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The Relationship Between Rumination, Depression, and Aggression in Children

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COLLEGE OF ARTS AND SCIENCES

THE RELATIONSHIP BETWEEN RUMINATION,
DEPRESSION, AND AGGRESSION IN CHILDREN

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A Thesis submitted to the
Department of Psychology
in partial fulfillment of the
requirements for the degree of
Master of Science

Degree Awarded:
Summer Semester, 2014

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ABSTRACT

The purpose of this study was to examine the shared and unique associations of sadness rumination and anger rumination and their links to depressive and aggressive symptoms in pre/early adolescents. Children, seven through fourteen years old, completed self-report measures of their response styles, depressive symptoms, and peer nominations of aggressive behaviors. Results revealed that anger rumination uniquely predicted aggressive and depressive symptoms, controlling for sadness rumination. In contrast to previous studies, sadness rumination did not predict depressive symptoms when anger rumination was controlled for. In addition, sadness rumination was negatively associated with aggressive symptoms. Gender did not moderate the relationship between any of the variables. An exploratory cluster analysis was also conducted to examine patterns of rumination and their associated behavioral correlates. The following groups emerged: general ruminators, high sadness ruminators, high anger ruminators, and low ruminators. Results revealed that general ruminators did not demonstrate comorbid depressive and aggressive behaviors. Study limitations and future directions for research are discussed.

Keywords: rumination, response styles, depression, aggression

INTRODUCTION

Understanding factors involved in the development of depressive and aggressive behaviors in children is important given their association with immediate and long-term negative outcomes. Research shows that depressive symptoms in children increase risk of major depressive disorder, suicide, and substance abuse (Klein, Kujawa, Black, & Pennock, 2013), while aggression at an early age is associated with increased risk of truancy and antisocial behaviors (Waldman & Lehey, 2013). In addition, depressive and aggressive disorders in children are highly comorbid (Angold, Costello, Erkanli, 1999). Children who display comorbid depressive and aggressive behaviors are at greater risk for negative outcomes compared to children with either diagnoses alone (Wolff & Ollendick, 2006). Although theories on the development of psychopathology in children exist, there are still gaps in understanding the emergence and developmental course of co-occurring childhood disorders. In particular, there is a need to better understand the factors that contribute to a child's risk for depression, aggression, and their comorbidity.

Research suggests that multiple factors contribute to the development of depression and aggression in children (Angold et al., 1999; Ginicola, 2007; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002; Rowe, Maughan, & Eley, 2006; Wolff & Ollendick, 2006; Zigler and Glick, 2001). One promising area of research is how children respond to negative affect. Specifically, the degree to which children ruminate in response to negative affect may be one way in which children are at risk for the development of both depression and aggression. The present study seeks to examine children's tendencies to ruminate in response to feelings of sadness and anger and how these factors relate to depression, aggression, and their comorbidity.

There are individual differences in how people respond to negative affect. One way is through rumination. A ruminative response style is characterized by repetitive and focused attention on the causes and consequences of one's negative feelings (Morrow & Nolen-Hoeksema, 1990). Rumination has been linked to increased risk of psychopathology, including depression, anxiety, borderline personality disorder, eating disorders, and substance abuse disorders (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Baer & Sauer, 2011; Nolen-Hoeksema, 1987, 1991). Some theorists propose that rumination increases risk of psychopathology by activating memories associated with that particular emotion. For example, when an individual becomes sad, past thoughts and memories linked to this emotion are activated, prolonging and

exacerbating the emotional experience (Morrow & Nolen-Hoeksema, 1990). As a result, those who engage in a ruminative response style to feelings of sadness tend to experience longer and more severe episodes of depressed mood. Rumination is also thought to increase negative mood by negatively influencing one's interpretation of events, reducing one's ability to concentrate, proactively address their problems, and engage in pleasure seeking activities that would otherwise improve their mood (Nolen-Hoeksema, 1991). Most research on rumination focuses on one type of negative affect, sad mood. There is considerable evidence in support of associations between sadness rumination and depression with adult populations (Aldao et al., 2010) as well as with preadolescent and adolescent populations (Abela & Hankin, 2008; Abela, Parkinson, Stolorow, & Starrs, 2009; Aldao et al., 2010; Driscoll, Lopez, & Kistner, 2009; Peled & Moretti, 2007; Rood, Roelofs, Bogels, Nolen-Hoeksema, & Schouten, 2009).

In contrast to the large body of research on sadness rumination, studies of rumination to anger have received considerably less attention. However, in the past decade, a growing body of research has suggested that rumination to anger has similar effects on risk for psychopathology. Just as sadness rumination is associated with prolonging depressed mood, response styles theory predicts that anger rumination exacerbates or prolongs feelings of anger. Once an individual becomes angry, past thoughts, memories, and physiological reactions linked to this emotion are activated (Rusting & Nolen-Hoeksema, 1998). Thus, rumination may enhance the spreading activation of these links, prolonging and exacerbating the emotional experience of anger which, in turn, leads to increases in aggressive appraisals and behaviors towards others (Anderson & Bushman, 2002; Bushman et al., 2005; Rusting & Nolen-Hoeksema, 1998). Studies have demonstrated that individuals who engage in a ruminative response style to anger show increased aggression (Bushman et al., 2005; Collins & Bell, 1997; Denson, 2009; Repper, 2007; Peled & Moretti, 2007, 2010; Rusting & Nolen-Hoeksema, 1998; Verona, 2005). Despite the growing body of research that has found that anger rumination leads to increased aggression, few studies have tested this theory in children. Thus, the extent to which similar patterns are seen in a younger population is not well known. Understanding the effects of an angry ruminative response style in children could help identify vulnerabilities towards aggressive behavior prior to it becoming severe.

While most studies examining rumination tend to focus on rumination towards only one form of negative affect, either sadness or anger, the degree to which the tendency to ruminate

applies to a specific type of negative affect compared to negative affect in general (i.e., both sadness and anger) remains unknown. Recent theories of rumination suggest that individuals have a general tendency to ruminate that is not limited to a specific type of negative affect. For example, the attentional scope model of rumination suggests that the tendency to ruminate stems from a constricted attentional perception of negative information processed in the working memory and retrieved from long-term memory (Whitmer & Gotlib, 2013). Similarly, the multiple systems model suggests that the propensity towards rumination is influenced by dispositional tendencies and poor executive control (Denson, 2013; Denson, DeWall, & Finkel, 2012). There is also evidence suggesting neurological correlates underlying individual differences to ruminate (Denson, 2013). Collectively, these models posit that individuals who ruminate to sad feelings would also ruminate to anger, suggesting a generalized tendency that is not specific to sadness or anger.

