciano, Curci, Kafetsios, Elia, & Zammuner, 2012) and sadness rumination (Lanciano et al., 2012). A study using a community sample of currently depressed, previously depressed, and never depressed adults however, did not find concurrent associations between insecure attachment and rumination once gender and depressive symptoms were statistically controlled (Pearson et al., 2010). Only one study to date has examined the association between insecure attachment and anger rumination specifically (Burnette et al., 2007), using a categorical approach to assess attachment. All insecure attachment categories (preoccupied, dismissive, and fearful) were found to be positively correlated with anger rumination.

³ The terms “maternal attachment anxiety” and “maternal attachment avoidance” are used throughout the study to refer to adolescents’ self-reports of their attachment relationships with maternal figures.

Overall, despite variability in the assessment of both attachment and rumination across studies, previous research provides general support for the relationship between insecure attachment and ruminative thinking. With respect to specificity of associations, while some research has found associations between both attachment dimensions and increased rumination, there appears to be greater support for the link between attachment anxiety and rumination. For example, in addition to studies specifically assessing the role of attachment anxiety, in both Caldwell & Shaver's (2012) and Beyderman & Young's (2016) studies, despite correlations with both attachment anxiety and avoidance, stronger associations with rumination were observed with attachment anxiety.

1.4. The Role of Affect Regulation

Attachment theory maintains that secure attachment provides the basis for developing adaptive affect regulation strategies (Bowlby 1969/1982, 1973). Insecure attachment styles therefore, interfere with affect regulation and reinforce maladaptive coping approaches in times of emotional threat or distress. A model of attachment system activation has been proposed as a means to understand this association (Shaver & Mikulincer, 2002). When first presented with signs of distress, the attachment system is activated and individuals seek proximity to their attachment figure. For insecurely attached individuals, this attachment figure is not available, attentive, or responsive to their needs. This serves to increase the level of distress experienced, and forces the individual to adopt one of two coping strategies, hyperactivating or deactivating, in order to deal with the attachment insecurity and distress. Which strategy is adopted is largely unconscious, influenced by previous life experiences, and based upon whether seeking proximity to that attachment figure is a viable option (Shaver & Mikulincer, 2002). When attachment figures respond inconsistently and unpredictably, this promotes a state of uncertainty, as while proximity seeking is viable, it can be either rewarded or punished. This results in the use of hyperactivating strategies (Cassidy & Kobak, 1988) to regulate affect. Hyperactivating strategies involve clinging and controlling responses in attempts to garner greater attention and support, and overdependence on others for protection (Shaver & Hazan, 1993). Hypervigilance towards attachment- and threat-related cues, as well as constant concern and excessive efforts to achieve a sense of security in the availability of one's

attachment figure are also characteristic of hyperactivation (Mikulincer & Shaver, 2005). These strategies are believed to describe the cognitive, emotional, and behavioural expressions of attachment anxiety (Shaver & Mikulincer, 2002).

When seeking proximity to attachment figures is not considered viable however, deactivating strategies are used to regulate affect. Repeated instances of rejection and hostility from attachment figures and internalization of this pattern are argued to lead to suppression of normative attachment behaviours and deactivation of the attachment system. Deactivating strategies involve distancing from threat- and attachment-related cues through suppression or denial of thoughts and emotions relating to distress and attachment figures (Shaver & Mikulincer, 2002). Deactivating strategies and excessive self-reliance in response to distress are thought to reflect attachment avoidance (Mikulincer & Shaver, 2008).

Based on the emotion regulation (ER) model of attachment put forth by Shaver and Mikulincer (2002), attachment anxiety would likely result in affect dysregulation, and attachment avoidance in the suppression of affect. Support for the relationship between attachment anxiety and affect dysregulation has been found (Marganska, Gallagher, & Miranda, 2013; Wei, Vogel, Ku, & Zakalik, 2005), with adults high on attachment anxiety reporting they view themselves as incapable of regulating their distress (Mikulincer & Florian, 1998). Associations between attachment avoidance and suppression of emotion have also been demonstrated in adults (Caldwell & Shaver, 2012, 2015; Wei et al., 2005). These differential associations have been concurrently examined in middle-school students as well, with maternal attachment anxiety being uniquely related to emotion dysregulation and maternal attachment avoidance to emotional suppression, after controlling for shared variance between the two dimensions (Brenning, Soenens, Braet, & Bosmans, 2012). As a follow-up to this study, Brenning & Braet (2013) examined concurrent associations between both attachment dimensions and dysregulation and suppression of specific emotions (sadness and anger) in early adolescence. Attachment anxiety remained exclusively associated with dysregulation of negative affect (both sadness and anger dysregulation). Attachment avoidance, on the other hand, was significantly related to both sadness suppression and anger dysregulation. A recent study also examined these emotion-specific associations in older adolescents and early adults

(Clear & Zimmer-Gembeck, 2015) and found the same pattern of findings, with the exception of attachment anxiety also being concurrently associated with anger suppression. These studies provide some support for greater affect dysregulation in anxiously attached individuals, but also find variability in associations between each attachment dimension and affect regulation strategy based on the type of emotion experienced. Together these findings generally support the ER model of attachment, however these associations appear better established in the adult literature, and in studies where regulation strategies are not used in the context of a specific emotional state.

1.4.1. Attachment, Affect Regulation, and Rumination

While previous studies have examined relationships between dimensions of attachment and either rumination or affect, none have explicitly included all three variables in a single model. A study by Caldwell and Shaver (2012) examined attachment, rumination and affect dysregulation, but did so somewhat indirectly, investigating whether attachment anxiety and rumination were concurrently associated with increased negative affect as a proxy for emotional dysregulation. While this was confirmed, there remains a need to explicitly examine these associations, both in adolescent and adult populations, as well as prospectively.

The conceptualization of rumination as an outcome of either hyperactivation or deactivation is also somewhat unclear. While greater theoretical support exists for rumination as a hyperactivating strategy (Caldwell & Shaver, 2012; Mikulincer & Florian, 1998; Mikulincer & Shaver, 2007), some research has argued suppression, a strategy largely associated with deactivation, can also play a role in ruminative thinking. While appearing counterintuitive to the ER model of attachment and to earlier work on Response Styles Theory, some support for the association between suppression and rumination has been found in adults (Liverant, Kamholz, Sloan, & Brown, 2011; Moulds, Kandris, Starr, & Wong, 2007; Wenzlaff & Luxton, 2003) and adolescents (Dickson et al., 2012). Concurrent positive associations between rumination and emotional suppression (Liverant et al., 2011) as well as behavioural avoidance (Moulds et al., 2007) have been found, in addition to short-term prospective studies showing suppression (Wenzlaff & Luxton, 2003) and cognitive avoidance (Dickson et al., 2012) predict later rumination.

There are different explanations for this association. Some research has suggested that rumination may involve ineffective cognitive attempts to suppress emotion (Moulds et al., 2007). In particular, ruminative thoughts being less concrete and more abstract in nature has been argued to serve a cognitive avoidant function. Reduced concreteness in this thinking style is believed to enable emotional avoidance, as it reduces opportunities for emotional processing and impairs active problem solving (Watkins & Moulds, 2007). In contrast, other research has proposed rumination occurs as a *result* of suppression (Wenzlaff & Luxton, 2003). This theory suggests that suppression fuels rumination through a rebounding effect when presented with stressors. Thought suppression is believed to involve both a cognitively effortful process that serves to distract from unwanted thoughts, and a more automatic process that involves hypervigilance to detecting intrusive thoughts (Wegner, 1994). When one's cognitive load increases, for example when presented with a stressor, this thwarts attempts at distraction. With the more automatic monitoring process being largely unaffected, this is argued to result in greater frequency of the unwanted thoughts into consciousness (Wenzlaff & Luxton, 2003). Rumination's role in subsequent behavioural avoidance has also been highlighted, with the suggestion that ruminators might try to escape from the intense self-focus associated with rumination by suppressing both negative emotions and thoughts and engaging in avoidant behaviours (Nolen-Hoeksema et al., 2008). The variability in these conceptualizations, in addition to the inconsistencies found in earlier studies of attachment and rumination, point to the need to further investigate whether rumination shares associations with both strategies, or whether it is more strongly related to hyperactivation.

Furthermore, few studies have looked at different types of rumination. Given Peled and Moretti (2010) found that sadness and anger rumination were distinct constructs, it is surprising that few studies have examined both types of rumination. Those that have addressed both have been in the context of Borderline Personality Disorder (Baer & Sauer, 2011; Law & Chapman, 2015), and more recently, in regards to predisposing factors to substance use in adolescence (Wills, Simons, Sussman, & Knight, 2016). Further research examining both forms of ruminative thinking is therefore warranted.

1.5. Current Study

Several studies have examined associations between attachment styles and both rumination and affect regulation separately, but no study to date has examined a model with both attachment insecurity and impairments in affect regulation serving to predict levels of ruminative thought. Past studies have also used predominantly normative populations, namely high school and undergraduate students, and have often done so using cross-sectional data. Furthermore, most research has focused either exclusively on sadness rumination or ruminative brooding and few have examined antecedents of both sadness and anger rumination. The role of gender is also unclear, with some inconsistencies observed in previous research for both mean level differences of rumination and insecure attachment for males and females, as well as their associations with other outcomes (e.g., depressive symptoms). The current study, therefore, expands existing research by examining the role of both insecure attachment and affect regulation on two distinct forms of rumination in a population of high-risk male and female youth over time. Using a high-risk sample will provide an opportunity to investigate these relationships in a sample known to have elevated scores on measures of these constructs, thus allowing the examination of how these factors interact over development. The study has three main aims: 1) to determine whether insecure attachment serves as an antecedent to rumination in young adulthood; 2) to examine the role of affect regulation in the relationship between insecure attachment and rumination; and 3) to assess potential gender differences in the associations between insecure attachment, affect regulation, and rumination.

In examining these relationships, the specificity of associations between attachment dimensions and different types of rumination was somewhat exploratory. The primary theoretical model assessed the relationships between maternal attachment anxiety, affect dyscontrol⁴ and rumination. Based on previous research (Burnette et al., 2009; Garrison et al., 2014), it was predicted that maternal attachment anxiety would result in increases in ruminative thinking. With respect to the particular type of rumination, anger rumination and not sadness rumination was selected as the primary outcome for this

⁴ Dyscontrol is the term used in place of dysregulation in the current study's measure of affect regulation. The two terms are used synonymously, but dyscontrol is used primarily when referring specifically to the analyses completed in the current study.

model. This was decided partly as a function of the composition of the sample in the current study. Participants were initially selected for a larger project on the basis of displaying severe conduct and behavioural problems, including aggression, suggesting the potential for stronger associations between anger rumination and other measures of interest in this sample. Extending previous research (Brenning et al., 2012, Caldwell & Shaver, 2012) and supporting the ER model of attachment (Shaver & Mikulincer, 2002), it was also hypothesized that maternal attachment anxiety would be positively associated with affect dyscontrol and, further, that affect dyscontrol would be positively associated with anger rumination both within and across time. Affect dyscontrol was expected to partially mediate the association between attachment anxiety and anger rumination. Given the paucity of research on the specificity of associations between both types of rumination, and the fact that attachment anxiety has been linked to ruminative thinking patterns in general, an alternative or modified version of this model with sadness rumination as the outcome variable was also tested. This allowed examination of whether the affective component of rumination exhibited specificity in associations with attachment anxiety and affect dyscontrol in this sample.

The second theoretical model proposed examined associations between attachment avoidance, affect suppression, and sadness rumination. Specific predictions in this model were more tentative than the primary model, given mixed findings in the literature regarding some associations. While attachment anxiety and rumination have been linked more consistently, past research has provided some support for an association between attachment avoidance and both sadness rumination and general ruminative thinking (Beyderman & Young, 2016; Caldwell & Shaver, 2012); as such, attachment avoidance was hypothesized to predict sadness rumination in this sample. Similarly, while greater support exists for the relationship between rumination and affect dysregulation, some have argued affect suppression is also predictive of later rumination (Dickson et al., 2012; Wenzlaff & Luxton, 2003), therefore this association was also hypothesized. Lastly, attachment avoidance was expected to predict levels of affect suppression in the sample, in line with the ER model of attachment. The role of affect suppression as a mediator of this association was also explored.

Potential gender differences were assessed both at the measurement and structural level. No specific predictions regarding gender were made given the inconsistencies observed in previous research regarding both mean level differences and the associations between the variables of interest and other outcomes.

Chapter 2. Method

2.1. Overview

This study is part of a larger longitudinal project investigating risk and protective factors among Canadian adolescents at risk for aggression and antisocial behaviour. Adolescents were assessed at baseline (Time 1) and at approximately two- and five-years follow-up (Time 2 and Time 3). Data for the current study were drawn from measures completed at the three time points.

2.2. Participants and Procedure

Participants at Time 1 were 179 adolescents (97 males, 82 females) between the ages of 12 and 18 years ($M = 15.34$, $SD = 1.53$). The adolescents were drawn between 2003 and 2006 from two custody centres (54%) and a probation office (2%) in British Columbia, as well as a provincial assessment centre for youth with severe behaviour problems (44%).

In the youth justice settings, parental consent was sought to approach 132 youth and was refused by parents of 28 youth (21%). Of the 104 youth whose parents gave consent, 5 youth (4%) refused to consent/assent and one youth withdrew prior to completing the study (<1%). In the mental health setting, parental consent was sought and received for 102 youth. Of these youth, 19 (19%) refused to give consent/assent and two (2%) withdrew prior to completing the study. No significant⁵ differences were found between youth who participated versus those who did not participate with respect to age [$F(1, 226) = .78$, $p > .05$] or gender ($\chi^2 = .31$, $p > .05$).

Given that the overall focus of the larger project was to explore gender differences, efforts were made to approach all females admitted to the custody or mental health centre who were then matched with same-aged males. The exclusionary criteria, which included

⁵ The terms “significant” and “significance” used throughout the study refer to the criterion of statistical significance set for the particular statistical test being described.

an IQ below 70 and the presence of significant Axis I psychotic symptomatology, were assessed based on a file review. Youth who agreed to participate were administered three assessment modules, which were comprised of a number of semi-structured clinical interviews, self-report measures, and a computerized diagnostic assessment. At baseline, measures were administered in three separate testing sessions to reduce fatigue and enhance validity of responses. Participants received a \$30 cash honorarium or a gift certificate after completing Time 1 measures. All assessments were digitally recorded, and informed consent was obtained from both the youth and their legal guardian prior to interviews.

Consent was secured at Time 1 to contact youth for follow-up assessments (i.e., Time 2 and Time 3). Time 2 data was collected from 2005 to 2008 via telephone, between 22 and 33 months following the completion of Time 1 data collection. 98 participants (47 males, 51 females; $M_{\text{age}} = 17.86$ years, $SD = 1.48$) agreed to participate (55% of youth who participated at Time 1). Attrition was largely associated with difficulties in tracking youth (e.g., obtaining current contact information) rather than refusal to participate, with only 2 youth refusing to participate. Time 2 assessments included a subset of measures administered at Time 1 as well as additional mental and physical health questionnaires. A \$50 cash honorarium was provided upon completion. No significant differences in age, gender, ethnicity, and location were found between youth who participated in Time 2 data collection versus those that did not.

Time 3 data collection occurred from 2008 to 2010, between 25 and 34 months following completion of Time 2 data collection. Participants were contacted and asked to participate via telephone, Myspace, or Facebook. From the original sample of 179 participants, 71 (40%) were unable to be reached, 7 (4%) refused to participate, 3 (2%) were since deceased, and 2 (1%) had been incarcerated. An additional 7 participants (4%) were not contacted to participate in Time 3 data collection for reasons that were not documented. 89 youth (36 males, 53 females; $M_{\text{age}} = 19.92$ years, $SD = 1.58$) therefore agreed to participate (approximately 50% of youth who participated at Time 1). This attrition rate is consistent with other research with similar high-risk populations (Kim & Cicchetti, 2006). Youth who provided consent to participate were assessed either via telephone or in-person. Time 3 assessment consisted of two modules, comprised of semi-

structured interviews, structured diagnostic interviews and self-report questionnaires. Youth were provided a cash honorarium of \$175 upon completion of both Time 3 modules.

2.3. Measures

The Sadness and Anger Rumination Inventory (SARI; Peled & Moretti, 2007) is a self-report measure used at Time 1 and Time 3 that taps rumination on anger and sadness, using analogous items for the two forms of rumination. The SARI consists of 11 items for each form of rumination, with the words angry and anger in the anger rumination measure replaced with sad and sadness in the sadness rumination measure. Participants indicate on a 5-point scale ranging from 1 (Never) to 5 (Always) how often they engage in the activities described by each item, when they are angry (anger rumination measure) or sad (sadness rumination measure). The SARI demonstrated good reliability in the current sample at Time 1 ($\alpha = .96$ and $.94$ for sadness and anger rumination, respectively) and Time 3 ($\alpha = .95$ and $.96$ for sadness and anger rumination, respectively) as well as for an undergraduate sample ($\alpha = .92$ and $.91$ for sadness and anger rumination, respectively; Peled & Moretti, 2010).

Items from the anger rumination subscale were assessed in the current sample as part of measurement invariance analyses for Model 1 (described in Section 3.3.1). After examining factor loadings, inter-item correlations, R-square values, and standardized residuals, item 6 was dropped from further analyses for both males and females in the sample. Internal consistencies for Time 1 and 3 anger rumination for the 10-item scale were $.95$ and $.96$, respectively.

Sadness rumination items were also assessed, as part of measurement invariance analyses for Model 2 variables. Given measurement non-invariance as a function of gender was observed for sadness rumination, measurement models were examined separately for males and females (see Section 3.4.2). The complete 11-item measure was used at Time 1 and Time 3 for males ($\alpha = .96$ and $.94$, respectively). Following the same procedure outlined for anger rumination, item 6 was dropped from further analyses for

females. Internal consistencies for the 10-item measure for females at Time 1 and Time 3 were both $\alpha = .95$.

The Comprehensive Adolescent-Parent Attachment Inventory (CAPAI; Moretti, McKay, & Holland, 2000) is a 56-item measure of adolescent-parent attachment, originally developed for clinical and empirical purposes at the Maples Adolescent Treatment Centre, Burnaby, British Columbia, Canada. The measure draws items from Brennan, Clark, and Shaver's (1998) Experiences in Close Relationships (ECR) scale adapted for use with adolescents, and with reference to their relationships with their parents or primary caregivers, and is used at Time 1 in the current study. Consistent with the ECR and other self-report measures of attachment, two superordinate factors emerge from the CAPAI: attachment anxiety and attachment avoidance. In the overall study, the CAPAI was used to measure attachment anxiety and attachment avoidance in adolescents' relationships with their mother, father and friends. Eight items with the highest factor loadings from the original CAPAI were selected for inclusion in the protocol at Time 1. Attachment anxiety was assessed using 5 items and attachment avoidance with 3 items. Youth reported on their perception of their attachment with their mother, father and friends by rating each statement on a 7-point scale ranging from "Disagree Strongly" to "Agree Strongly". As mothers are the most frequently identified primary attachment figure throughout adolescence and into early adulthood (Rosenthal & Kobak, 2010), and continue to serve an integral role in providing a sense of security during these periods (Markiewicz, Lawford, Doyle, & Haggart, 2006), reports of attachment anxiety and avoidance in adolescents' relationship with only their maternal figure were used in the current study.

As part of measurement analyses, confirmatory factor analysis was performed on the full five-item maternal attachment anxiety subscale. Through examination of factor loadings, R-square values, standardized residuals and modification indices, two of the five items were dropped. The three items kept for further analyses were found to have the highest factor loadings. Internal consistencies for the three-item maternal attachment anxiety and avoidance measures were $\alpha = .79$ and $.70$, respectively.

The Affect Regulation Checklist (ARC; Moretti, 2003) is a 12-item measure adapted from published scales of emotion regulation (Gross & John, 1998, 2003; Shields

& Cicchetti, 1995) and augmented with supplementary items to tap three aspects of affect regulation in adolescents. In keeping with contemporary models, the ARC is based on a multidimensional view of emotion regulation that includes both maladaptive (e.g., lack of control, suppression) and adaptive (reflection) aspects of regulation. Furthermore, the ARC assesses regulatory characteristics independent of specific emotions. Items do not refer to specific emotions and as such avoid confounding regulatory processes with emotional states. The ARC has three subscales: Affect Dyscontrol (4 items; e.g., “I have a hard time controlling my feelings”; “It’s very hard for me to calm down when I get upset”), Affect Suppression (4 items; e.g., “I try hard not to think about my feelings”; “I try to do other things to keep my mind off of how I feel”), and Adaptive Reflection (4 items; e.g., “Thinking about why I have different feelings helps me to learn about myself”). Items are scored on a 3-point scale ranging from “not like me” to “a lot like me” and ask about experiences of affect in general. In the current study, the affect dyscontrol and affect suppression subscales at Time 1 ($\alpha = .80$ and $.63$, respectively) and Time 2 ($\alpha = .80$ and $.85$, respectively) were used.

The *Adult Self Report* (ASR; Achenbach & Rescorla, 2003) is a 126-item self-report measure which assesses general psychopathology and behavioural difficulties within the previous six months. The ASR is the adult version of the Child Behaviour Checklist, Youth Self-Report (CBCL-YSR; Achenbach, 1991; Achenbach & Edelbrock, 1981) questionnaire. Items are scored on a 3-point scale, ranging from 0 (never or not true) to 2 (often or very true) to provide both syndrome scales and DSM-oriented scales (based on DSM-IV diagnostic categories). Two broadband subscales assess internalizing and externalizing problems. The internalizing subscale is composed of three smaller syndrome subscales: withdrawn, somatic complaints, and anxious/depressed. The externalizing subscale is composed of three other syndrome subscales: aggressive behaviour, rule-breaking behaviour, and intrusive behaviour. Thought problems are also assessed, in addition to substance use. DSM-oriented subscales include depressive problems, anxiety problems, somatic problems, avoidant personality problems, attention deficit/hyperactivity problems (inattention and hyperactivity/impulsivity subscales), and antisocial personality problems. The aggressive behaviour and DSM-oriented depressive problems subscales were used for supplementary analyses in the current study ($\alpha = .87$ for both scales).

2.4. Treatment of Missing Data and Sample Descriptives

Of the 179 adolescents assessed at Time 1, 20 did not complete two or more of the measures used in the current study (CAPAI, ARC, SARI). Of these participants, 10 did not complete any measures of interest at Time 2 or Time 3, with 8 only partially completing measures of interest at Time 2 or Time 3. These 18 participants' responses were therefore eliminated from further analyses. The remaining two participants had complete data at Time 2 and Time 3 and were subsequently retained. Given the focus on maternal attachment, participants who failed to identify a primary maternal figure at Time 1 were also examined. Nine adolescents left the item blank and two reported having "no one" as a maternal figure. Two of these participants subsequently did not provide data on maternal attachment and were therefore removed, resulting in an N of 159.

Of the 159 participants remaining, complete data at Time 1 were available for 131 participants. Rates of missing data are presented in Table 2.1⁶. Across participants and measures, there were 27 cases of item-level missingness within a subscale. 11 of these cases were found to be missing greater than 20% of items in that scale and were in turn, treated as scale-level missing. Given the low proportion of cases with less than 20% of the scale items missing⁷, individual mean substitution was used to replace missing values. Scale-level missingness was handled using full information maximum likelihood estimation (FIML; Arbuckle, 1996) in Mplus Version 7.2 (Muthén & Muthén, 2014). FIML is currently viewed as one of the best "modern" approaches to handling missing data (together with multiple imputation; Schafer & Graham, 2002). It produces unbiased parameter estimates under the assumptions of multivariate normality and missing at random (MAR) data (Enders, 2010). An "implicit imputation" technique (Widaman, 2006), maximum likelihood estimation does not actually impute values for missing data, instead using all available data to estimate the values of the *parameters* with the highest likelihood of producing the sample data (Baraldi & Enders, 2010). FIML has been recommended for

⁶ Patterns of missing data were examined using the Little MCAR test in SPSS version 22, producing a non-significant result. There are some limitations associated with this test however, including low power and a bias toward producing Type II error (Enders, 2010, p. 21). Given these issues, and the nature of the current sample, it is therefore likely that the data is instead missing at random (MAR).

⁷ In one of these cases, substitution at 25% missingness was performed (i.e., missing one of four scale items).

use with longitudinal data (Graham, 2009) and offers an advantage to multiple imputation when examining model fit statistics commonly used in structural equation modelling (Enders, 2010).

Table 2.1. Rates of Scale-Level Missingness Across Measures and Time

Variable	Percent Missingness
Time 1	
Attachment Anxiety	5.0
Attachment Avoidance	5.7
Affect Dyscontrol	1.9
Affect Suppression	1.9
Sadness Rumination	13.2
Anger Rumination	11.3
Time 2	
Affect Dyscontrol	41.5
Affect Suppression	42.1
Time 3	
T3 Sadness Rumination	55.3
T3 Anger Rumination	54.1

The final sample at Time 1 consisted of 159 adolescents (84 males, 75 females) between the ages of 12 and 18 ($M = 15.41$, $SD = 1.52$), with 65.4% self-identifying as Caucasian; 23.9% as Aboriginal; and 9.3% as African/Caribbean, Asian, Hispanic, mixed or “other” ethnicity. 1.3% (2 participants) of the sample did not provide this information.

2.5. Analytical Procedure

Given sample size limitations, full structural equation modelling could not be used, and prospective and mediated relationships were instead tested within a path analysis

framework using Mplus Version 7.2 (Muthén & Muthén, 2014)⁸. In order to investigate the main aims of the study, concurrent and prospective associations between attachment, rumination, and affect regulation were examined simultaneously in two models. Model 1 (see Figure 2.1) assessed the hypotheses that maternal attachment anxiety and affect dyscontrol would be positively associated with anger rumination concurrently in adolescence, and predictive of levels of anger rumination into young adulthood. Model 2 (see Figure 2.2) tested predictions that both maternal attachment avoidance and affect suppression would be positively associated with sadness rumination concurrently in adolescence, as well as prospectively in young adulthood. Possible gender differences were examined using measurement and structural invariance analyses. Measurement invariance analyses were used to assess whether the measures of interest in the current study behaved similarly in males and females in the sample. If measurement invariance was observed between males and females, this implied that meaningful comparisons could be made regarding the measures across the two groups. If measurement invariance did not hold however, meaningful comparisons between measures could not be made. In addition, given that the sample size limited the use of full structural equation modelling, measurement was alternatively examined in a piecemeal fashion using invariance analyses, providing the opportunity to integrate some assessment of measurement into path models. Unstandardized factor loadings from these analyses were used to create weighted composite scores for each measure. These composites were then used in the final path models. Structural invariance was subsequently assessed to determine whether associations between measures in models differed as a function of gender.

Results are presented separately by model. For each, measurement invariance analyses for concurrent associations at Time 1 are presented first, followed by measurement invariance analyses across time within measures for affect regulation (e.g., Time 1 to Time 2 affect dyscontrol for Model 1) and rumination (e.g., Time 1 to Time 3 anger rumination for Model 1), as well as information regarding creation of weighted composites. Model fit and parameter estimates for path models are then described.

⁸ General guidelines suggest a minimum of a 5:1 ratio of participants to parameters being estimated in structural models (Kline, 2005). The recommended minimum sample size to detect a medium effect for the number of variables in the proposed model is 100 (O'Rourke & Hatcher, 2013).

Alternative models, involving removal of non-significant paths between measures (when justified) were also examined, in attempts to determine the most parsimonious model that best described the data given sample size constraints. Specificity of the type of rumination as the outcome variable was also assessed in a “modified” version of the model, where possible. Lastly, supplementary analyses describing concurrent associations between rumination and aggression and depressive symptoms are provided.

Model fit was assessed using the chi-square test of model fit, root mean square error of approximation (RMSEA), comparative fit index (CFI) and standardized root mean square residual (SRMR). The chi-square is a discrepancy function and represents the differences between the observed covariance matrix and the predicted covariance matrix. A non-significant chi-square is regarded as indicating an acceptable model for samples under 200, that is, that the observed covariance matrix is (statistically speaking) similar to the predicted matrix (Kenny, 2015). The RMSEA is a parsimony-adjusted index, which favors a more parsimonious model (Kline, 2005). The CFI calculates the relative improvement in fit of the proposed model compared to the null model (which assumes zero covariances between observed variables; Kline, 2005). The SRMR is the average difference between the correlation matrices of the hypothesized model and the actual sample (Byrne, 2012). The following criteria has been suggested as indicative of good model fit: a RMSEA of less than .05, a CFI of .95 or greater, and a SRMR of less than .08 (Hu & Bentler, 1999). Controversy surrounds acceptable cut-offs for these and other goodness of fit indices however, with some arguing Hu and Bentler’s (1999) recommendations are too conservative (Marsh, Hau, & Wen, 2004). Given the sample size in the current study, it is also important to note that in analyses with smaller samples, the chi-square test can result in more type I errors, and CFI and SRMR values are larger (Kenny, 2015). Therefore, in addition to the cut-offs for good fit, less conservative criteria were used to indicate adequate model fit (RMSEA less than .08; CFI greater than .90; SRMR less than .08), as well as the inspection of standardized residual covariances.

Indirect effects were tested using RMediation (Tofighi & MacKinnon, 2011). RMediation is a web application that determines confidence intervals (CI) of the indirect effect using methods based on distribution-of-the-product method. The product of two regression paths – path a (path from independent variable to mediator) and path b (path

from mediator to dependent variable are used to produce confidence intervals. If the 95% CI does not capture zero, a statistically significant indirect effect is present (Kenny, 2013).

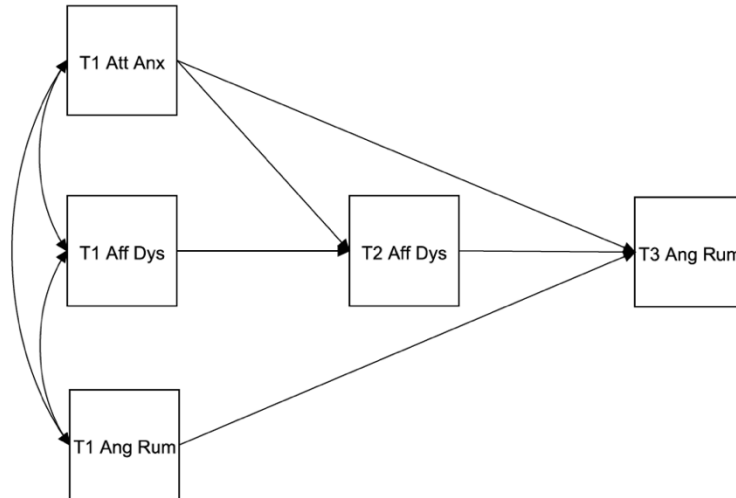


Figure 2.1 Path diagram examining concurrent and prospective associations between attachment anxiety, affect dyscontrol, and anger rumination (Model 1).

Note. T1 Att Anx = Time 1 attachment anxiety; T1 Aff Dys = Time 1 affect dyscontrol; T1 Ang Rum = Time 1 anger rumination; T2 Aff Dys = Time 2 affect dyscontrol; T3 Ang Rum = Time 3 anger rumination.

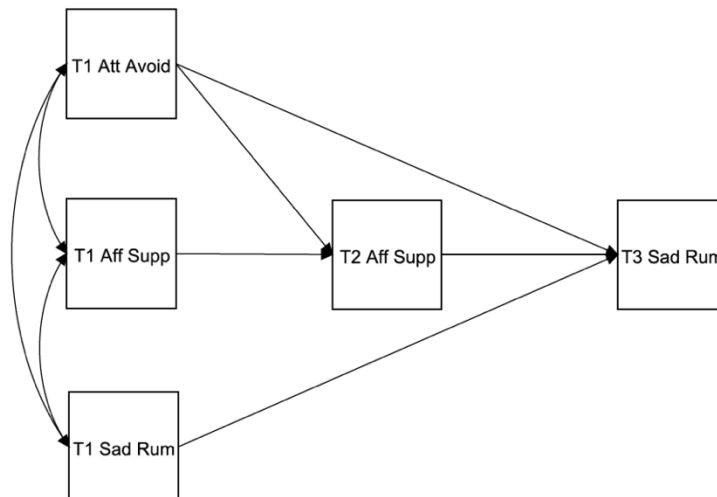


Figure 2.2 Path diagram examining concurrent and prospective associations between attachment avoidance, affect suppression, and sadness rumination (Model 2).

Note. T1 Att Avoid = Time 1 attachment avoidance; T1 Aff Supp = Time 1 affect suppression; T1 Sad Rum = Time 1 sadness rumination; T2 Aff Supp = Time 2 affect suppression; T3 Sad Rum = Time 3 sadness rumination.

Chapter 3. Results

3.1. Data Preparation

Following individual mean substitution to replace missing item-level values, the data were examined for normality and the presence of outliers. Univariate outliers were assessed on both the predictor (attachment anxiety, attachment avoidance, affect dyscontrol, affect suppression) and outcome variables (sadness and anger rumination). Outliers were identified through the inspection of boxplots and standardized scores (Z-scores) for each variable. Tabachnick and Fidell (2007) suggest that standardized scores in excess of 3.29 are potential outliers. As such, z-scores were examined and those with scores at or above 3.29 identified as univariate outliers. No outliers were identified using this method. The potential presence of multivariate outliers in the sample was examined using Mahalanobis' distance. Mahalanobis' distance was calculated for each participant at Time 1 and 2 using all predictor variables and compared with a critical value of the χ^2 distribution (Tabachnick & Fidell, 2007). No multivariate outliers were identified for either the male or female samples using this method.

Normality was evaluated through inspection of both values of skewness and kurtosis⁹ and visual inspection of histograms. Data were considered to exhibit univariate skew or kurtosis if their values were greater than or equal to |2.00| (Miles & Shevlin, 2001). Values of skewness and kurtosis were not found to exceed critical values for all but one of the measures of interest for the current study. The weighted composite for attachment anxiety in males had a kurtosis value of 2.601. Path analyses for males using the attachment anxiety composite (Model 1) were therefore run using both conventional maximum likelihood estimation (ML) and maximum likelihood estimation with robust standard errors (MLR) in Mplus. MLR estimation produces standard errors that are robust to non-normality and can be used with both complete and incomplete data (Muthén & Muthén, 1998-2015).

⁹ Refer to Appendix B for skewness and kurtosis values for all measures of interest in the current study.

Youth who completed the measures of interest at Time 3 (sadness and anger rumination) were compared to those who did not on model-specific measures by gender¹⁰ using independent samples t-tests. For Model 1 variables, males who completed Time 3 anger rumination reported lower levels of attachment anxiety at Time 1 than those that did not ($t(76.08) = 2.17, p = .033$)¹¹. Females who completed Time 3 anger rumination reported higher levels of both affect dyscontrol and anger rumination at Time 1 ($t(73) = -2.13, p = .037$ and $t(66) = -2.28, p = .026$, respectively). Zero-order correlations between these measures and remaining Time 1 Model 1 measures were subsequently compared between completers and non-completers to examine potential differences in associations. No significant differences in associations were observed for both males and females¹². With respect to Model 2 variables, males who completed Time 3 sadness rumination did not differ on any of the measures of interest. Females, however, were found to vary with respect to affect suppression at Time 2, with those who completed Time 3 sadness rumination reporting significantly higher levels of affect suppression ($t(42.46) = -4.29, p = .00$). No significant differences in associations between Time 2 suppression and both Time 1 attachment avoidance and suppression were found between females who had completed Time 3 sadness rumination versus those that did not. Across gender and models, age was not found to differ significantly between completers and non-completers.