Yet findings of sex differences in tendencies to ruminate to sadness and anger conflict with the idea that rumination is a general tendency. Specifically, females are more likely than males to ruminate on feelings of sadness (Driscoll, Lopez, & Kistner, 2009; Johnson & Whisman, 2013; Lopez, Driscoll, & Kistner, 2009; Nolen-Hoeksema, 1987, 1991; Ziegert & Kistner, 2002). However, sex differences in the tendency to ruminate to anger are mixed. While some studies report that males are more likely than females to ruminate in response to anger (Knobloch-Westerwick & Alter, 2005; Linden et al., 2003; Rusting and Nolen-Hoeksema, 1998), others report no sex differences (Peled & Moretti, 2010). Also, one study using a clinical sample of adolescents found that girls reported greater anger rumination than boys (Peled & Moretti, 2007).

Explanations of sex differences in rumination have focused primarily on socialization to conform to sex role stereotypes. From an early age, these roles are reinforced by those closest to children (e.g., parents, teachers) and are based on expectations of what is considered appropriate emotional expression for male and female children. For example, feminine-like displays of emotionality (i.e., crying when sad or upset) may not be encouraged in boys, however, in girls it is expected (Brody, 1985; Nolen-Hoeksema, 1991; Verona, 2005). These findings suggest that for some children, the tendency to ruminate may depend on sociocultural factors. However, for others, ruminating to both emotions may reflect a general tendency.

To date, few studies have examined rumination to more than one emotion in a single study. Examining the unique and shared components of sadness and anger rumination in adolescents and young adults, Peled and Moretti (2007, 2010) found that sadness rumination, but not anger rumination, predicted depression. They also found that anger rumination, but not sadness rumination, predicted aggression. While unique behavioral correlates were demonstrated for sadness and anger rumination, the tendency to ruminate to both sadness and anger was strongly correlated ($r=.72$ and $.74$, respectfully). Moderate correlations ($r=.56$ and $.57$) have been reported in other studies using a variety of measures of sadness and anger rumination (Baer & Sauer, 2010; Gilbert, Cheung, Irons, & McEwan, 2005, respectfully). Taken together, these results suggest that there may be different patterns of ruminative response styles with some individuals exhibiting a generalized tendency to ruminate to negative affect whereas rumination by others is specific to feelings of sadness or anger. These findings raise some interesting questions about the correlates of these different patterns of ruminative response styles. Specifically, are individuals who ruminate to both sadness and anger at increased risk for comorbid depression and aggression?

An aim of the proposed study is to better understand the shared and unique vulnerabilities involved in the development of depressive and aggressive behaviors in children. This will be accomplished by examining a ruminative response style to both sadness and anger and to explore the extent to which they are related in pre/early adolescence. Specifically, this study will examine if sadness rumination is uniquely associated with depressive symptoms and anger rumination uniquely associated with aggressive symptoms. Only two studies have examined the unique and shared behavioral correlates of sadness and anger rumination. Both studies were conducted with adolescent and adult populations. Examining these associations in a younger population could provide insight into the role of rumination as a predictor of duration and severity in the developmental trajectories of psychopathology. The study of vulnerabilities among pre/early adolescent youth is especially important given that rates of psychopathology and gender differentiation increase during this time. Identifying rumination as a predisposition may provide a viable target for intervention, given the trajectory of negative outcomes associated with these disorders.

Another goal of this study is to explore the general and affect-specific nature of rumination by examining patterns of response styles in this sample. In addition to exploring if

some individuals ruminate to a specific emotion while others express a general tendency towards both, this study will explore the extent to which rumination to both sadness and anger is associated with comorbid depressive and aggressive behaviors. To our knowledge, no study has examined this relationship directly. However, there is evidence to suggest that the tendency to ruminate to both sadness and anger may lead to more severe psychopathology. For example, Baer and Sauer (2010) found that borderline personality features were significantly associated with both sadness and anger rumination in a sample of college students. The extent to which children who ruminate to both feelings of sadness and anger have more severe depressive and aggressive symptoms is unknown.

The present study tests the following hypotheses:

- 1) Sadness rumination, controlling for anger rumination, will be uniquely associated with increased symptoms of depression.
- 2) Anger rumination, controlling for sadness rumination, will be uniquely associated with increased symptoms of aggression.
- 3) Multiple patterns of rumination will emerge such that some children will exhibit a general tendency, rumination to both sadness and anger, whereas others are expected to exhibit affect-specific rumination. With the latter, two forms of rumination are expected, children who ruminate to sadness, not anger, and children who ruminate to anger, not sadness. It is also expected that a group of children will be low in rumination to both types of negative affect.
- 4) Children with a general rumination tendency will be the group most likely to present with both depressive and aggressive symptoms. In contrast, the children with an affect-specific pattern of rumination will present with elevated depressive symptoms in the case of those whose rumination is specific to sadness and elevated aggressive symptoms in the case of those whose rumination is specific to anger.

METHODS

Participants

Participants in this study were part of a previous study (Driscoll, 2005; Repper, 2007) examining rumination in children. A total of 254 children participated (49.6% male, 66.5% Caucasian, 19.7% African American, 7.9 Hispanic, 0.8% Asian/Pacific Islander, 5.1% Biracial). Participants consisted of fourth through ninth graders who attended Florida State University Developmental Research School, which is affiliated with Florida State University. Table 1 summarizes the demographics of the participants in this study. The mean family income of the participants was \$60,000.

Measures

Measures of rumination.

Children's Responses Styles Scale (CRSS; Appendix A). Sadness rumination was assessed using the Children's Responses Styles Scale, a 20-item self-report questionnaire of children's tendency to ruminate or distract in response to sad affect. The Rumination subscale consists of 10-items. Participants were asked to rate the frequency with which they engage in ruminating or distracting behaviors on an 11-point Likert scale. The CRSS was demonstrated to be a reliable and valid measure of response styles in children (Ziegert & Kistner, 2002). Cronbach's alpha for the Rumination subscale for this sample was .84.

Children's Anger Rumination Scale (CARS; Appendix B). Anger rumination was assessed using the Children's Anger Rumination Scale (CARS), a 19-item self-report questionnaire of children's tendency to ruminate in response to anger. Participants were asked to rate their response on a Likert-scale. The CARS was adapted by Repper (2007) from Sukhodolsky et al.'s (2001) Anger Rumination Scale (ARS) to be more developmentally appropriate for children and adolescents. The CARS consists of four subscales: Angry Afterthoughts, Thoughts of Revenge, Angry Memories, and Understanding of Causes and was demonstrated to be a reliable and valid measure of anger rumination (Repper, 2007). Cronbach's alpha for this sample was .92.