3.2. Descriptive Analyses

Table 3.1 presents descriptive information on all the measures of interest across time points for Models 1 and 2. The values provided are weighted composites¹³. Independent samples t-tests were completed to examine mean-level differences on the

¹⁰ These analyses were completed using raw subscale scores given that issues described during measurement invariance analyses for males (see Section 3.4.2) prevented calculation of a weighted composite for Time 3 sadness rumination.

¹¹ The t statistic reported for this analysis and that for Time 2 suppression does not assume homogeneity of variance, given violations of Levene's test for equality of variances.

¹² Correlations were completed in SPSS. Tests of significant differences between correlation coefficients were completed using an online calculator (Preacher, 2002).

¹³ As Model 2 measures were non-invariant across gender, means and standard deviations for the total sample are not provided for these scales. Examination of mean-level differences were also not assessed for this reason.

measures of interest as a function of gender. Females in the current sample reported higher levels of Time 1 attachment anxiety ($t(126) = -3.22, p = .002$)¹⁴, Time 1 anger rumination ($t(139) = -3.66, p = .00$), and Time 2 affect dyscontrol ($t(91) = -3.10, p = .003$) than males¹⁵. Zero-order correlations are presented in Table 3.2.

Table 3.1 Descriptive Information on Measures of Interest

	Total		Males		Females	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
T1 Attachment Anxiety	2.30	1.72	1.89	1.39	2.79	1.92
T1 Attachment Avoidance	--	--	2.24	1.19	2.66	1.53
T1 Affect Dyscontrol	1.57	.49	1.53	.50	1.63	.48
T1 Affect Suppression	--	--	2.05	.51	1.64	.41
T1 Sadness Rumination	--	--	1.86	.86	2.51	.85
T1 Anger Rumination	2.69	1.01	2.45	1.05	2.99	.89
T2 Affect Dyscontrol	1.55	.50	1.43	.46	1.71	.49
T2 Affect Suppression	--	--	2.10	.63	1.83	.61
T3 Sadness Rumination	--	--	--	--	2.76	.83
T3 Anger Rumination	2.62	.86	2.66	.85	2.71	.83

¹⁴ The t statistic reported for this analysis does not assume homogeneity of variance given a violation of Levene's test for equality of variances. As neither homogeneity of variance or normality assumptions were met for attachment anxiety in males, this result should be interpreted with caution.

¹⁵ Sample sizes for t-tests vary as they were performed on weighted composites in SPSS prior to the use of FIML in Mplus to account for scale-level missingness.

Table 3.2 Zero-order Correlations

	1	2	3	4	5	6	7	8	9	10
1. T1 Attachment Anxiety		.27	.37	.10	.26	.21	-.05	.15	.16	.32
2. T1 Attachment Avoidance	.06		.06	.12	.13	.002	.08	.36	.40	.29
3. T1 Affect Dyscontrol	.21	-.03		.13	.21	.42	.32	.40	.16	.41
4. T1 Affect Suppression	.07	.28	.26		.19	.13	-.45	.03	.20	-.13
5. T1 Sadness Rumination	.30	.08	.23	.08		.71	.001	-.10	.38	.36
6. T1 Anger Rumination	.15	-.002	.30	.11	.65		.14	.11	.29	.40
7. T2 Affect Dyscontrol	.38	.11	.43	.006	.39	.21		.43	.11	.48
8. T2 Affect Suppression	.26	.21	.16	.15	.41	.32	.26		.01	.14
9. T3 Sadness Rumination	--	--	--	--	--	--	--	--		.52
10. T3 Anger Rumination	.28	.16	.10	.17	.58	.32	.47	.41	--	

Note. Values above the diagonal are females and below are males. Correlations between Time 3 sadness rumination and all other variables are not provided for males as a weighted composite could not be created. Correlations are provided to assess the magnitude of associations between measures – see Figures 3.2, 3.3., 3.4, and 3.6 for information regarding statistical significance of relationships of interest.

3.3. Model One

3.3.1. Invariance Analyses

Prior to examining associations between the measures of interest, measurement invariance with gender as the grouping variable was completed with maximum likelihood estimation in Mplus Version 7.2 (Muthén & Muthén, 2014). Measurement invariance analyses involve examining whether the individual items *within* a measure “operate equivalently” across different groups (Byrne, 2012, p.193). Measurement invariance was assessed in the current study in a series of steps, each with increasingly restrictive constraints. The first and least restrictive step assesses *configural invariance*, the configuration or pattern of free and fixed parameters in the model (Dimitrov, 2010). Configural invariance compares a baseline model between the two groups, in this case males and females, without imposing equality constraints on any of the parameters (with the exception of the chosen marker variable) (Byrne, 2012, p. 206). The next step examines *metric invariance* (also known as *weak invariance*), constraining the factor loadings of each item to be equal across groups (Dimitrov, 2010). Item intercepts are then constrained across groups to assess *scalar or strong invariance*. Lastly, residual variances are constrained to be equal (Dimitrov, 2010) to assess *strict invariance*. A chi-square difference test was used to test invariance. Following a “forward” or “sequential constraint” approach (Dimitrov, 2010), the chi-square difference test used the chi-square values of a less constrained model and a more constrained model (assuming equality across groups for a specific parameter) to assess the level of invariance. See Table 3.3 (adapted from Dimitrov, 2010) for more detail. A non-significant result ($p > .05$) suggests invariance of the parameters specified between groups for that particular measure (Dimitrov, 2010). The p -value of the chi-square difference test is presented first for each analysis, followed by model fit statistics for the highest level of invariance achieved (e.g., level 4 model fit statistics when strict invariance is observed).

Table 3.3 Steps for Assessing Invariance Across Groups

	Parameters Constrained	$\Delta\chi^2$ Test	Invariance Type
Level 1	Marker variable		
Level 2	Factor loadings, <i>marker variable</i>	$\Delta\chi^2_{L2-L1}$	Weak
Level 3	Item intercepts, <i>factor loadings, marker variable</i>	$\Delta\chi^2_{L3-L2}$	Strong
Level 4	Residual variances, <i>item intercepts, factor loadings, marker variable</i>	$\Delta\chi^2_{L4-L3}$	Strict

Time 1 Model

Potential measurement invariance between males and females was assessed for all Time 1 measures simultaneously in an overall model (see Figure 3.1). Strict invariance ($\Delta\chi^2_{L4-L3} p = .54$) was observed for all Time 1 variables (maternal attachment anxiety, affect dyscontrol, and anger rumination). Fit statistics for the model were predominantly within the adequate range ($\chi^2(277) = 409.28, p = .00$; RMSEA = .078; CFI = .91; SRMR = .086). Unstandardized factor loadings for items in each measure were all positive and significant.

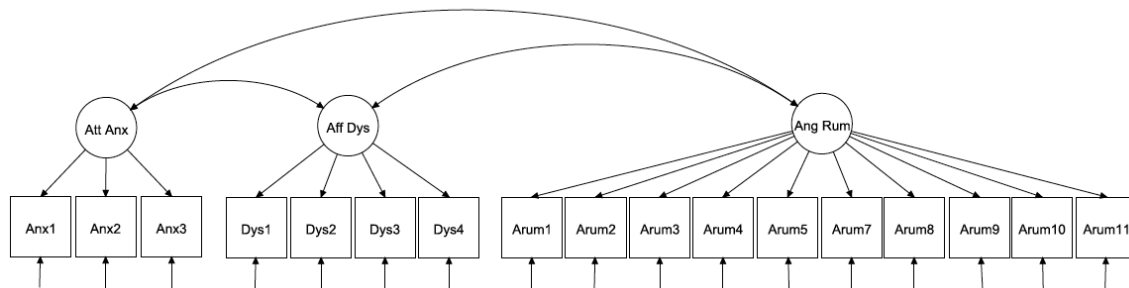


Figure 3.1 Time 1 model for Model 1 invariance analyses.

Note. Att Anx = Time 1 attachment anxiety; Aff Dys = Time 1 affect dyscontrol; Ang Rum = Time 1 anger rumination. Indicators are individual items comprising each subscale.

Time 2 and 3 Measures

Invariance as a function of gender was assessed across time points for affect dyscontrol (Time 1 to Time 2) and anger rumination (Time 1 to Time 3). With respect to affect dyscontrol, strict invariance was once again observed ($\Delta\chi^2_{L4-L3} p = .49$). The model fit the data adequately overall ($\chi^2(58) = 83.96, p = .014$; RMSEA = .075; CFI = .92; SRMR

= .11). Unstandardized factor loadings remained positive and significant. Strict invariance was also found in the current sample for anger rumination across Time 1 to Time 3 ($\Delta\chi^2_{L4-L3} p = .45$). This model fit poorly to the data¹⁶ ($\chi^2(394) = 667.46, p = .00$; RMSEA = .098; CFI = .86; SRMR = .13), however, unstandardized factor loadings for the items remained positive and significant.

Weighted Composites

Weighted composites were derived by creating product terms for each item within a subscale with its respective unstandardized factor loading, which were then averaged to produce the weighted composite score for each subscale. For Time 1 variables (maternal attachment anxiety, affect dyscontrol, anger rumination), the unstandardized factor loadings from the level 4 Time 1 model measurement invariance analyses were used to create the weighted composites. For Time 2 affect dyscontrol, the unstandardized loadings from the level 4 analyses of Time 1 to Time 2 affect dyscontrol were used. Similarly, the loadings obtained from the level 4 analyses for Time 1 to Time 3 anger rumination were used to create the Time 3 anger rumination weighted composite.

Structural Invariance

Given that measurement invariance for Model 1 variables was established, structural invariance of the model was subsequently examined. Structural invariance involves examining whether the associations *between* measures in the model behave similarly across groups (Byrne, 2012). The initial baseline model was found to have extremely poor fit ($\chi^2(11) = 235.33, p = .00$; RMSEA = .51; CFI = .00; SRMR = 2.98). Of note, the observed chi-square statistic from for the two groups differed substantially ($\chi^2 = 229.99$ and 5.34 for males and females, respectively), suggesting poorer model fit for males than females in the sample. Further examination of the results (e.g., model paths, standardized residuals, modification indices) suggest differences in the associations

¹⁶ Model fit was consistently poor at baseline and at each subsequent level of invariance analyses (with fit statistics remaining relatively unchanged from one level to the next).

between variables in the model as a function of gender. For these reasons, it was decided to examine Model 1 separately for males and females¹⁷.

3.3.2. Model One Path Analyses

Prior to completing Model 1 path analyses for males and females, the potential role of age was examined. Zero-order correlations between participant age at Time 1 and all model variables were not significant, therefore age was not included as a covariate in Model 1 analyses.

Females

The proposed model (see Figure 3.2)¹⁸ showed good fit to the data ($\chi^2(2) = .21, p = .90$; RMSEA = .00, 90% CI [.00, .098]; CFI = 1.00; SRMR = .014). With respect to concurrent relationships at Time 1, consistent with initial hypotheses, attachment anxiety was significantly associated with affect dyscontrol ($\beta = .37, p = .00$) and affect dyscontrol was significantly associated with anger rumination ($\beta = .42, p = .00$). The relationship between attachment anxiety and anger rumination however, was small to medium in magnitude, and was not statistically significant ($\beta = .21, p = .077$). In assessing these associations across time, the hypothesis of affect dyscontrol serving as a potential mediator in the association between attachment anxiety and anger rumination was not supported. Despite a significant concurrent relationship at Time 1, Time 1 attachment anxiety did not significantly predict affect dyscontrol at Time 2 ($\beta = -.15, p = .30$). A direct relationship was found between Time 1 attachment anxiety and anger rumination at Time 3 ($\beta = .28, p = .015$). Time 2 affect dyscontrol was also found to be a significant predictor of increased anger rumination at Time 3 ($\beta = .42, p = .001$). Within measures, levels of affect dyscontrol at Time 1 were significantly and positively associated with levels at Time

¹⁷ Given the sample had to be split by gender, subsamples were only sufficient to detect large effect sizes. Given this reduction in power, results should also be interpreted with some caution.

¹⁸ Refer to Appendix C for unstandardized parameter estimates, standard errors, and 95% confidence intervals for standardized parameter estimates for all path models.

2 ($\beta = .43, p = .001$), as were levels of anger rumination from Time 1 to Time 3 ($\beta = .31, p = .009$)¹⁹.

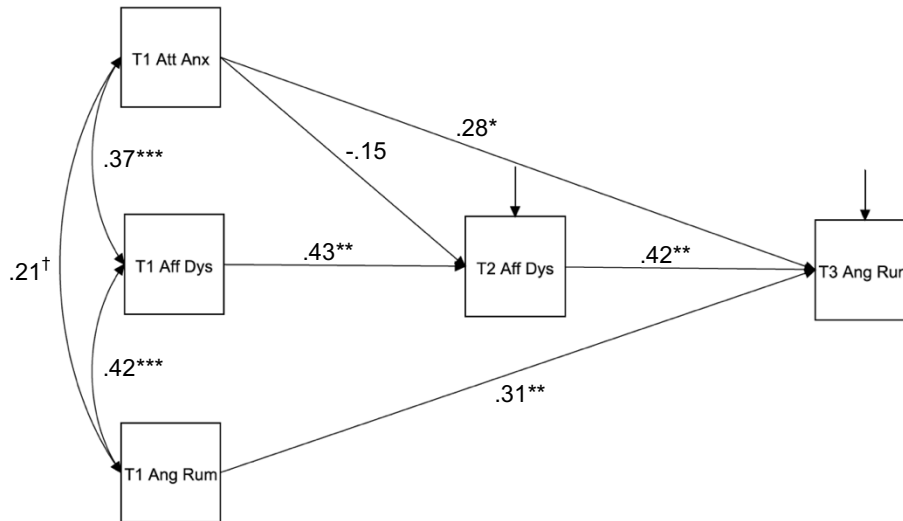


Figure 3.2 Model 1 path diagram for females.

Note. Parameter estimates given are standardized estimates. Residual variances have been omitted for clarity. [†] $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$.

An alternative model was tested with the Time 1 attachment anxiety to Time 2 affect dyscontrol non-significant path removed. Model fit, as well as the magnitude and significance of concurrent associations and predictive relationships remained largely unchanged²⁰.

Specificity of Anger Versus Sadness Rumination

The specificity of predictions made for anger rumination in Model 1 were further assessed through secondary analyses (see Figure 3.3). Maternal attachment anxiety and affect dyscontrol were examined as potential predictors of sadness rumination in place of anger rumination in the original model for females²¹. This modified Model 1 fit the data well

¹⁹ Some of the 95% confidence intervals for standardized parameter estimates in the model contain the value zero. This indicates that for these associations, a population value of zero is possible.

²⁰ Differences in values of parameter estimates between models were all less than .06 in value.

²¹ Unfortunately, this modified Model 1 could not be assessed in males as a weighted composite for Time 3 sadness rumination could not be created (see Section 3.4.2).

($\chi^2(2) = .012, p = .99$; RMSEA = .00, 90% CI [.00, .00]; CFI = 1.00; SRMR = .003). With respect to concurrent relationships at Time 1, the magnitude and significance of the association between attachment anxiety and affect dyscontrol remained unchanged from Model 1. The relationship between Time 1 attachment anxiety and sadness rumination was significant ($\beta = .24, p = .049$), however, the association between affect dyscontrol and sadness rumination was not ($\beta = .20, p = .094$). In terms of prospective relationships, associations between attachment anxiety and Time 2 affect dyscontrol, as well as affect dyscontrol from Time 1 to Time 2 remained relatively unchanged from the original Model 1. No association was observed between Time 1 attachment anxiety and Time 3 sadness rumination ($\beta = .011, p = .94$) and Time 2 affect dyscontrol did not significantly predict sadness rumination at Time 3 ($\beta = .17, p = .30$). Levels of sadness rumination at Time 1 were positively and significantly associated with levels at Time 3 ($\beta = .38, p = .002$)²².

In comparing relationships between variables in the original Model 1 and in the modified Model 1, attachment anxiety was only predictive of increased anger rumination. With respect to affect dyscontrol, both concurrent and prospective associations with anger rumination were noticeably larger in magnitude than those with sadness rumination. This would suggest that for females in the sample, attachment anxiety and affect dyscontrol play a particular role in anger rumination.

²² Some of the 95% confidence intervals for standardized parameter estimates in the model contain the value zero. This indicates that for these associations, a population value of zero is possible.

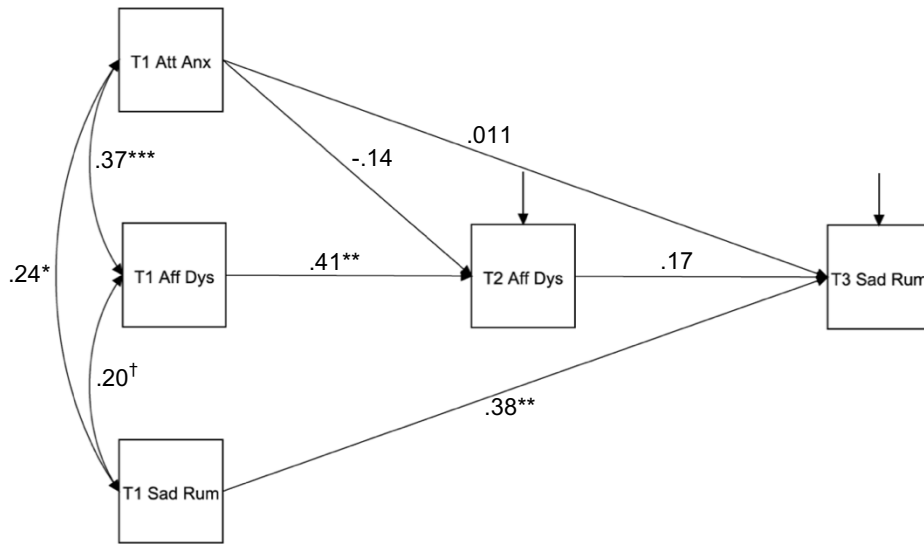


Figure 3.3 Modified Model 1 path diagram with sadness rumination as outcome variable for females.

Note. Parameter estimates given are standardized estimates. Residual variances have been omitted for clarity. † $p < .10$; * $p < .05$; ** $p < .01$, *** $p < .001$.

Males

The proposed model fit the data well ($\chi^2(2) = 1.45, p = .48$; RMSEA = .00, 90% CI [.00, .20]; CFI = 1.00; SRMR = .042; see Figure 3.4). With respect to concurrent associations at Time 1, the relationship between attachment anxiety and affect dyscontrol, while small to medium in magnitude, was not significant ($\beta = .21, p = .054$). The association between attachment anxiety and anger rumination ($\beta = .17, p = .14$) was also not significant. Affect dyscontrol was however, significantly associated with anger rumination ($\beta = .29, p = .005$). When examining relationships between variables across time, consistent with initial hypotheses, Time 1 attachment anxiety was found to significantly predict increased affect dyscontrol at Time 2 ($\beta = .29, p = .025$). The association between Time 2 affect dyscontrol and anger rumination at Time 3 was not significant however ($\beta = .38, p = .13$), and a significant direct relationship between Time 1 attachment anxiety and Time 3 anger rumination was not observed ($\beta = .069, p = .80$). Similar to findings for females, levels of affect dyscontrol at Time 1 were significantly and positively associated with levels at Time 2 ($\beta = .37, p = .006$). The association between levels of anger

rumination from Time 1 to Time 3 ($\beta = .31, p = .055$), while medium in magnitude, was not statistically significant²³.

An alternative model was assessed in which the non-significant direct path from Time 1 attachment anxiety to Time 3 anger rumination was removed. Model fit remained relatively unchanged, as did all but one relationship. The path between Time 2 affect dyscontrol and Time 3 anger rumination was statistically significant ($\beta = .41, p = .029$). The potential indirect effect of Time 1 attachment anxiety on Time 3 anger rumination through Time 2 affect dyscontrol was subsequently assessed using RMediation (Tofighi & MacKinnon, 2011) and affect dyscontrol was not found to be significant mediator (95% CI [-.004, .202]). This change in significance, with little difference in the magnitude of the association between Time 2 affect dyscontrol and Time 3 anger rumination in the two models, speaks to potential power issues in the model (likely due to a smaller sample size at Time 3).

The original and alternative models were run using both ML and MLR estimation, given attachment anxiety fell above the acceptable cut-off value for kurtosis. With the exception of the chi-square value²⁴, model fit statistics and the magnitude of parameter estimates for both concurrent and predictive relationships were identical using MLR estimation²⁵.

²³ Some of the 95% confidence intervals for standardized parameter estimates in the model contain the value zero. This indicates that for these associations, a population value of zero is possible.

²⁴ Chi-square values obtained using ML versus MLR estimation were close in value and both were not statistically significant.

²⁵ For the original model using MLR estimation, while the magnitude of the association between Time 1 attachment anxiety and Time 2 affect dyscontrol was identical to analyses using ML estimation, the association was no longer statistically significant ($p = .055$) when using MLR estimation. This was also observed in the alternative model using MLR estimation ($p = .052$). Further, the association between Time 1 and Time 3 anger rumination was statistically significant ($p = .034$) in the alternative model using MLR estimation. These changes in statistical significance may also reflect potential power issues due to sample size.

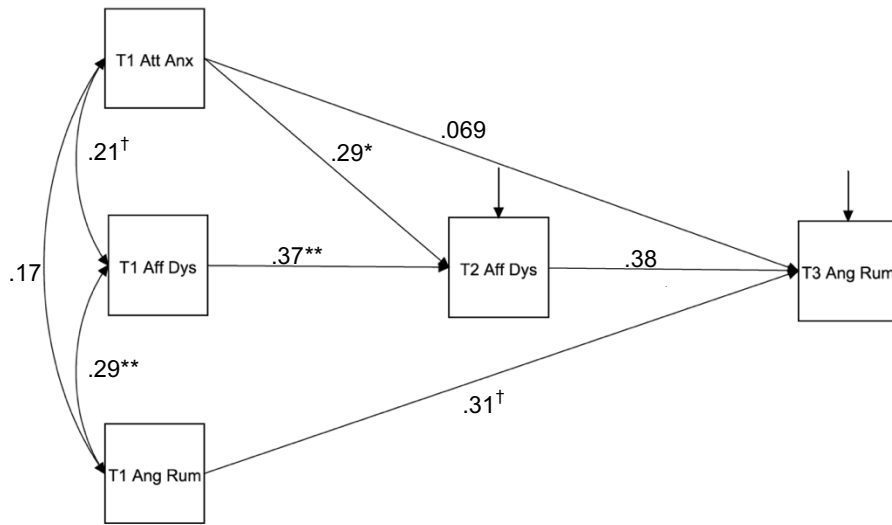


Figure 3.4 Model 1 path diagram for males.

Note. Parameter estimates given are standardized estimates. Residual variances have been omitted for clarity. † $p < .10$; * $p < .05$; ** $p < .01$.

3.4. Model Two

3.4.1. Invariance Analyses

Time 1 Model

Similar to the procedure for Model 1, measurement invariance was assessed for all Time 1 measures (attachment avoidance, affect suppression, and sadness rumination) in Model 2 simultaneously in an overall model (see Figure 3.5). Weak invariance was not achieved ($\Delta\chi^2_{L2-L1} p = .032$), with measures differing between males and females at the factor loading level. The model did not fit the data well ($\chi^2(264) = 412.17, p = .00$; RMSEA = .084; CFI = .90; SRMR = .089). Given variance as a function of gender, the measurement models of each subscale were assessed separately for males and females using confirmatory factor analyses (CFAs).

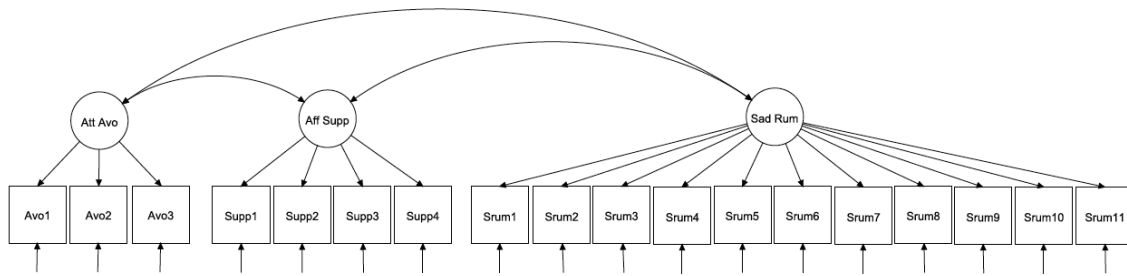


Figure 3.5 Time 1 model for Model 2 invariance analyses.

Note. Att Avo = Time 1 attachment avoidance; Aff Supp = Time 1 affect suppression; Sad Rum = Time 1 sadness rumination. Indicators are individual items comprising each subscale.

3.4.2. Measurement Models by Gender

Females

Time 1 Model

When assessing all Time 1 measures for Model 2 simultaneously, the model fit the data adequately, ($\chi^2(116) = 157.70, p = .0061$; RMSEA = .069; CFI = .93; SRMR = .078). Unstandardized factor loadings for items in each measure were all positive and significant.

Time 2 and 3 Measures

Measurement models were assessed across time points for affect suppression (Time 1 to Time 2) and sadness rumination (Time 1 to Time 3). When examining Time 1 and Time 2 affect suppression, the model fit predominantly within the adequate range ($\chi^2(19) = 28.48, p = .075$; RMSEA = .082; CFI = .93; SRMR = .081). Unstandardized factor loading estimates for Time 2 affect suppression were positive and significant. With respect to sadness rumination, the model fit the data somewhat poorly overall ($\chi^2(169) = 241.90, p = .0002$; RMSEA = .080; CFI = .92; SRMR = .12), with all unstandardized factor loadings for Time 3 sadness rumination also being positive and significant.

Weighted Composites

For Time 1 variables (maternal attachment avoidance, affect suppression, sadness rumination), the unstandardized factor loadings from the Time 1 measurement

model for females were used to create the weighted composites. Unstandardized loadings from the Time 1 to Time 2 affect suppression and the Time 1 to Time 3 sadness rumination measurement models were used to create the Time 2 affect suppression and Time 3 sadness rumination weighted composites, respectively.

Males

Time 1 Model

When assessing all Time 1 measures simultaneously for males, the model fit the data poorly overall ($\chi^2(132) = 232.20, p = .00$; RMSEA = .095; CFI = .88; SRMR = .099). Unstandardized factor loadings for items in each measure were all positive and significant however, with the exception of the factor loading for item 1 for maternal attachment avoidance ($p = .066$).

Time 2 and 3 Measures

Similar to analyses for females, measurement models were assessed across time points for affect suppression and sadness rumination. The measurement model assessing Time 1 and Time 2 affect suppression fit the data adequately ($\chi^2(19) = 27.32, p = .097$; RMSEA = .073; CFI = .92; SRMR = .089), with unstandardized factor loadings for items being positive and significant. The CFA output for Time 3 sadness rumination was not interpretable, with standard errors of the model parameter estimates not being trustworthy, due to having more parameters than male participants at Time 3 ($n = 29$). This same issue was consequently encountered with the Time 1 to Time 3 measurement model and therefore, no factor loadings were obtained for Time 3 sadness rumination.

Weighted Composites

Weighted composites for Model 2 Time 1 variables (attachment avoidance, affect suppression, sadness rumination) and Time 2 affect suppression were created in the same manner that was previously detailed for females. Due to the issues assessing measurement of sadness rumination at Time 3 for males in the sample, a weighted composite was not created for this measure.

3.4.3. Model Two Path Analyses

Females

Zero-order correlations between participant age at Time 1 and all model variables were not significant, therefore age was not included as a covariate in Model 2 analyses for females.

The proposed model fit the data adequately (see Figure 3.6; $\chi^2(2) = 2.97, p = .23$; RMSEA = .081, 90% CI [.00, .26]; CFI = .93; SRMR = .064). With respect to concurrent relationships, attachment avoidance was not significantly associated with both affect suppression ($\beta = .11, p = .33$) and sadness rumination ($\beta = .081, p = .54$) at Time 1. The association between affect suppression and sadness rumination was also not significant ($\beta = .15, p = .23$). When examining associations across time, consistent with initial predictions, attachment avoidance at Time 1 was directly related to increases in sadness rumination at Time 3 ($\beta = .43, p = .003$). Time 1 attachment avoidance was also predictive of increased affect suppression at Time 2 ($\beta = .31, p = .035$). Contrary to original hypotheses, Time 2 affect suppression did not significantly predict levels of sadness rumination at Time 3 ($\beta = -.12, p = .53$). Within measures, levels of affect suppression at Time 1 were not significantly associated with levels at Time 2 ($\beta = -.075, p = .59$). Sadness rumination at Time 1 was however, significantly associated with increased sadness rumination at Time 3 ($\beta = .28, p = .036$)²⁶.

An alternative model was assessed in which the non-significant direct path from Time 2 affect suppression to Time 3 sadness rumination was removed. This model showed good fit to the data ($\chi^2(3) = 3.37, p = .34$; RMSEA = .04; CFI = .97; SRMR = .070). The magnitude and significance of concurrent associations and predictive relationships remained largely unchanged.

²⁶Some of the 95% confidence intervals for standardized parameter estimates in the model contain the value zero. This indicates that for these associations, a population value of zero is possible.

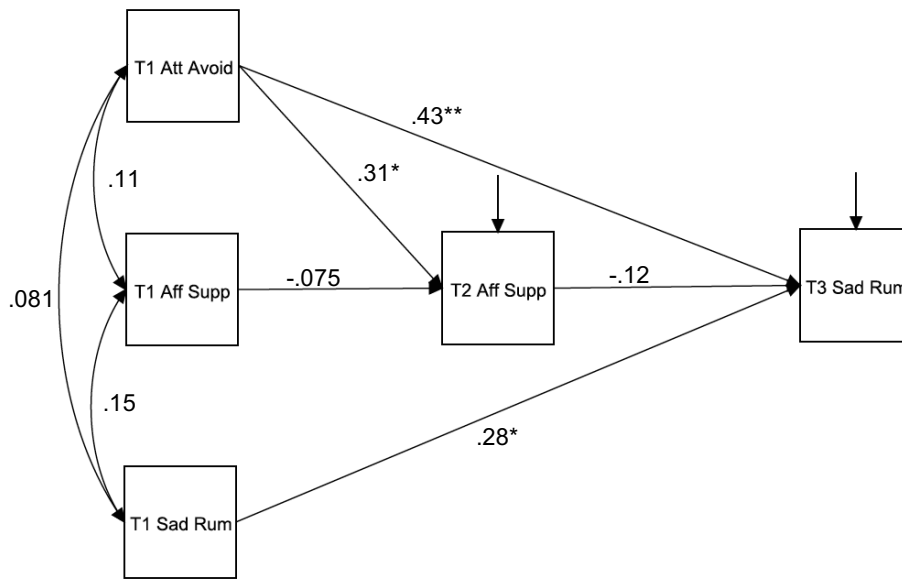


Figure 3.6 Model 2 path diagram for females.

Note. Parameter estimates given are standardized estimates. Residual variances have been omitted for clarity. * $p < .05$; ** $p < .01$.

As Model 2 was more exploratory than Model 1, with additional measurement-related issues, the specificity of sadness rumination in its association with maternal attachment avoidance was not assessed (in a modified Model 2 with anger rumination as the outcome variable) as findings would be difficult to interpret.

Males

Given reliable factor loadings could not be obtained for Time 3 sadness rumination and, therefore, a weighted composite could not be calculated, the full Model 2 path diagram could not be examined for males.

Zero-order correlations were examined between participant age at Time 1 and all Model 2 weighted composites. A significant association was found between participant age and sadness rumination at Time 1 ($r = .27, p = .017$). As such, age was included as a covariate in further analyses for males.

With respect to concurrent associations, a covariance model with Time 1 weighted composites for attachment avoidance, affect suppression, and sadness rumination was

created. Given the number of parameters, the model was just-identified and model fit could not be assessed. Time 1 attachment avoidance was not significantly related to sadness rumination ($\beta = .081, p = .51$), but was significantly associated with affect suppression at Time 1 ($\beta = .28, p = .008$). Affect suppression was not however, significantly associated with sadness rumination at Time 1 ($\beta = .071, p = .55$)²⁷.

The association between affect suppression from Time 1 to Time 2 was examined via zero-order correlation. The relationship between affect suppression from Time 1 to Time 2 was not significant ($r = .19, p = .18$).

Summary of Prospective Results

- With respect to the role of insecure attachment on ruminative thinking, hypotheses were supported for high-risk females, with maternal attachment anxiety significantly predicting anger rumination, and attachment avoidance predicting sadness rumination into young adulthood.
- Partial support was obtained for hypotheses regarding the associations between affect regulation and rumination. Affect dyscontrol was predictive of increased anger rumination in both males and females, but was not found to mediate the association between attachment anxiety and anger rumination. Further, affect suppression was not predictive of sadness rumination in females.
- Some support for the attachment-affect regulation link was found, with attachment anxiety predicting affect dyscontrol in males and attachment avoidance predicting affect suppression in females.
- Gender differences were observed at the mean level and structural level for Model 1, with gender differences observed at the measurement level for Model 2.

²⁷ Including age as a covariate did not significantly change any of the associations between Time 1 variables.

3.5. Supplementary Analyses: Rumination and Psychopathology

Additional analyses were conducted to examine concurrent associations between rumination and behavioural outcomes. Specifically, examination of associations between anger rumination and aggressive behaviour, and between sadness rumination and depressive symptoms. These associations were previously assessed in the current sample at Time 1 (Peled & Moretti, 2007). Anger rumination was found to significantly predict both overt ($\beta = .69, p = .001$) and relational aggression ($\beta = .46, p < .001$) in the sample. Sadness rumination was found to significantly predict depressive symptoms ($\beta = .66, p < .001$). Structural invariance was found across gender, with the same model fitting for males and females and producing “comparable regression weights” (Peled & Moretti, 2007, p.71)²⁸. Concurrent associations were re-assessed at Time 3 in the current study. Given separate weighted composites were created for sadness and anger rumination for males and females, Time 3 results will be reported separately by gender.

3.5.1. Anger Rumination and Aggressive Behaviour

The concurrent association between anger rumination and aggressive behaviour was examined at Time 3. Consistent with findings at Time 1, anger rumination was significantly associated with higher levels of aggressive behaviour, as assessed by the Adult Self Report (ASR), for both females and males ($r = .62, p = .00$, and $r = .61, p = .00$, respectively) in the sample. This association remained significant for females and males after controlling for both levels of Time 1 anger rumination ($r = .59, p = .00$, and $r = .59, p = .002$, respectively) and concurrent sadness rumination ($r = .42, p = .006$, and $r = .40, p = .037$, respectively)²⁹. Associations between sadness rumination and aggression were also examined to assess specificity of relationships. A significant association between Time 3 sadness rumination and aggressive behaviour was found for both males and females, but the association only remained significant in females ($r = .51, p = .001$) after controlling for concurrent levels of anger rumination.