Measures of mood.

Children's Depression Inventory (CDI; Appendix C). Depression was assessed using the Children Depression Inventory, a 27-item self-report questionnaire that measures depressive symptoms in children during the previous two-weeks. The CDI consists of 5 subscales: Negative

mood, Interpersonal Problems, Ineffectiveness, Anhedonia, and Negative Self-Esteem. Together, these subscales form a total score. The CDI has been demonstrated to be a reliable and valid measure (Finch, Saylor, Edwards, & McIntosh, 1987). Cronbach's alpha for the CDI total score for this sample was .88.

Peer Sociometric Nominations (Appendix D). Aggression was assessed using a peer nomination procedure (Crick & Grotpeter, 1995) where participants were asked to nominate three fellow classmates participants based on a set of descriptive statements. Nomination scores were standardized within class (Repper, 2007).

Demographics.

Age, gender, SES, and ethnicity were obtained from school records.

Procedure

The procedures and methods of this study were approved by the Florida State Institutional Review Board (IRB; Appendices E and F), county, and the school in which data was collected. Parental consent and child assent were obtained prior to the start of the study. Letters describing the study and consent forms were sent to the parents of all students prior to data collection. After parental consent was received, child assent was obtained prior to data collection. Data collection occurred during the fall of the 2004-2005 school year. Data were collected in a group-administration format. During administration, children were asked to complete a packet of questionnaires that assessed their thoughts and experiences. Participants were informed about confidentiality and given verbal and written directions for each measure. Research assistants were available throughout the administration to answer questions and monitor that the participants did not discuss their answers with other participants. Individual assistance and/or extra time were provided to those who needed it.

RESULTS

Preliminary Analyses

Prior to the analyses, all variables were examined for missing values, assumptions of normality and linearity, skewness and kurtosis, and univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity. Several children's data were omitted because of incomplete protocols, thus yielding the following number of completed protocols: CDI (N= 301), peer sociometric nominations for aggression (N=254), CRSS (N=250), and CARS (N=245). Participants dropped from the study due to missing data were compared on key variables and showed no statistically significant differences. Pairwise exclusion was applied in each analysis. Examination of the z-scores indicated three univariate outliers for CDI and a positively skewed distribution. Four univariate outliers were also identified for peer sociometric nominations for aggression, with a positively skewed distribution for both measures. After careful review, it was decided that their data would be included because nothing suggested that their responses were invalid. Therefore, the data were adjusted using square root and logarithmic transformations, respectfully, according to procedures outlined by Tabachnick and Fidell (2013) to correct for nonnormality. Mahalanobis distances suggested that there were no multivariate outliers. In addition, the means and variances of the scales used in this study varied, therefore, all variables, except for gender and age, were converted to z-scores.

There was a positive correlation between anger rumination and sadness rumination ($r=.57, p<.00$). As illustrated in Table 2, sadness rumination was also positively correlated with depressive symptoms, while anger rumination was positively correlated with both depressive and aggressive symptoms. Age was negatively correlated with sadness rumination and anger rumination. Gender was also negatively associated with anger rumination, depressive symptoms, and aggressive symptoms such that girls reported significantly less anger rumination, depressive, and aggressive symptoms.

Examination of the unique and shared behavioral correlates of sadness rumination and anger rumination

A hierarchical regression analysis was used to test the hypothesis that sadness rumination is uniquely associated with depressive symptoms in children. As illustrated in Table 3, sadness rumination significantly predicted depressive symptoms when controlling for only gender and age ($\beta =.24, p<.000$). However, in contrast to our hypothesis, sadness rumination no longer

predicted depressive symptoms when anger rumination was controlled for ($\beta = -.12, \rho = .07$). To explore shared behavioral correlates between sadness rumination and anger rumination, the relationship between sadness rumination and aggression was also examined. As demonstrated in Table 4, sadness rumination, controlling for gender and age, was not predictive of aggressive symptoms ($\beta = .02, \rho = .81$). However, when controlling for anger rumination, sadness rumination negatively predicted aggressive symptoms ($\beta = -.22, \rho < .05$).

A hierarchical regression analysis was also used to test the hypothesis that anger rumination is uniquely associated with aggressive symptoms in children. As Table 5 demonstrates, anger rumination significantly predicted aggressive symptoms ($\beta = .28, \rho < .001$), controlling for gender and age. This relationship remained when sadness rumination was controlled for ($\beta = .41, \rho < .001$). The relationship between anger rumination and depressive symptoms was also explored. As Table 6 illustrates, anger rumination significantly predicted depressive symptoms, controlling for gender and age ($\beta = .56, \rho < .001$). The relationship remained when sadness rumination was controlled for ($\beta = .63, \rho < .001$).

In an attempt to understand the unexpected finding that anger rumination, not sadness rumination, uniquely predicted depressive symptoms, additional regression analyses were conducted to provide more information about the types of depressive symptoms associated with sadness and anger rumination. Some of the items of the CDI tap irritable moods and conduct problems. It is possible that strong associations of anger rumination with this subset of items may account for the unexpected finding that anger rumination was more strongly associated with depressive symptoms than sadness rumination. Results of exploratory regression analyses are presented in Table 7. Anger rumination was positively associated with all five CDI subscales. In contrast, sadness rumination was positively associated with four subscales (negative mood, negative self-esteem, ineffectiveness, and anhedonia), and unrelated to one subscale (interpersonal problems).

The moderating effects of gender were also explored. As reported in Table 3, regression analyses examining the moderating effects of gender on sadness rumination and depressive symptoms found no moderating effects ($\beta = .18, \rho = .27$). In addition, gender did not moderate the relationship between sadness rumination and aggressive symptoms ($\beta = .17, \rho = .37$), anger rumination and aggressive symptoms ($\beta = -.14, \rho = .47$), or anger rumination and depressive

symptoms ($\beta=.18$, $\rho=.27$). These findings are shown in Table 4, Table 5, and Table 6, respectfully.