²⁸ Confidence intervals for Time 1 associations reported in Peled and Moretti (2007) were not available. Confidence intervals for Time 3 associations however, can be found in Appendix D.

²⁹ For males, the raw Time 3 sadness rumination subscale was used.

3.5.2. Sadness Rumination and Depressive Symptoms

The association between sadness rumination and depressive symptoms at Time 3 could only be assessed for females in the sample using weighted composites³⁰. As young adults, sadness rumination continued to be significantly related to depressive symptoms for females ($r = .60, p = .00$), even when controlling for Time 1 sadness rumination ($r = .55, p = .00$) and concurrent levels of anger rumination ($r = .46, p = .003$). Similar to the examination of aggressive behaviour, associations between depressive symptoms and anger rumination were also examined. Time 3 anger rumination was significantly correlated with depressive symptoms for females in the sample, however the associations were no longer significant once Time 3 sadness rumination was statistically controlled for.

³⁰ The association between the raw sadness rumination subscale score and depressive symptoms at Time 3 was examined for males. Similar to findings for females using the weighted composite, the association was significant when controlling for Time 1 sadness rumination ($r = .83, p = .00$) as well as concurrent levels of anger rumination ($r = .67, p = .00$).

Chapter 4. Discussion

4.1. Overview

The current study examined the role of insecure attachment and affect regulation in the development of ruminative thinking in a sample of high-risk adolescent males and females. The purpose of the study was to gain a better understanding of the developmental antecedents of anger and sadness rumination. In Model 1, adolescent reports of maternal attachment anxiety were hypothesized to predict anger rumination in young adulthood, with affect dyscontrol serving to mediate this association. Model 2 hypothesized maternal attachment avoidance as a predictor of increased sadness rumination in youth, and affect suppression a potential mediator of this relationship. Gender differences were explored, both at the measurement and structural level, with final models being assessed separately for females and males in the sample.

4.2. Rumination in Adolescence

Consistent with initial predictions and previous research, positive concurrent associations between anger rumination, maternal attachment anxiety, and affect dyscontrol were found in adolescence for both high-risk males and females. The association between attachment anxiety and anger rumination was small to moderate, but not statistically significant. Stronger associations were observed between affect dyscontrol and both attachment anxiety and anger rumination across gender, particularly in females. Less support was found for predictions regarding sadness rumination, with a concurrent relationship between sadness rumination and maternal attachment avoidance not observed in this sample in adolescence, for males or females. Similarly, weak to small concurrent associations were found between sadness rumination and affect suppression across gender. A significant concurrent relationship was found between attachment avoidance and affect suppression in adolescence, but only in males. Taken together, concurrent findings provide greater support for the links proposed in Model 1, which is in line with earlier predictions. Evidence for potential gender differences in these

associations were also observed and will be addressed during discussion of prospective associations.

4.3. Rumination in Young Adulthood

4.3.1. Model One

When examining associations over time, initial hypotheses regarding prospective relationships between attachment anxiety, affect dyscontrol, and anger rumination were generally supported, but were often found to vary as a function of gender. For example, reports of maternal attachment anxiety predicted higher levels of anger rumination in young adulthood, but this was seen only in high-risk females. In addition, maternal attachment anxiety significantly predicted increases in affect dyscontrol, but only among high-risk males. The only relationship that was consistent among males and females in the sample was the positive association between affect dyscontrol and later anger rumination³¹. The hypothesis of affect regulation serving as a potential mediator in the association between insecure attachment and rumination was not supported. Maternal attachment anxiety and affect dyscontrol were both direct predictors of anger rumination for females. For males, despite the findings that attachment anxiety predicted affect dyscontrol in late adolescence, which in turn predicted anger rumination in young adulthood, a significant indirect effect of attachment anxiety on anger rumination through affect dyscontrol was not found³². These findings should be interpreted with some caution however, as it is possible that the current study was unable to detect the indirect effect due to power issues. For high-risk males, it may be the case that insecure attachment fuels ruminative thinking through increased affect dysregulation, but for girls, both insecure attachment and affect dysregulation influence rumination directly.

Taken together, Model 1 findings are in general agreement with previous research showing an association between attachment anxiety and ruminative thinking (Burnette et

³¹ While the association between affect dyscontrol at Time 2 and anger rumination at Time 3 did not meet cut-offs of statistical significance for males, the magnitude of the association suggests a relationship of practical significance.

³² When testing the alternative model using RMediation.

al., 2009; Caldwell & Shaver, 2013; 2015; Garrison et al., 2014; Saffrey & Ehrenberg, 2007) as well as the ER model of attachment (Shaver & Mikulincer, 2002), supporting the idea that hyperactivation of the attachment system results in increased negative affect and associated dysregulation which serves to intensify ruminative thinking (Caldwell & Shaver, 2012; Mikulincer & Florian, 1998). Some evidence for specificity regarding the type of rumination in these associations was also observed in the current sample, with attachment anxiety predicting anger and not sadness rumination, with a stronger association observed between affect dyscontrol and anger rumination as well. Once again, these findings should be interpreted with some caution given sample size issues and the fact that the model could not be assessed in both males and females. Further research in both larger and normative samples is therefore necessary to determine whether there is in fact specificity in developmental antecedents for each type of rumination and further, whether the specificity observed for anger rumination is more than a reflection of the current sample of females.

Gender Differences

The gender difference observed in the prospective associations between attachment anxiety and anger rumination is somewhat novel, in that a number of the previous studies that have examined this relationship have not explicitly assessed the role of gender (Beyderman & Young, 2016; Burnette et al., 2007; 2009), or have used solely female participants (Lanciano et al., 2012). Gender differences in levels of rumination have been well established, however, and have been observed with levels of attachment anxiety as well (Saffrey & Ehrenberg, 2007), with females generally experiencing greater impairment. For females in the current sample, relationships with maternal figures may play an especially important role in ruminative thinking. There is some support for the impact of maternal relationship quality and the promotion of certain coping responses in adolescent females in recent research (Stroud & Fitts, 2015). For young adolescent females experiencing lower relationship quality with maternal figures, mothers' suggestions to use disengaging coping strategies when presented with stressors (e.g., avoidance, denial, distraction) were associated with higher rates of ruminative brooding. While this was assessed in an all-female sample, other research has also examined the impact of maternal responses to child stress in both adolescent males and females, finding mothers play a particular role in socializing a ruminative response style in daughters (Cox

et al., 2010). Gender roles and femininity in particular, have been implicated in this association, with maternal figures with more traditional gender role beliefs being particularly likely to encourage emotional expressions of distress in daughters (Cox et al., 2010). As these studies were conducted using community samples, future research with clinical and at-risk samples is therefore needed to assess whether these associations are consistently observed across adolescence.

The finding that attachment anxiety did not predict later affect dyscontrol in females is difficult to understand given how robust concurrent associations were at Time 1. Levels of affect dyscontrol remained relatively constant from Time 1 to Time 2, however, suggesting that perhaps in the current sample of females other factors are contributing to difficulties regulating affect. For females in later adolescence, other relationships, such as those with romantic partners or peers may be at the forefront, with maternal attachment not as influential on affect dysregulation at that particular point in time. This finding could also simply be a reflection of the characteristics of this particular sample of high-risk females, with this association being observed in more normative samples of adolescent females. This speaks to the need for further research examining these associations in other community samples of adolescents.

4.3.2. Model Two

Partial support for Model 2 predictions were found when examining prospective associations in females in the sample³³. As hypothesized, attachment avoidance positively predicted levels of sadness rumination in young adulthood and levels of attachment avoidance predicted later affect suppression. These findings are in agreement with those found in previous studies (Brenning et al., 2012; Caldwell & Shaver, 2012; 2015; Garrison et al., 2014; Wei et al., 2005), and further support the ER model of attachment, with attachment avoidance resulting in deactivation of the attachment system, and affect suppression serving as one of several deactivation strategies (Shaver & Mikulincer, 2002).

³³ Given constraints regarding measurement invariance, prospective associations could only be fully assessed in females in the sample.

Contrary to initial predictions however, support was not observed for the association between affect suppression and sadness rumination.

The finding that affect suppression was not associated with rumination in the current sample could potentially reflect methodological differences between the current study and those that have previously examined this relationship. In previous research, when predicting rumination as a result of earlier suppressive behaviours this was often done within a relatively short time period (e.g., daily over the course of a week: Dickson et al., 2002; pre- and post-assessment over a span of 10 weeks: Wenzlaff & Luxton, 2003). The span of time between assessments in the current study is much longer (e.g., approximately 2 years) and perhaps for this reason, the current study does not adequately capture this association. Some variability also exists in how suppression is defined and assessed, with the focus on either cognitive (thought) suppression, emotional suppression, behavioural avoidance, or a combination, with findings varying somewhat as a result. More recent research also suggests that the association between emotion suppression and rumination may be more complex, with beliefs regarding negative emotions also playing a role in rates of suppression (Burwell, 2015). Further research, particularly with adolescents and young adults, is therefore needed to gain a clearer understanding of the relationship between suppression and ruminative thinking.

Differences were observed in comparing concurrent and prospective associations between attachment avoidance and sadness rumination, with the prospective relationship being noticeably stronger (moderate in magnitude and statistically significant), than the concurrent association in adolescence. As the majority of previous studies examining the association between attachment avoidance and rumination were cross-sectional in nature, it is unclear whether this finding is specific to the current sample of at-risk females, or is indicative of potential developmental differences in the impact of maternal attachment avoidance on ruminative thinking. Perhaps in early to mid-adolescence, other interpersonal processes are more central in promoting rumination. Co-rumination for example, could be more salient during this developmental period than in young adulthood. Co-rumination involves “excessively discussing problems within a dyadic relationship” (Rose, 2002, p. 1830). While overlapping with ruminative thinking in general, given a shared focus on negative content or problems, co-rumination is believed to be distinct

from rumination, as it involves a social and conversational process (Rose, Carlson, & Waller, 2007). Adolescent girls have been found to co-ruminate with peers more than boys (Rose, 2002), with recent research finding co-rumination with peers is predictive of increases in ruminative brooding in both adolescent males and females (Stone & Gibb, 2015). Future research using larger samples of males and females across the developmental period of adolescence, should therefore examine these associations in order to gain a greater understanding of the relative impacts of both attachment and co-rumination on rates of ruminative thinking.

4.4. Clinical Implications

Supplementary analyses revealed that sadness rumination was associated with depressive symptoms both in adolescence and young adulthood in the current sample. This is in line with previous research highlighting the role of sadness rumination in depression in adolescents (Abela & Hankin, 2011; Aldao et al., 2010; Rood et al., 2009) and adults (Nolen-Hoeksema, 2000; Spasojevic & Alloy, 2001). These associations were significant for both males and females, supporting earlier research observing gender differences in the overall rates of sadness rumination (with females reporting significantly more ruminative thinking), but not necessarily in its associations with depression (Rood et al., 2009). A concurrent association between sadness rumination and aggressive behaviour was also found in females in young adulthood. This association has also been observed in previous research (McLaughlin, Aldao, Wisco, & Hilt, 2014), with sadness rumination actually serving to mediate the association between depressive symptoms and later aggressive behaviour in early adolescence (albeit in males). This finding should be interpreted with some caution however, as only basic analyses (partial correlations) were used to examine these associations, and further, the aggressive behaviour and depressive symptom subscales on the Adult Self Report measure were found to be highly correlated³⁴ with one another in this sample.

Anger rumination on the other hand, was related to aggressive behaviour both in adolescence and young adulthood, providing further support for the link between

³⁴ $r = .63$ and $.67$ for males and females, respectively.

ruminative thoughts about anger and aggression found in other studies with youth (Smith, et al., 2016; Vasquez et al., 2012) and adults (Anestis et al., 2009; Bushman et al., 2005; White & Turner, 2014). Similar to the sadness rumination-depression link, associations between anger rumination and aggressive behaviour were significant for both males and females in the sample.

Given the well-established associations between rumination and a host of other issues apart from depression and aggressive behaviour, some research has proposed that ruminative thinking, and repetitive negative thinking more generally, may in fact serve as transdiagnostic risk factor for psychopathology (see Drost, van der Does, van Hemert, Penninx, & Spinhoven, 2014; McEvoy, Watson, Watkins, & Nathan, 2013; Nolen-Hoeksema & Watkins, 2011; Watkins, 2009). Rumination's widespread influence on mental health and well-being therefore highlights the need to explicitly target ruminative thinking in clinical interventions. Obtaining a clearer picture of the developmental antecedents to rumination can also serve to highlight possible targets for both prevention and intervention.

4.4.1. Interventions Targeting Ruminative Thinking

Mindfulness

Given its role as a transdiagnostic risk factor for psychopathology, interest in explicitly targeting rumination in therapeutic approaches has grown in recent years. The role of mindfulness has been examined extensively as one such approach. Mindfulness has been defined as “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003). Across studies, variability is observed in how mindfulness is assessed. Some research focuses on trait or dispositional mindfulness, while other studies examine state mindfulness or certain facets of mindfulness (e.g., awareness, nonjudgment, nonreactivity). Rumination has been found to be negatively associated with dispositional mindfulness (Borders, Earleywine, & Jajodia, 2010). The facets of nonjudgment, nonreactivity and acting with awareness have also been found to be significantly associated with decreases in anger rumination, with nonjudgment and acting with awareness playing a particular role (Eisenlohr-Moul, Peters, Pond, & DeWall, 2016;

Peters, Eisenlohr-Moul, Upton, & Baer, 2013; Peters et al., 2015). Overall, these studies provide consistent support for the role of mindfulness in decreasing ruminative thinking in adults. While fewer studies have examined this association in adolescents, similar patterns have emerged, with support for the role of state mindfulness in decreasing ruminative thinking in young adolescents (Hilt & Pollak, 2012). Acting with awareness, nonjudgment, and nonreactivity have been associated with lower state rumination following stressful events as well (Ciesla, Reilly, Dickson, Emanuel, & Updegraff, 2012).

Research has also examined the role of mindfulness with respect to dimensions of insecure attachment in adults. Both attachment anxiety and avoidance have been found to predict lower levels of dispositional mindfulness (Caldwell & Shaver, 2013). Dispositional mindfulness has also been found to moderate the association between attachment anxiety and well-being (Davis, Morris, & Drake, 2016). Support for the positive association between increased attachment security and mindfulness however, has not been observed when focusing on state mindfulness (Pepping, Davis, & O'Donovan, 2015). Overall, findings in these studies, and those focused on rumination specifically, illustrate the usefulness of mindfulness skills in reducing ruminative thought patterns.

Given the promise of mindfulness in reducing ruminative thinking and associated psychopathology, several existing treatment options would likely prove beneficial for use with “high ruminators”. Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002; 2012), which integrates mindfulness-based stress reduction techniques with components of CBT, as well as stand-alone mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982; 1990) are two such treatment options. In a recent study by Hawley et al. (2014), formal mindfulness practice for both MBCT and MBSR was associated with decreased rumination, with rumination serving to mediate the association between mindfulness practice and changes in depressive symptoms post-treatment. Mindfulness skills taught as part of dialectical behaviour therapy (DBT; Linehan, 1993) is another potential treatment option which has shown success in treating both adolescents and adults with a host of presenting issues, including BPD, self-harm and suicidal ideation, as well as anxiety.

Rumination-Focused Cognitive Behavioural Therapy

A form of Cognitive Behavioural Therapy (CBT) targeting ruminative thinking has also shown therapeutic promise. Rumination-Focused CBT (RFCBT; Watkins, 2016; Watkins et al., 2007; 2011) is a manualized treatment that involves some of the traditional components of CBT, but with several additional elements, with the focus not being directly on changing the content of thoughts (as in CBT), instead on altering the thinking process itself (Watkins, 2016). Based on previous research, RFCBT asserts that there are two discrete types of rumination – a helpful or constructive type which involves “concrete, process-focused and specific thinking” (Watkins, 2016, p. 11) and an unhelpful or unconstructive type which includes “abstract and evaluative thinking” (Watkins, 2016, p. 11). The overall goal is to therefore assist individuals in moving from the unconstructive to the more constructive type of thinking. Behavioural activation strategies are integrated into the intervention, with rumination being considered a form of avoidance (Watkins et al., 2007). Functional analysis is used to help patients reduce this ‘avoidance’ by understanding and identifying helpful versus unhelpful thinking patterns and learning to replace the avoidant behaviour with more helpful behaviour. Imagery and behavioural experiments are also used to assist in this process (Watkins et al., 2007).

RFCBT was first evaluated in a clinical case series, which found significant reductions in reported symptoms of depression and other comorbid disorders as well as rumination in a small sample of patients with previous histories of chronic depression and comorbid diagnoses (Watkins et al., 2007). It was subsequently assessed in a randomized controlled trial in a slightly larger sample of depressed adults, comparing it to treatment as usual (Watkins et al., 2011). Individuals who completed RFCBT in the study reported significantly fewer depressive symptoms and rumination than those in the TAU group, as well as fewer comorbid Axis II diagnoses and lower rates of relapse. An internet-based version (iRFCBT) as well as a group version of the treatment has also been developed, with reductions in levels of depression, anxiety, worry, and rumination found when compared to a waitlist control group in a sample of young adults selected for being particularly vulnerable to worrying and ruminative thinking (Watkins, 2016). The role of RFCBT and its adaptations as a potential prevention program were assessed as part of this work and are still in progress (Cook & Watkins, 2016), showing promise in serving to treat depression and comorbid disorders as well as prevent their onset.

Attachment-Based Family Therapy

Given the associations observed between insecure attachment and ruminative thinking in the current study and in previous research, specifically targeting attachment relationships with caregivers could also serve as a useful approach to both prevention and treatment of rumination. Attachment-Based Family Therapy (ABFT; Diamond, Diamond, & Levy, 2014) has been shown to be an effective intervention for depressed and suicidal adolescents. The program is “trauma-based, emotion-focused, and process-oriented” involving five treatment tasks (see Diamond et al., 2014 for further detail) with the overall goal being to identify and repair attachment injuries in the relationship. There is significant empirical evidence for ABFT (see Diamond, Russon, & Levy, 2016 for review), with an initial randomized control trial showing both faster and larger reductions in suicidal ideation when compared to enhanced usual care (i.e., therapist in the community, tracking of depressive symptoms and suicidal ideation; Diamond et al. 2010). ABFT has since been adapted for use with suicidal lesbian, gay and bisexual teens (Diamond et al., 2012) as well as youth with unresolved anger towards caregivers (Diamond, Shahar, Sabo, & Tsvieli, 2016).

Connect Parent Group

The Connect Parent Group (Connect; Moretti & Braber, 2013) is another promising attachment-based intervention. The 10-week manualized program is for caregivers of pre-adolescents and adolescents with serious behaviour problems. The program focuses on strengthening “the building blocks” of secure attachment, which include increased caregiver reflective functioning³⁵ and sensitivity, a shared partnership between the adolescent and caregiver, and dyadic affect regulation (Moretti, Obsuth, Craig, & Bartolo, 2015). Each week introduces a new attachment principle which integrates consideration of the developmental period of adolescence and the challenges frequently experienced in caregiver-adolescent relationships. While not working with adolescents directly, caregivers have reported significant decreases in their adolescents’ internalizing and externalizing symptoms post-treatment, compared to a waitlist condition, as well as at one-year follow-up (Moretti & Obsuth, 2009). A randomized controlled trial comparing Connect

³⁵ Caregiver reflective functioning refers to the caregiver’s “capacity to reflect upon her own and her child’s internal mental experience” (Slade, 2005, p. 269)

to other parent training programs also recently found that Connect was the only program to continue to show reductions in child externalizing behaviour two years' post-treatment (Hogstrom, Olofsson, Ozdemir, Enebrink, & Stattin, 2016).

Targeting the process of maladaptive thinking, as well as potential antecedents to ruminative thinking, therefore show considerable promise in alleviating a host of negative symptoms in adults and some youth. Future research is necessary to examine these processes in more depth with respect to ruminative thinking, particularly for adolescents.

4.5. Study Limitations and Future Directions

Several limitations are important to consider in interpreting the findings of the present study. With respect to sample characteristics, the size of the sample limited the complexity of statistical analyses that could be completed, necessitating the use of a path analysis framework instead of a full structural equation modelling (SEM) approach. Given this, measurement (structural) validity was instead examined in a piecemeal fashion. While weighted composites provided some benefit in integrating information regarding the measurement models of subscales used in the study, the use of SEM would have allowed both measurement and structural models to be examined simultaneously and, thus, the possibility of accounting for measurement error (MacCallum & Austin, 2000). Structural invariance in Model 1 and measurement invariance in Model 2 as a function of gender served to further complicate this issue as models had to be run separately by gender, further reducing sample size and power. The limitations of which were illustrated most clearly in males in the sample, as measurement models could not be fully assessed and subsequently weighted composites and the full path model for Model 2 could not be examined. As smaller sample sizes are associated with larger confidence intervals (Cumming, 2012), the sample size constraints and associated reductions in power in the current study also had implications for the confidence intervals of standardized parameter estimates calculated in Models 1 and 2; producing wider (and less precise) confidence interval estimates.

In addition to the use of less complex statistical techniques, the number of parameters in the models were also limited as a result of sample size. As such,

examination of the associations between rumination and outcomes, such as aggression or depressive symptoms, were also completed in a piecemeal fashion, instead of being integrated into the overall path models. Doing so would have provided a clearer picture of associations between these outcomes and other variables in the model, including information regarding direct and indirect effects.

The use of a high-risk sample is an obvious strength of the current study; however, it also limits generalizability of the findings to other populations. While the associations between rumination and affective outcomes (aggressive behaviour and depressive symptoms) were examined at Time 1 in an undergraduate sample (Peled & Moretti, 2010), relationships between rumination, insecure attachment and affect regulation were not. Therefore, the use of an age-matched community comparison sample would have been beneficial to ascertain whether the associations observed in the current sample differ from those in normative populations, and if so, how. Further, while the psychometric properties of each measure used in the current study have been previously assessed to some extent (ARC: Penney, 2007; CAPAI: Steiger, 2003, 2008; SARI: Peled, 2006), it would also be useful to examine the measurement models in normative community samples, as the measures were all created in the laboratory and most often used with clinical or high-risk samples.

The use of normative samples or multiple samples would be particularly useful in gaining a greater understanding of the gender differences observed in the current study. With respect to gender differences found at the level of the measures used, it would be important to examine whether the measurement invariance or non-invariance between males and females differs in other samples. Gender differences in the associations between parameter estimates could also be compared across groups. Such comparisons would be integral to strengthening the findings of the current study, as it is currently unclear whether the gender differences observed are reflective of the current sample, of high-risk youth in general, or of youth overall.

Given the duration between the first point of contact and the last wave of data collection (spanning approximately five years or longer), and the high-risk nature of the sample, attrition over time was to be expected. Just over 50% of participants were lost

from Time 1 to Time 3 in the current study, with attrition rates similar to those found in other studies with high-risk samples (Kim & Cicchetti, 2016). In comparing those participants who had completed the measures of interest at Time 3 versus those that did not, some significant differences in mean levels of measures of interest were observed, with males who had completed Time 3 measures having lower mean levels of attachment anxiety at Time 1, and females having higher mean levels of affect dyscontrol and anger rumination at Time 1 and affect suppression at Time 2. While mean level differences were observed, associations between these measures and other Time 1 variables in their respective models were not found to differ significantly between completers and non-completers. Further, while the rate of attrition in the current study resulted in significant reliance on data estimation techniques, the use of full information maximum likelihood estimation (FIML) can be viewed as a relative strength of the study, as it is currently viewed as one of the best approaches to handling missing data (Schafer & Graham, 2002).

With respect to measurement, while concurrent and prospective associations were examined in the current study, anger and sadness rumination questionnaires were not completed at the second time point of the overall project. This prevented formal examination of longitudinal associations between variables. Having all measures at the three time points in the study would have provided the opportunity to utilize growth curve analyses, which would permit examination of both within and between participant changes (Curran, Obeidat, & Losardo, 2010) in levels of rumination, maternal attachment, and affect regulation from adolescence into young adulthood. As levels of rumination have been found to increase from early to mid-adolescence (Jose & Brown, 2008) and to decline across adulthood (Nolen-Hoeksema & Aldao, 2011), it would be interesting to more closely examine levels of rumination in this “in-between” period of later adolescence to early adulthood, as well as how these levels influence the pattern of associations with insecure attachment and affect regulation. Further, as potential bidirectional associations between affect dysregulation and rumination have been proposed and examined in previous research (e.g., the emotional cascade model in BPD; Selby et al., 2009; Selby & Joiner, 2009; 2013), having rumination questionnaires completed at Time 2 would have been ideal in order to test the alternative model of rumination serving as a potential mediator in the association between insecure attachment and later affect dysregulation.

All measures used to assess the variables of interest in the current study were self-report questionnaires. This is problematic due to the potential for response bias and common method variance. Future studies should therefore employ a multi-method approach to assessment. Both experimental induction of rumination (Nolen-Hoeksema & Morrow, 1993) and affect regulation strategies have proven fruitful in previous research and could be used in addition to self-report measures. Daily-diary methods also provide an opportunity to track multiple instances of ruminative thinking and affect regulation processes over a set period of time. Use of multiple methods would increase accuracy in reporting and provide additional information not necessarily available via self-report alone (e.g., contextual factors, day-to-day fluctuations, bi-directionality of effects).

Insecure attachment was examined solely for maternal figures in the current study, which was viewed as a useful first step in assessing the research questions of interest, as maternal figures have most frequently been reported as the primary attachment figure (Rosenthal & Kobak, 2010). There is still value however, in examining the role of insecure attachment with paternal figures in predicting ruminative thinking. It would be useful to determine whether similar patterns of associations with rumination and affect regulation strategies emerge, as well as whether gender differences are observed (and if so, if they differ from those seen with maternal figures). Given that maternal figures were reported on more consistently than paternal figures in the current sample, with sample size and power issues favouring less complex models, paternal attachment was not assessed in the current study. Future research should however, examine attachment relationships with both caregivers simultaneously to assess their individual and paired impacts on rumination. Further, as romantic relationships are of increasing importance during adolescence and young adulthood, it would also be interesting to examine the role of insecure attachment with romantic partners in predicting ruminative thinking. This could not be adequately assessed in the current study due to sample size issues (not all adolescents would be in a romantic relationship, further reducing sample size) and attachment with romantic partners not being assessed until the second time point.

Chapter 5. Conclusion

Despite certain limitations, the current study is one of the first to explicitly examine the roles of both dimensions of insecure attachment, as well as affect dysregulation and suppression, as possible antecedents to ruminative thinking in a high-risk adolescent sample. Few studies have examined the developmental antecedents of rumination in high-risk youth, as well as both sadness and anger rumination in the same study. Both theoretical models provide important information on the role of maternal attachment insecurity and affect regulation on rumination, with insecure attachment with maternal figures appearing to play a particular role in both sadness and anger rumination in girls. While further research is needed to examine the role of gender in these associations, as well as the pattern of associations in adolescence, the current study adds to the growing literature regarding potential developmental precursors to rumination. Findings also highlight the importance of addressing these factors in interventions with high-risk youth.

References

- Abela, J. R. Z., Aydin, C. M., & Auerbach, R. P. (2007). Responses to depression in children: Reconceptualizing the relation among response styles. *Journal of Abnormal Child Psychology*, 35, 913-927.
- Abela, J. R. Z., & Hankin, B. L. (2011). Rumination as a vulnerability factor to depression during the transition from early to middle adolescence: A multiwave longitudinal study. *Journal of Abnormal Psychology*, 120(2), 259-271.
- Achenbach, T. M. (1991). *Manual for the youth self-report and 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.
- Achenbach, T. M., & Edelbrock, C. (1981). Behavioral problems and competencies reported by parents of normal and disturbed children aged four to sixteen. *Monographs of the Society for Research in Child Development*, 46(1, Serial No. 188).
- Achenbach, T.M., & Rescorla, L. A. (2003). *Manual for the ASEBA adult forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.
- Ainsworth, M. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Oxford, England: Lawrence Erlbaum.
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30, 217-237.
- Allen, J. P., Marsh, P., McFarland, C., McElhaney, K. B., Land, D. J., Jodl, K. M., & Peck, S. (2002). Attachment and autonomy as predictors of the development of social skills and delinquency during mid adolescence. *Journal of Consulting and Clinical Psychology*, 70(1), 56-66.
- Anestis, M. D., Anestis, J. C., Selby, E. A., & Joiner, T. E. (2009). Anger rumination across forms of aggression. *Personality and Individual Differences*, 46, 192-196.
- Arbuckle, J. L. (1996). Full information estimation in the presence of incomplete data. In G.A. Marcoulides & R.E. Schumacker (Eds.), *Advanced structural equation modeling: Issues and techniques* (pp. 243-277). NJ: Erlbaum.
- Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Relationships to well-being in adolescence. *Journal of Youth and Adolescence*, 16(5), 427-454.

- Baraldi, A. N., & Enders, C. K. (2010). An introduction to modern missing data analyses. *Journal of School Psychology, 48*, 5-37.
- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology, 61*(2), 226-244.
- Beyderman, I., & Young, M. A. (2016). Rumination and overgeneral autobiographical memory as mediators of the relationship between attachment and depression. *Personality and Individual Differences, 98*, 37-41.
- Bollen, K. A., & Stine, R. (1990). Direct and indirect effects: Classical and bootstrap estimates of variability. *Sociological Methodology, 20*, 115-140.
- Borders, A. Earleywine, M., & Jajodia, A. (2010). Could mindfulness decrease anger, hostility, and aggression by decreasing rumination? *Aggressive Behavior, 36*, 28-44.
- Bowlby, J. (1969/1982). *Attachment and loss: Volume 1. Attachment*. New York: Basic Books.
- Bowlby, J. (1973). *Attachment and loss: Volume 2. Separation*. New York: Basic Books.
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46-76). NY: Guilford Press.
- Brenning, K. M., & Braet, C. (2013). The emotion regulation model of attachment: An emotion-specific approach. *Personal Relationships, 20*, 107-123.
- Brenning, K. M., Soenens, B., Braet, C., & Bosmans, G. (2012). Attachment and depressive symptoms in middle childhood and early adolescence: Testing the validity of the emotion regulation model of attachment. *Personal Relationships, 19*, 445-464.
- Brumariu, L. E., & Kerns, K. A. (2010). Parent-child attachment and internalizing symptoms in childhood and adolescence: A review of empirical findings and future directions. *Development and Psychopathology, 22*, 177-203.
- Burnette, J. L., Davis, D. E., Green, J. D., Worthington, E. L., & Bradfield, E. (2009). Insecure attachment and depressive symptoms: The mediating role of rumination, empathy, and forgiveness. *Personality and Individual Differences, 46*, 276-280.
- Burnette, J. L., Taylor, K. W., Worthington, E. L., & Forsyth, D. R. (2007). Attachment and trait forgiveness: The mediating role of angry rumination. *Personality and Individual Differences, 42*, 1585-1596.

- Burwell, R. A. (2015). Self-evaluative and emotion processes linked with brooding rumination among adolescents. *Journal of Adolescence*, *41*, 162-174.
- Burwell, R. A., & Shirk, S. R. (2007). Subtypes of rumination in adolescence: Associations between brooding, reflection, depressive symptoms, and coping. *Journal of Clinical Child and Adolescent Psychology*, *36*(1), 56-65.
- Bushman, B. J. (2002). Does venting anger feed or extinguish the flame? Catharsis, rumination, distraction, anger, and aggressive responding. *Personality and Social Psychology Bulletin*, *28*, 724-731.
- Bushman, B. J., Bonacci, A. M., Pedersen, W. C., Vasquez, E. A., & Miller, N. (2005). Chewing on it can chew you up: Effects of rumination on triggered displaced aggression. *Journal of Personality and Social Psychology*, *88*(6), 969-983.
- Byrne, B. M. (2012). *Structural equation modeling with Mplus: Basic concepts, applications and programming*. New York, NY: Routledge.
- Caldwell, J. G., & Shaver, P. R. (2012). Exploring the cognitive-emotional pathways between adult attachment and ego-resiliency. *Individual Differences Research*, *10*(3), 141-152.
- Caldwell, J. G., & Shaver, P. R. (2013). Mediators of the link between adult attachment and mindfulness. *Interpersona*, *7*(2), 299-310.
- Caldwell, J. G., & Shaver, P. R. (2015). Promoting attachment-related mindfulness and compassion: A wait-list-controlled study of women who were mistreated during childhood. *Mindfulness*, *6*, 624-636.
- Caselli, G., Ferretti, C., Leoni, M., Rebecchi, D., Rovetto, F., & Spada, M. M. (2010). Rumination as a predictor of drinking behaviour in alcohol users: A prospective study. *Addiction*, *105*, 1041-1048.
- Cassidy, J., & Kobak, R. R. (1988). Avoidance and its relation to other defensive processes. In J. Belsky & T. Nezworski (Eds.), *Clinical implications of attachment* (pp. 300-323). Hillsdale, NJ: Erlbaum.
- Chopik, W. J., Edelstein, R. S., & Fraley, R. C. (2013). From the cradle to the grave: Age differences in attachment from early adulthood to old age. *Journal of Personality*, *81*(2), 171-183.
- Ciesla, J. A., Reilly, L. C., Dickson, K. S., Emanuel, A. S., & Updegraff, J. A. (2012). Dispositional mindfulness moderates the effects of stress among adolescents: Rumination as a mediator. *Journal of Clinical Child & Adolescent Psychology*, *41*(6), 760-770.

- Clear, S. J., & Zimmer-Gembeck, M. J. (2015). Associations between attachment and emotion-specific emotion regulation with and without relationship insecurity priming. *International Journal of Behavioral Development*. doi:10.1177/0165025415620057
- Conway, M., Csank, P. A. R., Holm, S. L., & Blake, C. K. (2000). On assessing individual differences in rumination on sadness. *Journal of Personality Assessment*, 75(3), 404-425.
- Conway, M., Mendelson, M., Giannopoulos, C., Csank, P. A. R., & Holm, S. L. (2004). Childhood and adult sexual abuse, rumination on sadness, and dysphoria. *Child Abuse & Neglect*, 28, 393-410.
- Cook, L., & Watkins, E. (2016). Guided, internet-based, rumination-focused cognitive behavioural therapy (i-RFCBT) versus a no-intervention control to prevent depression in high-ruminating young adults, along with an adjunct assessment of the feasibility of unguided i-RFCBT, in the Reducing Stress and Preventing Depression trial (RESPOND): Study protocol for a phase III randomised controlled trial. *Trials*, 17(1). doi:10.1186/s13063-015-1128-9
- Cox, S. J., Mezulis, A. H., & Hyde, J. S. (2010). The influence of child gender role and maternal feedback to child stress on the emergence of gender difference in depressive rumination in adolescence. *Developmental Psychology*, 46(4), 842-852.
- Cumming, G. (2012). *Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis*. New York: Routledge.
- Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. *Journal of Cognition and Development*, 11(2), 121-136.
- Davis, T. J., Morris, M., & Drake, M. M. (2016). The moderation effect of mindfulness on the relationship between adult attachment and wellbeing. *Personality and Individual Differences*, 96, 115-121.
- Del Giudice, M. (2011). Sex differences in romantic attachment: A meta-analysis. *Personality and Social Psychology Bulletin*, 37(2), 193-214.
- Denson, T. F. (2009). Angry rumination and the self-regulation of aggression. In J. P. Forgas, R. F. Baumeister, & D. M. Tice (Eds.), *Psychology of self-regulation: Cognitive affective and motivational processes* (pp. 234-244). New York: Psychology Press.
- Denson, T. F. (2012). The multiple systems model of angry rumination. *Personality and Social Psychology Review*, 17(2), 103-123.