Examination of response styles patterns, rumination to both sadness and anger, and comorbid depression and aggression

An exploratory cluster analysis was used to classify response styles patterns in this sample. Cluster analysis classifies participants in a sample relative to each other based on the characteristics they possess (Hair & Black, 2000). In this study, participants were classified based on their tendency to ruminate towards sadness, anger, or both. Separate measures of sadness rumination and anger rumination were used as cluster variants. A k-means clustering method was used to specify four groups. The cluster analysis identified the expected groups based on a priori predictions: the general ruminators or those high in sadness and anger rumination (General; $N=55$), those high in sadness rumination and low in anger rumination (High Sadness; $N=73$), those high in anger rumination but low in sadness rumination (High Anger; $N=51$), and the low ruminators or those low in sadness and anger rumination (Low Ruminators; $N=62$). Figure 1 presents the mean value of sadness and anger rumination for all four groups. Although the characteristics of the cluster groups developed as expected, the mean scores within the high sadness and high anger rumination groups were not extreme in either direction. Demographic information for each group is summarized in Table 8. There were significant age differences between cluster groups, $F(3, 237) = 3.71$, $p < .05$. Specifically, general ruminators ($M = 9.67$, $SD = 1.74$) were significantly younger than low ruminators ($M = 10.69$, $SD = 1.74$). Gender distribution was relatively even within the general ruminators (49% male, 51% female) and low ruminators groups (50% male, 50% female). However, the high sadness ruminators consisted of more females than males (63% vs. 37%). In addition, the high anger ruminators consisted of more males than females (73% vs. 27%). A Chi-square test for independence indicated a significant difference between gender and cluster groups, $\chi^2(3, n = 241) = 15.30$, $p < .01$, $phi = .25$.

Next, cluster groups were compared with regard to their differences on behavioral correlates as suggested by Hair and Black (2000). Figure 2 illustrates the patterns of depressive and aggressive symptoms for each group. Separate one-way between-groups analyses of covariance were performed to explore group differences on measures of depressive and aggressive symptoms, controlling for age and gender. There was a statistically significant

difference in depressive symptoms for the cluster groups, $F(3, 234) = 19.47$, $p < .001$, partial eta squared = .20. There was also a statistically significant difference in aggressive symptoms for the cluster groups, $F(3, 235) = 9.14$, $p < .001$, partial eta squared = .10.

To determine the source of significant main effects of clusters, post-hoc comparisons using the Tukey HSD test were conducted (see Table 9). For depressive symptoms, the general ruminators and the high anger ruminators reported significantly higher levels of depressive symptoms than the other two clusters. In addition, these two clusters did not differ from each other on depressive symptoms and the two clusters with lowest depressive symptoms, high sadness ruminators and the low ruminators, did not differ from each other. For aggression, the high anger ruminators were more aggressive than the other three clusters which did not differ from each other.

DISCUSSION

There were two goals of the current study. The first was to examine the shared and unique associations between sadness rumination and anger rumination and their relationship to depressive and aggressive behaviors in pre/early adolescent children. This was accomplished by examining rumination to both sadness and anger in a single study. Few studies have examined the relationship between sadness and anger rumination and their unique and shared behavioral correlates. No study, to our knowledge, has examined these relationships in younger children. The second goal of this study was to explore the general and affect-specific nature of rumination. Most studies to date tend to focus on one aspect of rumination lending support for its affect-specific nature. However, recent theories suggest that the tendency to ruminate reflects a more generalized tendency. Therefore, another aim of this study was to explore different patterns of rumination and examine if a general tendency to ruminate to both sadness and anger would increase risk of comorbid depressive and aggressive behaviors in children.

To examine the shared and unique associations between sadness rumination and anger rumination, the independent relationships between sadness rumination and depression and anger rumination and aggression were tested. Similar to previous studies (e.g., Abela & Hankin, 2008; Peled & Moretti, 2007; Ziegert & Kistner, 2002), this study found that children who ruminated to sadness reported more depressive symptoms. Similarly, children who ruminated to anger were perceived by their peers as more aggressive. When shared associations were examined, sadness rumination and aggression were unrelated. This is consistent with previous findings (Peled & Moretti, 2007, 2010, Repper, 2007). However, contrary to these studies, anger rumination and depression were significantly related in our sample.

In addition, the findings in this study were contrary to those found in the few studies that have examined the unique associations between sadness and anger rumination and their behavioral outcomes. Most notably, sadness rumination was no longer associated with depression when anger rumination was controlled for. However, anger rumination predicted depressive symptoms, even after controlling for sadness rumination. This finding is perplexing given the literature showing strong associations between sadness rumination and depression from childhood to adulthood. However, given that few studies have examined sadness and anger rumination together in one study, this finding may not be unique. It may be that anger rumination is a stronger predictor of depression and aggression in younger children. These findings may also

suggest that children who show a tendency towards anger rumination may display more irritable symptoms of depression or more severe emotional dysregulation (e.g., disruptive mood dysregulation disorder). Further research is needed to determine the association between rumination and various behavioral outcomes. In addition, the current study is an extension of Peled and Moretti (2007, 2010) studies in a younger population. Thus, the differences between this and their study may reflect age differences between samples (e.g., pre/early adolescents vs. adolescents and young adults). These findings may be unique to younger children whose response styles and patterns of association will change as they get older. Alternatively, differences in findings may be a function of differences in the measures of rumination, depressive, and aggressive behaviors used between the studies. Replication of our findings with older samples and using multiple measures of rumination is needed to determine the source of differences across studies.

In contrast to the findings for depressive symptoms, the findings for aggression are largely consistent with prior research. As predicted, anger rumination predicted aggression even when controlling for sadness rumination. Additionally, when anger rumination was controlled for, a negative relationship between sadness rumination and aggression emerged, such that children who ruminated to sadness were perceived as less aggressive by their peers. This is interesting given that sadness rumination and aggression were previously unrelated. The negative association between sadness rumination and aggression is consistent with findings from Peled and Moretti (2007, 2010), who suggest that high levels of sadness rumination may inhibit aggression by eliciting feelings of self-blame and inhibiting arousal and hostility towards others.

To explore the general and affect-specific nature of rumination, patterns of rumination were explored. Cluster groups were created based on the rumination tendencies of the sample and compared for differences in depressive and aggressive symptoms. As expected, four cluster groups emerged that reflected theorized patterns: children with a general rumination tendency (high sadness/high anger rumination), high sadness ruminators (high sadness/low anger rumination), high anger ruminators (low sadness/high anger rumination) and low ruminators (low sadness/low anger rumination). Moreover, sex differences in cluster membership, with girls more likely to be in the high sadness ruminators group and boys more likely to be in the high anger ruminators group, supports prior research on sex differences.

Contrary to the hypothesis that children with a general rumination tendency to both sadness and anger will show elevated depressive and aggressive symptoms, this group differed from other groups only on depressive symptoms. They did not have higher levels of aggression compared to the other groups. However, the co-occurrence of depressive and aggressive symptoms was demonstrated among high anger ruminators. The report of elevated depressive symptoms among both high anger and general ruminators exemplifies the positive and unique association between anger rumination and depression in this sample.