- Denson, T. F., Pedersen, W. C., Friese, M., Hahm, A., & Roberts, L. (2011). Understanding impulsive aggression: Angry rumination and reduced self-control capacity are mechanisms underlying the provocation-aggression relationship. *Personality and Social Psychology Bulletin*, 37(6), 850-862.
- Diamond, G. S., Diamond, G. M., & Levy, S. A. (2014). *Attachment-based family therapy for depressed adolescents*. Washington, DC: American Psychological Association Press.
- Diamond, G. M., Diamond, G. S., Levy, S., Closs, C., Ladipo, T., & Siqueland, L. (2012). Attachment-based family therapy for suicidal lesbian, gay, and bisexual adolescents: A treatment development study and open trial with preliminary findings. *Psychotherapy*, 49(1), 62-71.
- Diamond, G., Russon, J., & Levy, S. (2016). Attachment-based family therapy: A review of the empirical support. *Family Process*. doi:10.1111/famp.12241
- Diamond, G. M., Shahar, B., Sabo, D., & Tsvieli, N. (2016). Attachment-based family therapy and emotion-focused therapy for unresolved anger: The role of productive emotional processing. *Psychotherapy*, 53(1), 34-44.
- Diamond, G. S., Wintersteen, M. B., Brown, G. K., Diamond, G. M., Gallop, R., Shelef, K., & Levy, S. (2010). Attachment-based family therapy for adolescents with suicidal ideation: A randomized controlled trial. *Journal of the Academy of Child and Adolescent Psychiatry*, 49(2), 122-131.
- Dickson, K. S., Ciesla, J. A., & Reilly, L. C. (2012). Rumination, worry, cognitive avoidance, and behavioral avoidance: Examination of temporal effects. *Behavior Therapy*, 43, 629-640.
- Dimitrov, D. M. (2010). Testing for factorial invariance in the context of construct validation. *Measurement and Evaluation in Counseling and Development*, 43(2), 121-149.
- Drost, J., van der Does, W., van Hemert, A. M., Penninx, B. W. J. H., & Spinhoven, P. (2014). Repetitive negative thinking as a transdiagnostic factor in depression and anxiety: A conceptual replication. *Behaviour Research and Therapy*, 63, 177-183.
- Eisenlohr-Moul, T. A., Peters, J. R., Pond, R. S., & DeWall, C. N. (2016). Both trait and state mindfulness predict lower aggressiveness via anger rumination: A multilevel mediation analysis. *Mindfulness*, 7, 713-726.
- Enders, C. K. (2010). *Methodology in the social sciences: Applied missing data analysis*. New York: The Guildford Press.

- Fearon, R. P., Bakermans-Kranenburg, van IJzendoorn, M. H., Lapsley, A. M., & Roisman, G. I. (2010). The significance of insecure attachment and disorganization in the development of children's externalizing behaviour: A meta-analytic study. *Child Development, 81*(2), 435-456.
- Garrison, A. M., Kahn, J. H., Miller, S. A., & Sauer, E. M. (2014). Emotional avoidance and rumination as mediators between adult attachment and emotional disclosure. *Personality and Individual Differences, 70*, 239-245.
- Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology, 60*, 549-576.
- Gross, J. J., & John, O. P. (1998). Mapping the domain of expressivity: Multimethod evidence for a hierarchical model. *Journal of Personality and Social Psychology, 74*, 170-191.
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*, 348-362.
- Guerra, R. C., & White, B. A. (2016). Psychopathy and functions of aggression in emerging adulthood: Moderation by anger rumination and gender. *Journal of Psychopathology and Behavioral Assessment*. doi:10.1007/s10862-016-9563-9.
- Hawley, L. L., Schwartz, D., Bieling, P. J., Irving, J., Corcoran, K., Farb, N. A. S., ... Segal, Z. V. (2014). Mindfulness practice, rumination and clinical outcome in mindfulness-based treatment. *Cognitive Therapy and Research, 38*, 1-9.
- Hazan, C., & Shaver, P. R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*, 511-524.
- Heleniak, C., Jenness, J. L., Vander Stoep, A., McCauley, E., & McLaughlin, K. A. (2016). Childhood maltreatment exposure and disruptions in emotion regulation: A transdiagnostic pathway to adolescent internalizing and externalizing psychopathology. *Cognitive Therapy and Research, 40*, 394-415.
- Hilt, L. M., Armstrong, J. M., & Essex, M. J. (2012). Early family context and development of adolescent ruminative style: Moderation by temperament. *Cognition and Emotion, 26*(5), 916-926.
- Hilt, L. M., McLaughlin, K. A., & Nolen-Hoeksema, S. (2010). Examination of the response styles theory in a community sample of young adolescents. *Journal of Abnormal Child Psychology, 38*, 545-556.
- Hilt, L. M., & Pollak, S. D. (2012). Getting out of rumination: Comparison of three brief interventions in a sample of youth. *Journal of Abnormal Child Psychology, 40*, 1157-1165.

- Hilt, L. M., Roberto, C. A., & Nolen-Hoeksema, S. (2013). Rumination mediates the relationship between peer alienation and eating pathology in young adolescent girls. *Eating and Weight Disorders, 18*(3), 263-267.
- Hogstrom, J., Olofsson, V., Ozdemir, M., Enebrink, P., & Stattin, H. (2016). Two-year findings from a national effectiveness trial: Effectiveness of behavioural and non-behavioural parenting programs. *Journal of Abnormal Child Psychology*. doi:10.1007/s10802-016-0178-0
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.
- Jose, P. E., & Brown, I. (2008). When does the gender difference in rumination begin? Gender and age differences in the use of rumination by adolescents. *Journal of Youth and Adolescence, 37*, 180-192.
- Kabat-Zinn, J. (1982). An out-patient program in behavioral medicine for chronic pain participants based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33-47.
- Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Delacorte.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science & Practice, 10*, 144-156.
- Kenny, D. A. (2013, May 6). *Mediation*. Retrieved from <http://davidakenny.net/cm/mediate.htm>
- Kenny, D. A. (2015, November 24). *Measuring model fit*. Retrieved from <http://davidakenny.net/cm/fit.htm>
- Kim, J., & Cicchetti, D. (2006). Longitudinal trajectories of self-system processes and depressive symptoms among maltreated and nonmaltreated children. *Child Development, 77*, 624-639.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling*. (2nd ed). New York: The Guildford Press.
- Lanciano, T., Curci, A., Kafetsios, K., Elia, L., & Zammuner, V. L. (2012). Attachment and dysfunctional rumination: The mediating role of emotional intelligence abilities. *Personality and Individual Differences, 53*, 753-758.

- Law, K. C. & Chapman, A. L. (2015). Borderline personality features as a potential moderator of the effect of anger and depressive rumination on shame, self-blame, and self-forgiveness. *Journal of Behavior Therapy and Experimental Psychiatry*, 46, 27-34.
- Liverant, G. I., Kamholz, B. W., Sloan, D. M., & Brown, T. A. (2011). Rumination in clinical depression: A type of emotional suppression? *Cognitive Therapy and Research*, 35(3), 253-265.
- Lowry, R. (n.d.). *The confidence interval of rho* [Online calculator]. Retrieved from <http://vassarstats.net/rho.html>?
- MacCallum, R. C., & Austin, J. T. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology*, 51, 201-226.
- Madigan, S., Brumariu, L. E., Villani, V., Atkinson, L., & Lyons-Ruth, K. (2016). Representational and questionnaire measures of attachment: A meta-analysis of relations to child internalizing and externalizing problems. *Psychological Bulletin*, 142(4), 367-399.
- Manfredi, C., Caselli, G., Rovetto, F., Rebecchi, D., Ruggiero, G. M., Sassaroli, S., & Spada, M. M. (2011). Temperament and parental styles as predictors of ruminative brooding and worry. *Personality and Individual Differences*, 50, 186-191.
- Marganska, A., Gallagher, M., & Miranda, R. (2013). Adult attachment, emotion dysregulation, and symptoms of depression and generalized anxiety disorder. *American Journal of Orthopsychiatry*, 83(1), 131-141.
- Margolese, S. K., Markiewicz, D., & Doyle, A. B. (2005). Attachment to parents, best friend, and romantic partner: Predicting different pathways to depression in adolescence. *Journal of Youth and Adolescence*, 34(6), 637-650.
- Markiewicz, D., Lawford, H., Doyle, A.B., & Haggart, N. (2006). Developmental differences in adolescents' and young adults use of mothers, fathers, best friends, and romantic partners to fulfill attachment needs. *Journal of Youth and Adolescence*, 35(1), 127-140.
- Marsh, H. W., Hau, K., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling: A Multidisciplinary Journal*, 11(3), 320-341.
- Maxwell, J. P. (2004). Anger rumination: An antecedent of athlete aggression? *Psychology of Sport and Exercise*, 5, 279-289.

- Maxwell, J. P., Sukhodolsky, D. G., Chow, C. C. F., & Wong, C. F. C. (2005). Anger rumination in Hong Kong and Great Britain: Validation of the scale and a cross-cultural comparison. *Personality and Individual Differences*, 39(6), 1147-1157.
- McEvoy, P. M., Watson, H., Watkins, E. R., & Nathan, P. (2013). The relationship between worry, rumination, and comorbidity: Evidence for repetitive negative thinking as a transdiagnostic construct. *Journal of Affective Disorders*, 151, 313-320.
- McLaughlin, K. A., Aldao, A., Wisco, B. E., & Hilt, L. M. (2014). Rumination as a transdiagnostic factor underlying transitions between internalizing symptoms and aggressive behavior in early adolescents. *Journal of Abnormal Psychology*, 123(1), 13-23.
- McLaughlin, K. A., & Nolen-Hoeksema, S. (2012). Interpersonal stress generation as a mechanism linking rumination to internalizing symptoms in early adolescents. *Journal of Clinical Child & Adolescent Psychology*, 41(5), 584-597.
- Mikulincer, M., & Florian, V. (1998). The relationship between adult attachment styles and emotional and cognitive reactions to stressful events. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 143-165). NY: Guilford Press.
- Mikulincer, M., & Shaver, P. R. (2005). Attachment theory and emotions in close relationships: Exploring the attachment-related dynamics of emotional reactions to relational events. *Personal Relationships* 12, 149-168.
- Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. New York, NY: Guildford Press.
- Mikulincer, M., & Shaver, P. R. (2008). Adult attachment and affect regulation. In J. Cassidy and P. R. Shaver, (Eds.). *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 503-531). New York, NY: Guildford Press.
- Miles, J. N. V. & Shevlin, M. E. (2001). *Applying regression & correlation: A guide for students and researchers*. London: Sage Publications.
- Mor, N., & Winquist, J. (2002). Self-focused attention and negative affect: A meta-analysis. *Psychological Bulletin*, 128(4), 638-662.
- Moretti, M. M. (2003). *The Affect Regulation Checklist (ARC)*. Unpublished measure and data. Simon Fraser University, Burnaby, British Columbia, Canada.
- Moretti, M. M., & Braber, K. (2013). *Connect: An attachment focused treatment group for parents and caregivers – A principle based manual*. Burnaby, BC: Simon Fraser University.

- Moretti, M. M., McKay, S., & Holland, R. (2000). *The Comprehensive Adolescent-Parent Attachment Inventory (CAPAI)*. Unpublished measure and data. Simon Fraser University, Burnaby, British Columbia, Canada.
- Moretti, M. M., & Obsuth, I. (2009). Effectiveness of an attachment-focused manualized intervention for parents of teens at risk for aggressive behaviour: The Connect program. *Journal of Adolescence*, 32(6), 1347-1357.
- Moretti, M. M., Obsuth, I., Craig, S. G., & Bartolo, T. (2015). An attachment-based intervention for parents of adolescents at-risk: Mechanisms of change. *Attachment and Human Development*, 17(2), 119-135.
- Moulds, M. L., Kandris, E., Starr, S., & Wong, A. C. M. (2007). The relationship between rumination, avoidance and depression in a non-clinical sample. *Behaviour Research and Therapy*, 45, 251-261.
- Muthén, L. K. & Muthén, B. O. (1998-2015). *Mplus User's Guide*. (7th ed). Los Angeles, CA: Muthén & Muthén.
- Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, 100(4), 569-582.
- Nolen-Hoeksema, S. (1998). The other end of the continuum: The costs of rumination. *Psychological Inquiry*, 9(3), 216-219.
- Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology*, 3, 504-511.
- Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. *Personality and Individual Differences*, 51, 704-708.
- Nolen-Hoeksema, S., Gilbert, K., & Hilt, L. M. (2015). Rumination and self-regulation in adolescence. In G. Oettingen & P. M. Gollwitzer (Eds.), *Self-regulation in adolescence* (pp. 311-331). New York: Cambridge University Press.
- Nolen-Hoeksema, S., & Harrell, Z. A. (2002). Rumination, depression, and alcohol use: Tests of gender differences. *Journal of Cognitive Psychotherapy: An International Quarterly*, 16(4), 391-403.
- Nolen-Hoeksema, S., & Jackson, B. (2001). Mediators of the gender difference in rumination. *Psychology of Women Quarterly*, 25, 37-47.
- Nolen-Hoeksema, S., Larson, S., & Grayson, C. (1999). Explaining the gender difference in depressive symptoms. *Journal of Personality and Social Psychology*, 77(5), 1061-1072.

- Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally occurring depressed mood. *Cognition and Emotion*, 7(6), 561-570.
- Nolen-Hoeksema, S., Stice, E., Wade, E., and Bohon, C. (2007). Reciprocal relations between rumination and bulimic, substance abuse, and depressive symptoms in female adolescents. *Journal of Abnormal Psychology*, 116(1), 198-207.
- Nolen-Hoeksema, S., & Watkins, E. R. (2011). A heuristic for developing transdiagnostic models of psychopathology: Explaining multifinality and divergent trajectories. *Perspectives of Psychological Science*, 6(6), 589-609.
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3(5), 400-424.
- O'Mahen, H. A., Karl, A., Moberly, N., & Fedock, G. (2015). The association between childhood maltreatment and emotion regulation: Two different mechanisms contributing to depression? *Journal of Affective Disorders*, 174, 287-295.
- O'Rourke, N., & Hatcher, L. (2013). *A step-by-step approach for using SAS® for factor analysis and structural equation modeling* (2nd ed.). Cary, NC: SAS Institute Inc.
- Padilla Paredes, P., & Calvete, E. (2014). Cognitive vulnerabilities as mediators between emotional abuse and depressive symptoms. *Journal of Abnormal Child Psychology*, 42, 743-753.
- Pearson, K. A., Watkins, E. R., Mullan, E. G., & Moberly, N. J. (2010). Psychosocial correlates of depressive rumination. *Behaviour Research and Therapy*, 48, 784-791.
- Peled, M., & Moretti, M. M. (2007). Rumination on anger and sadness in adolescence: Fueling of fury and deepening of despair. *Journal of Clinical Child and Adolescent Psychology*, 36(1), 66-75.
- Peled, M., & Moretti, M. M. (2010). Ruminating on rumination: Are rumination on anger and sadness differentially related to aggression and depressed mood? *Journal of Psychopathology and Behavioural Assessment*, 31(1), 108-117.
- Penny, S. (2007). *Too much, too little? The roles of affect dysregulation and deficient affect in youth violence*. Unpublished doctoral dissertation. Simon Fraser University, Burnaby, BC, Canada.
- Pepping, C. A., Davis, P. J., & O'Donovan, A. (2015). The association between state attachment security and state mindfulness. *PLoS ONE*, 10(3), e0116779. doi:10.1371/journal.pone.0116779

- Peters, J. R., Eisenlohr-Moul, T. A., Upton, B. T., & Baer, R. A. (2013). Nonjudgment as a moderator of the relationship between present-centred awareness and borderline features: Synergistic interactions in mindfulness assessment. *Personality and Individual Differences, 55*, 24-28.
- Peters, J. R., Smart, L. M., Eisenlohr-Moul, T. A., Geiger, P. J., Smith, G. T., & Baer, R. A. (2015). Anger rumination as a mediator of the relationship between mindfulness and aggression: The utility of a multidimensional mindfulness model. *Journal of Clinical Psychology, 71*(9), 871-884.
- Preacher, K. J. (2002, May). *Calculation for the test of the difference between two independent correlation coefficients* [Computer software]. Available from <http://quantpsy.org>
- Raes, F., & Hermans, D. (2008). On the mediating role of subtypes of rumination in the relationship between childhood emotional abuse and depressed mood: Brooding versus reflection. *Depression and Anxiety, 25*, 1067-1070.
- Rawal, A., Park, R. J., & Williams, M. G. (2010). Rumination, experiential avoidance, and dysfunctional thinking in eating disorders. *Behaviour Research and Therapy, 48*, 851-859.
- Ray, R. D., Wilhelm, F. H., & Gross, J. J. (2008). All in the mind's eye? Anger rumination and reappraisal. *Journal of Personality and Social Psychology, 94*(1), 133-145.
- Reynolds, S., Searight, H. R., & Ratwik, S. (2016). Adult attachment styles and rumination in the context of intimate relationships. *North American Journal of Psychology, 16*(3), 495-506.
- Rood, L., Roelofs, J., Bogels, S. M., Nolen-Hoeksema, S., Schouten, E. (2009). The influence of emotion-focused rumination and distraction on depressive symptoms in non-clinical youth: A meta-analytic review. *Clinical Psychology Review, 29*, 607-616.
- Rose, A. J. (2002). Co-rumination in the friendships of girls and boys. *Child Development, 73*(6), 1830-1843.
- Rose, A. J., Carlson, W., & Waller, E. M. (2007). Prospective associations of co-rumination with friendship and emotional adjustment: Considering the socioemotional trade-offs of co-rumination. *Developmental Psychology, 43*(4), 1019-1031.
- Rosenthal, N. L., & Kobak, R. (2010). Assessing adolescents' attachment hierarchies: Differences across developmental periods and associations with individual adaptation. *Journal of Research on Adolescence, 20*(3), 678-706.