In addition, if sadness rumination inhibits the expression of aggressive acts, this may explain why aggression was low within the general rumination group. It may be that the self-oriented nature of sadness rumination inhibits the action-oriented nature of aggression. Interestingly, high anger ruminators reported higher depressive and aggressive symptoms demonstrating that when uninhibited by sadness rumination, children are more aggressive.

This study provides a unique contribution to the growing literature on the role of rumination as a predisposition in the development of depression and aggression in children. The examination of multiple response styles and behavioral outcomes allowed us to assess the strength and developmental nature of the association between rumination, depression, and aggression. Given the high comorbidity and complexity of psychopathology in children, understanding the nature of rumination may provide viable targets for identifying and treating various disorders early on.

Limitations

Several limitations of the current study should be noted. First, the present study used self-reported measures to assess depressive symptoms. Although the CDI is a widely used measure with high reliability and validity, clinical diagnoses should not be made from it. Future studies should include multiple measures of depression and a thorough clinical interview from multiple informants (i.e., parent, child, and teachers) for additional information. Similarly, measures of sadness and anger rumination were self-report and may benefit from the additional information gathered by the observation of another informant. Second, participants in this study were recruited from a community sample. Future studies should also include a clinical sample as larger effects of sadness rumination on depression may be seen in a sample of children exhibiting clinically significant levels of depression. Third, although the creation of cluster groups allows one to examine a natural grouping of data based on similarities, there are limitations associated

with this type of analysis. Given that the number of groups is selected prior to analysis, it is possible to create cluster groups that lack external validity or replicability.

Conclusion

Few studies have examined the shared and unique associations of sadness rumination and anger rumination and their links to depressive and aggressive symptoms. This study is the first to examine these associations in pre/early adolescents. The results demonstrated that the relationship between sadness rumination and depression is not as unique as previously assumed. In fact, anger rumination may play a bigger role in the development of childhood depression than previously thought. Although this study did not find the expected behavioral outcomes with each pattern of rumination, it does support the idea that different patterns of rumination may exist in children. The unique findings of this study highlight the need for future studies to explore the relationship between multiple risk and vulnerability factors in order to gain a greater understanding the developmental trajectory for multiple forms of psychopathology in children.

Table 1*Demographic Data for Participants*

	M±SD
Age	10.6 ±1.78
	N (%)
Gender	
Males	126 (49.6)
Females	128 (50.4)
Race/Ethnicity	
Caucasian	169 (66.5)
African American	50 (19.7)
Hispanic	20 (7.9)
Asian/Pacific Islander	2 (.8)
Biracial	13 (5.1)
Total	254

Table 2*Intercorrelations Among Rumination, Depression, Aggression, Gender and Age*

	M±SD	1	2	3	4	5	6
1. Sadness Rumination	49.93 ±21.06	--	.57***	.23***	-.06	.07	-.20**
2. Anger Rumination	39.52±13.16		--	.57***	.28***	-.24***	-.20**
3. Depressive Symptoms	9.1±7.75			--	.21**	-.19**	-.11
4. Aggressive Symptoms	18.59±23.95				--	-.26***	.11
5. Gender	--					--	.00
6. Age	10.6 ±1.78						--

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

Table 3

Hierarchical Regression Analyses Examining Concurrent Association Between Sadness Rumination and Depressive Symptoms, Controlling for Gender, Age, and Anger Rumination

	B	SE B	B	ΔR²
Step 1				.06**
Gender	-.12	.04	-.19**	
Age	-.00	.00	-.14*	
Step 2				.05***
Gender	-.13	.04	-.21**	
Age	-.00	.00	-.09	
Sadness Rumination	.07	.02	.24***	
Step 3				.24***
Gender	-.02	.04	-.04	
Age	.00	.00	-.03	
Sadness Rumination	-.04	.02	-.12	
Anger Rumination	.20	.02	.63***	
Step 4				.00
Gender	-.02	.04	-.03	
Age	-.00	.00	-.03	
Sadness Rumination	-.10	.06	-.30	
Anger Rumination	.20	.02	.64***	
Gender X Sadness Rumination	.04	.03	.18	

*p<.05, **p<.01, ***p<.001

Table 4

Hierarchical Regression Analyses Examining Concurrent Association Between Sadness Rumination and Aggressive Symptoms, Controlling for Gender, Age, and Anger Rumination

	B	SE B	B	ΔR²
Step 1				.08***
Gender	-.10	.02	-.26***	
Age	.00	.00	.12	
Step 2				.00
Gender	-.10	.02	-.26***	
Age	.00	.00	.12	
Sadness Rumination	.00	.01	.02	
Step 3				.10***
Gender	-.06	.02	-.15**	
Age	.00	.00	.16*	
Sadness Rumination	-.04	.01	-.22**	
Anger Rumination	.08	.01	.41***	
Step 4				.00
Gender	-.06	.02	-.15*	
Age	.00	.00	.16*	
Sadness Rumination	-.07	.04	-.38	
Anger Rumination	.08	.02	.41***	
Gender X Sadness Rumination	.02	.02	.17	

*p<.05, **p<.01, ***p<.001

Table 5

Hierarchical Regression Analyses Examining Concurrent Association Between Anger Rumination and Aggressive Symptoms, Controlling for Gender, Age, and Sadness Rumination

	B	SE B	B	ΔR^2
Step 1				.08***
Gender	-.10	.02	-.26***	
Age	.00	.00	.12	
Step 2				.07***
Gender	-.07	.02	-.19**	
Age	.00	.00	.17**	
Anger Rumination	.05	.01	.28***	
Step 3				.03**
Gender	-.06	.02	-.15*	
Age	.00	.00	.16*	
Anger Rumination	.08	.01	.41***	
Sadness Rumination	-.04	.01	-.22**	
Step 4				.00
Gender	-.06	.02	-.15*	
Age	.00	.00	.15*	
Anger Rumination	.10	.04	.54**	
Sadness Rumination	-.04	.01	-.22**	
Gender X Anger Rumination	-.02	.02	-.14	

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

Table 6

Hierarchical Regression Analyses Examining Concurrent Association Between Anger Rumination and Depressive Symptoms, Controlling for Gender, Age, and Sadness Rumination

	B	SE B	B	ΔR^2
Step 1				.06**
Gender	-.12	.04	-.19**	
Age	-.00	.00	-.14*	
Step 2				.28***
Gender	-.04	.03	-.06	
Age	.00	.00	-.03	
Anger Rumination	.17	.02	.56***	
Step 3				.01
Gender	-.02	.04	-.04	
Age	.00	.00	-.03	
Anger Rumination	.20	.02	.63***	
Sadness Rumination	-.04	.02	-.12	
Step 4				.00
Gender	-.02	.04	-.03	
Age	.00	.00	-.03	
Anger Rumination	.20	.06	.57**	
Sadness Rumination	-.04	.02	-.12	
Gender X Anger Rumination	.01	.04	.06	

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

Table 7

Sadness and Anger Rumination as Independent Predictors of Depression Subscales, Controlling for Gender and Age

	Sadness Rumination			Anger Rumination		
	B	SE B	B	B	SE B	β
Negative Mood	.07	.02	.21**	.16	.02	.49***
Interpersonal Problems	.01	.03	.02	.12	.03	.27***
Ineffectiveness	.07	.03	.14*	.20	.03	.41***
Anhedonia	.08	.02	.23***	.16	.02	.51***
Negative Self-Esteem	.10	.03	.21**	.18	.03	.38***

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

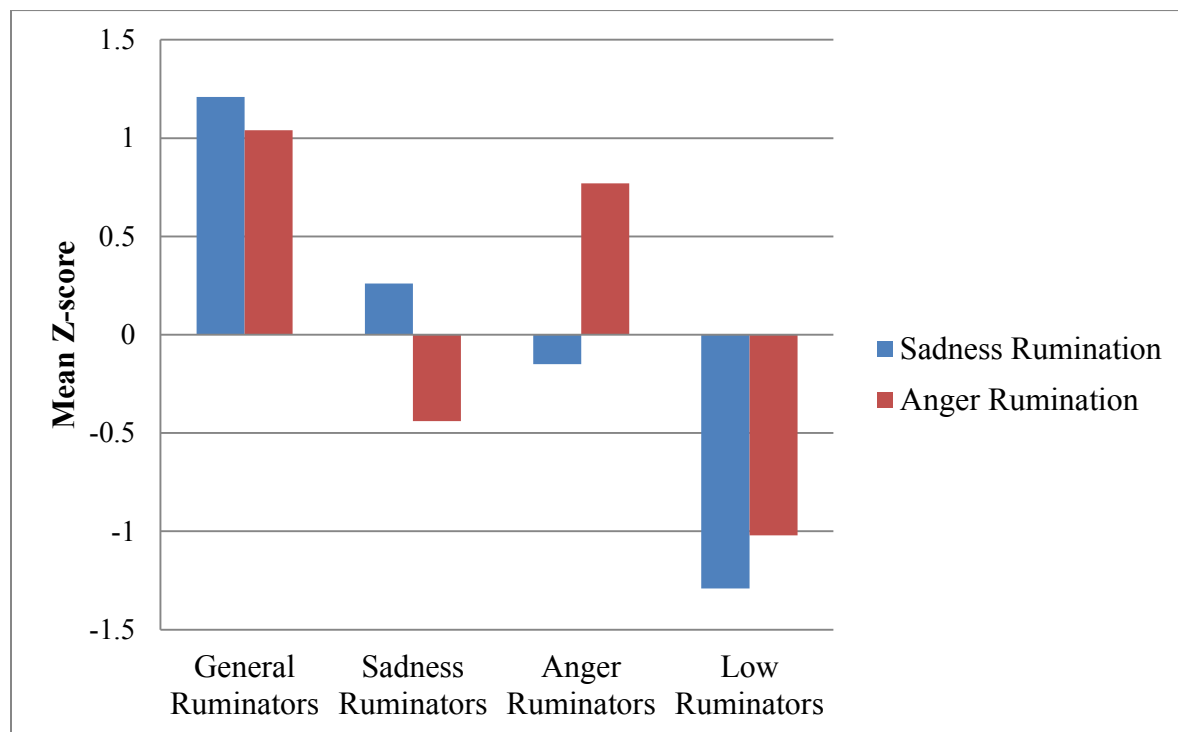


Figure 1. Mean value of sadness and anger rumination for each cluster group.

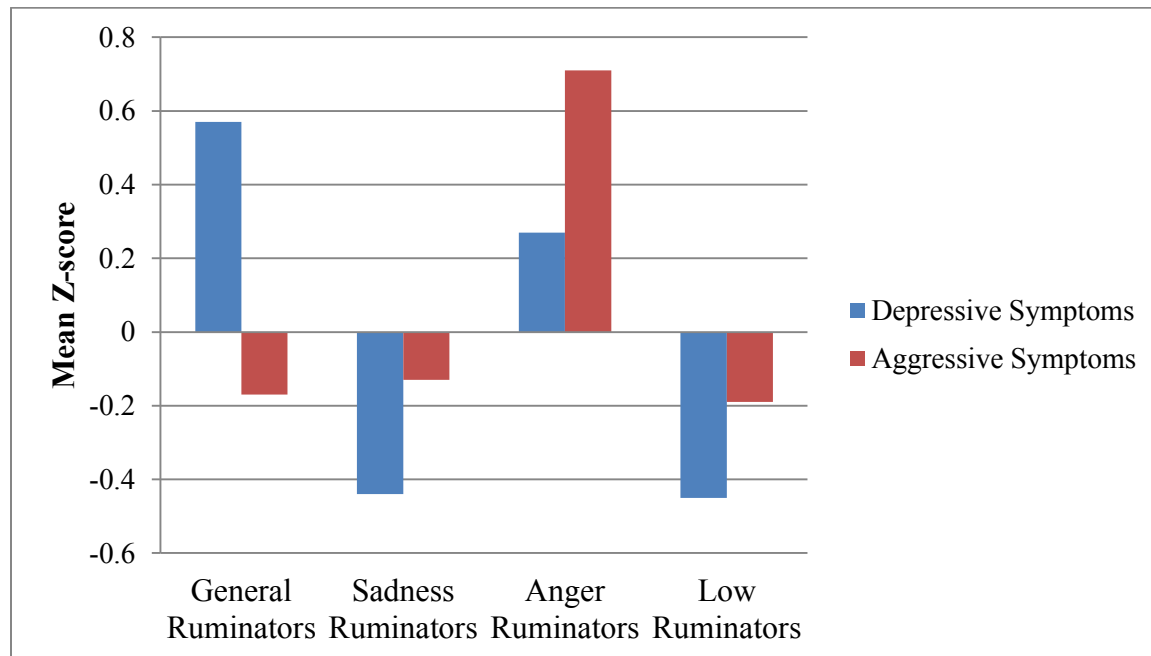
Table 8*Demographic Data for Cluster Groups*

	General Ruminators	Sadness Ruminators	Anger Ruminators	Low Ruminators
N	55	73	51	62
Age (M±SD)	9.67±.24	10.41±.20	10.08±.25	10.69±.22
Gender (%)				
Males	27 (49)	27 (37)	37 (73)	31 (50)
Females	28 (51)	46 (63)	14 (27)	31 (50)

Table 9*Means and Standard Deviations on Depressive and Aggressive Symptom for Each Cluster Group*

	General Ruminators		Sadness Ruminators		Anger Ruminators		Low Ruminators	
	M	SD	M	SD	M	SD	M	SD
Depression	.58 _a	.15	-.44 _b	.07	.27 _a	.15	-.45 _b	.09
Aggression	-.17 _a	.09	-.13 _a	.10	.71 _b	.20	-.19 _a	.10

Note: Means in the same row that do not share a subscript differ in follow-up tests at $p < .05$.