- Ruijten, T., Roelofs, J., & Rood, L. (2011). The mediating role of rumination in the relation between quality of attachment relations and depressive symptoms in non-clinical adolescents. *Journal of Child and Family Studies, 20*, 452-459.
- Rusting, C. L., & Nolen-Hoeksema, S. (1998). Regulating responses to anger: Effects of rumination and distraction on angry mood. *Journal of Personality and Social Psychology, 74*(3), 790-803.
- Saffrey, C., & Ehrenberg, M. (2007). When thinking hurts: Attachment, rumination, and postrelationship adjustment. *Personal Relationships, 14*, 351-368.
- Sarin, S., Abela, J., & Auerbach, R. (2005). The response styles theory of depression: A test of specificity and causal mediation. *Cognition & Emotion, 19*(5), 751-761.
- Sarin, S., & Nolen-Hoeksema, S. (2010). The dangers of dwelling: An examination of the relationship between rumination and consumptive coping in survivors of childhood sexual abuse. *Cognition and Emotion, 24*(1), 71-85.
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods, 7*(2), 147-177.
- Scharfe, E. (2002). Reliability and validity of an interview assessment of attachment representations in a clinical sample of adolescents. *Journal of Adolescent Research, 17*(5), 532-551.
- Segal, Z. V., Williams, M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. NY: Guildford Press.
- Segal, Z. V., Williams, M. G., & Teasdale, J. D. (2012). *Mindfulness-based cognitive therapy for depression* (2nd ed.). NY: Guildford Press.
- Selby, E. A., Anestis, M. D., Bender, T. W., & Joiner, T. E. (2009). An exploration of the emotional cascade model in borderline personality disorder. *Journal of Abnormal Psychology, 118*(2), 375-387.
- Selby, E. A., & Joiner, T. E. (2009). Cascades of emotion: The emergence of borderline personality disorder from emotional and behavioural dysregulation. *Review of General Psychology, 13*(3), 219-229.
- Selby, E. A., & Joiner, T. E. (2013). Emotional cascades as prospective predictors of dysregulated behaviors in borderline personality disorder. *Personality Disorders: Theory, Research, and Treatment, 4*(2), 168-174.
- Shaver, P. R., & Hazan, C. (1993). Adult romantic attachment: Theory and evidence. In D. Perlman & W. Jones (Eds.), *Advances in personal relationships: Volume 4* (pp. 29-70). London: Jessica Kingsley.

- Shaver, P. R., & Mikulincer, M. (2002). Attachment-related psychodynamics. *Attachment and Human Development, 4*(2), 133-161.
- Shaver, P. R., & Mikulincer, M. (2008). Adult attachment and cognitive and affective reactions to positive and negative events. *Social and Personality Compass, 2*(5), 1844-1865.
- Shields, A., & Cicchetti, D. (1995). The development of an emotion regulation assessment battery: Reliability and validity among at-risk grade-school children. Paper presented at the Society for Research in Child Development.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*, 422-445.
- Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment and Human Development, 7*(3), 269-281.
- Smith, S. D., Stephens, H. F., Repper, K., & Kistner, J. A. (2016). The relationship between anger rumination and aggression in typically developing children and high-risk adolescents. *Journal of Psychopathology and Behavioural Assessment*. doi:10.1007/s10862-016-9542-1
- Soper, D. S. (n.d.). *Regression coefficient confidence interval calculator* [Online calculator]. Retrieved from <http://www.danielsoper.com/statcalc>
- Spasojevic, J., & Alloy, L. B. (2001). Rumination as a common mechanism relating depressive risk factors to depression. *Emotion, 1*(1), 25-37.
- Spasojevic, J. & Alloy, L. B. (2002). Who becomes a depressive ruminator?: Developmental antecedents of ruminative response style. *Journal of Cognitive Psychotherapy: An International Quarterly, 16*, 405-419.
- Spasojevic, J., Alloy, L. B., Abramson, L. Y., MacCoon, D., & Robinson, M. S. (2004). Reactive rumination: outcomes, mechanisms, and developmental antecedents. In C. Papageorgiou and A. Wells (Eds.). *Depressive Rumination: Nature, Theory and Treatment* (pp. 43-58). England: John Wiley and Sons.
- Steiger, A. (2003). *Validation of the Comprehensive Adolescent-Parent Attachment Inventory (CAPAI)*. Unpublished master's thesis. Simon Fraser University, Burnaby, British Columbia, Canada.
- Steiger, A. (2008). *Parenting and attachment: An examination of mediation and moderation in the prediction of adolescent psychopathology*. Unpublished doctoral dissertation. Simon Fraser University, Burnaby, British Columbia, Canada.

- Stone, L. B., & Gibb, B. E. (2015). Brief report: Preliminary evidence that co-rumination fosters adolescents' depression risk by increasing rumination. *Journal of Adolescence*, 38, 1-4.
- Stroud, C. B., & Fitts, J. (2015). Rumination in early adolescent girls: Interactive contributions of mother-adolescent relationship quality and maternal coping suggestions. *Journal of Clinical Child and Adolescent Psychology*, doi: 10.1080/15374416.2015.1095737
- Sukhodolsky, D. G., Golub, A., & Cromwell, E. N. (2001). Development and validation of the anger rumination scale. *Personality and Individual Differences*, 31, 689–700.
- Tabachnik, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn and Bacon.
- Tofighi, D. & MacKinnon, D. P. (2011). RMediation: An R package for mediation analysis confidence intervals. *Behavior Research Methods*, 43, 692-700.
- Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology*, 76(2), 284-304.
- Treynor, W., Gonzales, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, 27(3), 247-259.
- Vasquez, E. A., Osman, S., & Wood, J. L. (2012). Rumination and the displacement of aggression in United Kingdom gang-affiliated youth. *Aggressive Behavior*, 38, 89-97.
- Watkins, E. R. (2009). Depressive rumination and co-morbidity: Evidence for brooding as a transdiagnostic process. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 27(3), 160-175.
- Watkins, E. R. (2016). *Rumination-focused cognitive-behavioural therapy for depression*. New York, NY: The Guildford Press.
- Watkins, E. R., & Moulds, M. L. (2007). Reduced concreteness of rumination in depression: A pilot study. *Personality and Individual Differences*, 43(6), 1386-1395.
- Watkins, E. R., Mullan, E., Wingrove, J., Rimes, K., Steiner, H., Bathurst, N., ... Scott, J. (2011). Rumination-focused cognitive-behavioural therapy for residual depression: Phase II randomised controlled trial. *The British Journal of Psychiatry*, 199, 317-322.

- Watkins, E., Scott, J., Wingrove, J., Rimes, K., Bathurst, N., Steiner, H., ... Malliaris, Y. (2007). Rumination-focused cognitive behaviour therapy for residual depression: A case series. *Behaviour Research and Therapy*, *45*, 2144-2154.
- Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review*, *101*, 34-52.
- Wenzlaff, R. M., & Luxton, D. D. (2003). The role of thought suppression in depressive rumination. *Cognitive Therapy and Research*, *27*(3), 293-308.
- White, B. A., & Turner, K. A. (2014). Anger rumination and effortful control: Mediation effects on reactive but not proactive aggression. *Personality and Individual Differences*, *56*, 186-189.
- Widaman, K. F. (2006). Missing data: What to do with or without them. *Monographs of the Society for Research in Child Development*, *71*, 42-64.
- Wilkinson, P. O., Croudace, T. J., & Goodyer, I. M. (2013). Rumination, anxiety, depressive symptoms and subsequent depression in adolescents at risk for psychopathology: A longitudinal cohort study. *BMC Psychiatry*, *13*, 250-258.
- Willem, L., Bijttebier, P., Claes, L., & Raes, F. (2011). Rumination subtypes in relation to problematic substance use in adolescence. *Personality and Individual Differences*, *50*, 695-699.
- Wills, T. A., Simons, J. S., Sussman, S., Knight, R. (2016). Emotional self-control and dysregulation: A dual-process analysis of pathways to externalizing/internalizing symptomatology and positive well-being in younger adolescents. *Drug and Alcohol Dependence*, *163*, S37-S45.

Appendix A.

Rumination Measures

A number of self-report measures are currently used to assess sadness rumination or general ruminative thinking, including the Rumination on Sadness Scale (RSS; Conway, Csank, Holm, & Blake, 2000) and the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), however, the most widely used questionnaire is the Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991). A psychometric analysis of the original 22-item measure was completed by Treynor, Gonzalez, & Nolen-Hoeksema (2003), which further delineated subcomponents of this scale. They argued there was significant item overlap between some RRS items and those on depression inventories, subsequently removing these items. Principal components analyses on the remaining items identified two factors – brooding and reflection. Ruminative brooding was said to involve “passive comparison of one’s current situation with some unachieved standard” and reflection a more neutral focus involving “turning inward to engage in cognitive problem solving” with the goal of alleviating symptoms (Treynor et al., 2003, p. 256). The brooding component was argued to be the more maladaptive component of rumination and was associated with more depression both concurrently and longitudinally (Treynor et al., 2003). Following this reconceptualization of the scale, a number of studies have explicitly examined only ruminative brooding in relation to outcomes. Others continue to use the full RRS scale, and others use all three – the total score, brooding, and reflection scales.

Appendix B.

Distribution Properties for Measures of Interest

Table B1. Skewness and Kurtosis Values for Model 1 and 2 Measures

Measure	Males		Females	
	Skew (SE)	Kurtosis (SE)	Skew (SE)	Kurtosis (SE)
T1 Attachment Anxiety	1.79 (.27)	2.60 (.53)	.88 (.28)	-.45 (.56)
T1 Attachment Avoidance	.24 (.27)	-1.14 (.54)	.20 (.28)	-1.20 (.56)
T1 Affect Dyscontrol	.21 (.27)	-1.07 (.53)	-.093 (.28)	-1.05 (.55)
T1 Affect Suppression	-.26 (.27)	-.76 (.53)	-.066(.28)	-.95 (.55)
T1 Sadness Rumination	.70 (.28)	-.33 (.56)	.10 (.30)	-.31 (.58)
T1 Anger Rumination	.54 (.28)	-.51 (.56)	-.17 (.29)	-.66 (.57)
T2 Affect Dyscontrol	.53 (.36)	-.66 (.70)	.32 (.34)	-.92 (.67)
T2 Affect Suppression	-.35 (.36)	-1.16 (.70)	-.001 (.34)	-1.39 (.67)
T3 Sadness Rumination	--	--	.32 (.36)	-.72 (.71)
T3 Anger Rumination	-.26 (.43)	-.84 (.83)	-.023 (.36)	.51 (.71)

Note. SE = standard error. Skewness and kurtosis values were calculated using weighted composites. Values for Time 3 sadness rumination are not provided for males as a weighted composite could not be created. Sample sizes for each measure vary as skewness and kurtosis values were examined in SPSS prior to the use of FIML in Mplus to account for scale-level missingness.

Appendix C.

Path Analyses Results

Table C1. Model 1 Unstandardized and Standardized Estimates for Females³⁶

Association	<i>B</i>	<i>SE</i>	β	95% CI	<i>p</i>
T1 Affect Dyscontrol → T2 Affect Dyscontrol	.442	.153	.427	[.162, .692]	.001
T1 Attachment Anxiety → T2 Affect Dyscontrol	-.039	.038	-.153	[-.444, .138] ^a	.295
T1 Anger Rumination → T3 Anger Rumination	.300	.121	.313	[.074, .552]	.009
T1 Attachment Anxiety → T3 Anger Rumination	.124	.053	.280	[.051, .509]	.015
T2 Affect Dyscontrol → T3 Anger Rumination	.725	.215	.421	[.178, .664]	.001
T1 Affect Dyscontrol WITH T1 Anger Rumination	.178	.056	.417	[.216, .618]	.000
T1 Attachment Anxiety WITH T1 Anger Rumination	.360	.217	.210	[-.027, .447] ^a	.077
T1 Attachment Anxiety WITH T1 Affect Dyscontrol	.340	.114	.369	[.168, .570]	.000

Note. CI = confidence interval. ^a95% confidence interval contains the value zero.

³⁶ 95% confidence intervals were determined using an online calculator (Soper, n.d.). As confidence interval estimators for regression coefficients are not always consistent, results should be interpreted with some caution.

Table C2. Modified Model 1 Unstandardized and Standardized Estimates for Females

Association	<i>B</i>	<i>SE</i>	<i>β</i>	95% CI	<i>p</i>
T1 Affect Dyscontrol → T2 Affect Dyscontrol	.435	.164	.408	[.129, .687]	.004
T1 Attachment Anxiety → T2 Affect Dyscontrol	-.035	.039	-.135	[-.434, .164] ^a	.369
T1 Sadness Rumination → T3 Sadness Rumination	.381	.136	.382	[.133, .631]	.002
T1 Attachment Anxiety → T3 Sadness Rumination	.005	.064	.011	[-.268, .290] ^a	.935
T2 Affect Dyscontrol → T3 Sadness Rumination	.292	.284	.166	[-.151, .483] ^a	.297
T1 Affect Dyscontrol WITH T1 Sadness Rumination	.077	.049	.204	[-.039, .447] ^a	.094
T1 Attachment Anxiety WITH T1 Sadness Rumination	.372	.205	.238	[-.003, .479] ^a	.049
T1 Attachment Anxiety WITH T1 Affect Dyscontrol	.311	.103	.373	[.174, .572]	.000

^a95% confidence interval contains the value zero.

Table C3. Model 1 Unstandardized and Standardized Estimates for Males

Association	<i>B</i>	<i>SE</i>	β	95% CI	<i>p</i>
T1 Affect Dyscontrol → T2 Affect Dyscontrol	.329	.127	.366	[.103, .629]	.006
T1 Attachment Anxiety → T2 Affect Dyscontrol	.094	.044	.289	[.032, .546]	.025
T1 Anger Rumination → T3 Anger Rumination	.258	.142	.305	[-.011, .621] ^a	.055
T1 Attachment Anxiety → T3 Anger Rumination	.043	.174	.069	[-.480, .618] ^a	.802
T2 Affect Dyscontrol → T3 Anger Rumination	.727	.489	.376	[-.114, .866] ^a	.126
T1 Affect Dyscontrol WITH T1 Anger Rumination	.151	.061	.290	[.083, .497]	.005
T1 Attachment Anxiety WITH T1 Anger Rumination	.242	.168	.168	[-.055, .391] ^a	.135
T1 Attachment Anxiety WITH T1 Affect Dyscontrol	.144	.080	.205	[-.008, .418] ^a	.054

^a95% confidence interval contains the value zero.

Table C4. Model 2 Unstandardized and Standardized Estimates for Females

Association	<i>B</i>	<i>SE</i>	β	95% CI	<i>p</i>
T1 Affect Suppression → T2 Affect Suppression	-.107	.201	-.075	[-.352, .202] ^a	.590
T1 Attachment Avoidance → T2 Affect Suppression	.120	.060	.307	[.016, .598]	.035
T1 Sadness Rumination → T3 Sadness Rumination	.277	.135	.281	[.014, .548]	.036
T1 Attachment Avoidance → T3 Sadness Rumination	.233	.084	.429	[.144, .714]	.003
T2 Affect Suppression → T3 Sadness Rumination	-.166	.260	-.119	[-.494, .256] ^a	.526
T1 Affect Suppression WITH T1 Sadness Rumination	.052	.045	.150	[-.099, .399] ^a	.232
T1 Attachment Avoidance WITH T1 Sadness Rumination	.104	.171	.081	[-.180, .342] ^a	.537
T1 Attachment Avoidance WITH T1 Affect Suppression	.072	.075	.114	[-.117, .345] ^a	.327

^a95% confidence interval contains the value zero.

Appendix D.

Supplementary Analyses

Table D1. Confidence Intervals for Associations between Rumination and Psychopathology³⁷

	Males	Females
	95% CI	95% CI
T3 ASR Aggressive Behaviour WITH:		
T3 Anger Rumination	[.32, .79]	[.40, .78]
Controlling for T1 Anger Rumination	[.23, .81]	[.34, .76]
Controlling for T3 Sadness Rumination	[.01, .69]	[.12, .64]
T3 Sadness Rumination	[.25, .78]	[.47, .81]
Controlling for T3 Anger Rumination	[-.15, .59] ^a	[.24, .71]
T3 Depressive Symptoms WITH:		
T3 Sadness Rumination	[.61, .90]	[.36, .76]
Controlling for T1 Sadness Rumination	[.62, .93]	[.28, .74]
Controlling for T3 Anger Rumination	[.37, .84]	[.17, .68]

Note. All confidence intervals for males involving Time 3 sadness rumination were obtained using the raw score as a weighted composite could not be calculated. ^a95% confidence interval contains the value zero.

³⁷ 95% confidence intervals for correlation coefficients were determined using an online calculator (Lowry, n.d.).