*Figure 2. Depressive and aggressive profiles for all groups.*

APPENDIX A

CHILDREN'S RESPONSE STYLE SCALE (CRSS)

Kids think and do many different things when they feel sad. We want to know HOW OFTEN you think or do a number of things when you're feeling this way. Please read each of the items below and circle a number to show how often you think or do each one when you feel sad. We don't want to know what you think and do just any time, we want to know what you think and do only when you're feeling sad. Please mark what you USUALLY think or do when you're sad, not what you think you should think or do.

1. When I'm sad, I think back to other times when I felt this way.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

2. I think about how I should have done something different.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

3. I think about something I did a little while ago that was a lot of fun.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

4. I go away by myself and think about why I feel this way.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

5. I do something I really like to do.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

6. I think, "I'll concentrate on something other than how I feel."

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

7. I go someplace alone to think about my feelings.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

8. I think, "Why can't I stop feeling this way?"

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
Never Always

9. I think, "I'm going to do something to make myself feel better."
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
10. I do something that has made me feel better in the past.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
11. I think about all the other times things didn't go the way I wanted them to.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
12. I think about fun things.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
13. I think about what made me feel like this.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
14. I concentrate on something else that makes me happier.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
15. I try to take my mind off my feelings by doing something I like.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
16. I replay in my head what happened.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
17. I think, "I'm going to go out and have some fun."
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
18. I think about a time when I was feeling much happier.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always
19. I think about my feelings.
 0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
 Never Always

20. I think about something that just happened, wishing it had gone better.

0-----1-----2-----3-----4-----5-----6-----7-----8-----9-----10
NeverAlways

APPENDIX B

CHILDREN'S ANGER RUMINATION SCALE (CARS)

Kids think and do many different things when they feel angry. We want to know HOW OFTEN you think or do a number of things when you're feeling this way. Please read each of the items below and circle a number to show how often you think or do each one when you feel angry. We don't want to know what you think and do just any time, we want to know what you think and do only when you're feeling angry. Please mark what you USUALLY think or do when you're angry, not what you think you should think or do.

1. I think a lot about other times when I was angry.

1-----2-----3-----4
almost never almost always

2. I think about the bad things that I didn't deserve that have been done to me.

1-----2-----3-----4
almost never almost always

3. I keep thinking about events that angered me for a long time.

1-----2-----3-----4
almost never almost always

4. I have long living fantasies of revenge after the conflict is over.

1-----2-----3-----4
almost never almost always

5. I think about certain events from a long time ago and they still make me angry.

1-----2-----3-----4
almost never almost always

6. I have difficulty forgiving people who have hurt me.

1-----2-----3-----4
almost never almost always

7. After an argument is over, I keep fighting with this person in my mind.

1-----2-----3-----4
almost never almost always

8. Memories of being angry pop up into my head before I fall asleep.

1-----2-----3-----4
almost never almost always

9. Whenever I experience anger, I keep thinking about it for a while.

1-----2-----3-----4
almost never almost always

10. I have had times when I could not stop thinking about a particular conflict.

1-----2-----3-----4
almost never almost always

11. I try to figure out what makes me angry.

1-----2-----3-----4
almost never almost always

12. I think about the reasons people treat me badly.

1-----2-----3-----4
almost never almost always

13. I have day dreams and fantasies that are violent.

1-----2-----3-----4
almost never almost always

14. I feel angry about certain things in my life.

1-----2-----3-----4
almost never almost always

15. When someone makes me angry I can't stop thinking about how to get back at this person.

1-----2-----3-----4
almost never almost always

16. When someone makes my angry, I keep wondering why this happened to me

1-----2-----3-----4
almost never almost always

17. Memories of even minor problems bother me for a while.

1-----2-----3-----4
almost never almost always

18. When something makes me angry, I turn this matter over and over again in my mind.

1-----2-----3-----4
almost never almost always

19. I replay what made me angry over and over after it happened.

1-----2-----3-----4
almost never almost always

APPENDIX C

CHILDREN'S DEPRESSION INVENTORY (CDI)

Kids sometimes have different feelings and ideas. This form lists the feelings and ideas in groups. From each group of three sentences, pick one sentence that describes you *best* for the past two weeks. After you pick a sentence from the first group, go on to the next group. There is no right or wrong answer. Just pick the sentence that best describes the way you have been recently. Put a mark like this [X] next to your answer. Put the mark in the box next to the sentence that you pick.

Here is an example of how this form works. Try it. Put a mark next to the sentence that describes you *best*.

Example:

- I read books all the time.
- I read books once in a while.
- I never read books.

Now, for each of the groups of sentences below, pick the sentences that describe you best.

Remember, pick out the sentences that describe you best in the PAST TWO WEEKS.

1. I am sad once in a while.
 I am sad many times.
 I am sad all the time.
2. Nothing will ever work out for me.
 I am not sure if things will work out for me.
 Things will work out for me OK.
3. I do most things OK.
 I do many things wrong.
 I do everything wrong.
4. I have fun in many things.
 I have fun in some things.
 Nothing is fun at all.
5. I am bad all the time.
 I am bad many times.
 I am bad once in a while.
6. I think about bad things happening to me once in a while.
 I worry that bad things will happen to me.
 I am sure that terrible things will happen to me.

7. I hate myself.
 I do not like myself.
 I like myself.
8. All bad things are my fault.
 Many bad things are my fault.
 Bad things are not usually my fault.
9. I do not think about killing myself.
 I think about killing myself but I would not do it.
 I want to kill myself.
10. I feel like crying everyday.
 I feel like crying many days.
 I feel like crying once in a while.
11. Things bother me all the time.
 Things bother me many times.
 Things bother me once in a while.
12. I like being with people.
 I do not like being with people many times.
 I do not want to be with people at all.
13. I cannot make up my mind about things.
 It is hard to make up my mind about things.
 I make up my mind about things easily.
14. I look OK.
 There are some bad things about my looks.
 I look ugly.
15. I have to push myself all the time to do my schoolwork.
 I have to push myself many times to do my schoolwork.
 Doing schoolwork is not a big problem.
16. I have trouble sleeping every night.
 I have trouble sleeping many nights.
 I sleep pretty well.
17. I am tired once in a while.
 I am tired many days.
 I am tired all the time.
18. Most days I do not feel like eating.
 Many days I do not feel like eating.
 I eat pretty well.

19. I do not worry about aches and pains.
 I worry about aches and pains many times.
 I worry about aches and pains all the time.
20. I do not feel alone.
 I feel alone many times.
 I feel alone all the time.
21. I never have fun at school.
 I have fun at school only once in a while.
 I have fun at school many times.
22. I have plenty of friends.
 I have some friends but wish I had more.
 I do not have any friends.
23. My schoolwork is alright.
 My schoolwork is not as good as before.
 I do very badly in subjects I used to be good in.
24. I can never be as good as other kids.
 I can be as good as other kids if I want to.
 I am just as good as other kids.
25. Nobody really loves me.
 I am not sure if anybody loves me.
 I am sure that somebody loves me.
26. I usually do what I am told.
 I do not do what I am told most times.
 I never do what I am told.
27. I get along with people.
 I get into fights many times.
 I get into fights all the time.

APPENDIX D

PEER NOMINATIONS FOR AGGRESSIVE BEHAVIOR

Circle the names of three classmates who are listed below who you think fit the statement:

INSERT NOMINATION ITEM

Name

Name

Name

Name

Name

Name

Overt Aggression Nomination Items:

1. Hits, kicks, punches others.
2. Says mean things to insult others or put them down.
3. Pushes and shoves others.
4. Tells other kids that they will beat them up unless the kids do what they say.
5. Calls others mean names.

Relational Aggression Nomination Items:

1. Tries to make other kids not like a certain person by spreading rumors about them.
2. When mad at a person, gets even by keeping the person from being in their group of friends.
3. When mad at a person, ignores them or stops talking to them.
4. Tells friends they will stop liking them unless friends do what they say.
5. Tries to keep a certain person from being in their group during activity or play time.

APPENDIX E

HUMAN SUBJECT COMMITTEE APPROVAL



Office of the Vice President For Research
Human Subjects Committee
P. O. Box 3062742
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

RE-APPROVAL MEMORANDUM

Date: 05/15/2014
To: Janet Kistner <kistner@psy.fsu.edu>
Address: 4301
Dept.: PSYCHOLOGY DEPARTMENT
From: Thomas L. Jacobson, Chair
Re: Re-approval of Use of Human subjects in Research:
Children's Response Styles and Attentional Bias

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 05/13/2015, you are must request renewed approval by the Committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chairman of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc:
HSC No. 2014.12755

APPENDIX F

HUMAN SUBJECTS APPLICATION FOR FULL IRB AND EXPEDITED EXEMPT REVIEW

Human Subjects Application For Full IRB and Expedited Exempt Review

Logout

Request for Renewal Form

Original Application Information [View application](#)

Project Title	Children's Response Styles and Attentional Bias
Protocol Number	2013.10589
Review Type	Full Committee
Principal Investigator	Janet Kistner
Approval Date	07/10/2013
Expiration Date	07/09/2014

Renewal Status

Note: The following questions pertain to the last approval period of the research project.

1. Was the study active in the last approval period?

Yes

2. No human subject research activities have occurred to date. For example: the research project has been placed on hold, no research activities have begun.

3. Subject recruitment and/or interventions occurred in the last approved period.

4. Following subjects. Enrollment was closed to new subjects in last approval period.

5. Data analysis of existing data and was approved as a existing data study. i.e. no subject involvement.

6. Open for data analysis only. No interaction with subject took place in the last approval period.

7. Completed (including all data analysis). Please upload copies of any pertinent publications that resulted.

Personnel Information

Have there been any changes in personnel (i.e. Principal Investigator, Co-Investigator and/or Research Staff)?

Yes

If yes, list role on project Name, Department, and Email Address

Christine VanGessel, Alex Cabrera, Megan Pyles, Caitlin Heighes, and Hillary Rimel are no longer active on this project.

Co-investigators on this project are:

Sherelle Harmon, Department of Psychology

Therese Skubic Kemper, Department of Psychology

Rebecca Lynch, Department of Psychology

Haley Stephens, Department of Psychology

Kimberly Driscoll, College of Medicine

Protocol Information

Please provide a summary/progress report of any study findings from the past year:

This research involves secondary analysis of a de-identified data set. During the last approval period, data were analyzed to evaluate the psychometric properties of our measures of rumination and unique behavioral correlates. Researchers have also been preparing for continued data analysis by conducting literature reviews relevant to this data set. In the upcoming approval period, data will be analyzed to examine the role of rumination in the development of depressive symptoms and aggression in children. Specifically, two types of rumination, rumination to sadness and rumination to anger, will be examined for their relationship with each other as well as their relationship with depressive and aggressive symptoms. One goal is to determine whether the tendency to ruminate applies to a specific type of negative affect or to negative affect in general. It is expected that these analyses will shed light on the development of depressive and aggressive symptoms and the comorbidity of depressive and aggressive symptoms in children.

Have any modifications been made to the protocol, consent form(s), recruitment materials, or other study documents?

No

Considering your experience with this study's implementation to date and your review of the relevant recent literature has the relationship between study risks and benefits changed since your last renewal of this project?

No

Anticipated completion date of the project: 7/9/2015

Financial Information

Are there changes in any financial interests related to this study or in any conflicts of interest of the PI or any other investigator as defined by University Policy or, if applicable, NIH/NSF policies regarding conflict of interest? (If yes, please upload documentation)

No

Is there any new funding proposed for this study?

No

Expired Studies

If your study expires before the date of FSU IRB continuing review approval, all enrollment and data collection must stop the day after it expires. Procedures and treatment needed for participant safety may continue, but data collection during this time cannot be used for research purposes.

Has the FSU IRB approval expired for this study?








No

HIPAA Compliance

Are you collecting identifiable health information about subjects enrolled or to be recruited after April 14, 2003?

No

Uploaded Documents

-  Click icon to view renewal documents
-   [Approval](#)
-  [ApprovalLetter2014-05-15-15-35-56.doc \(2.8KB \)](#)
-  [ChairReview2014-05-15-15-35-56.doc \(5.7KB \)](#)
-  [Zip and Download All](#)
-  [Zip and Download All](#)

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