THE ASSOCIATION OF RUMINATION TO GENERALIZED ANXIETY DISORDER AND TO DEFICITS IN EMOTION REGULATION

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Speak to me as to thy thinkings 
As thou dost ruminate and give 
thy worst of thoughts 
The worst of words

William Shakespeare

Before I begin I would like to acknowledge my colleagues Michael Armey, Rick Heimberg, Cindy Turk, and Doug Mennin who are collaborators on the work I will be discussing today
Why relate rumination to emotion regulation and GAD?

Isn’t rumination related to depression and worry to anxiety?

• Worry and rumination are both verbal, linguistic activities we do when in distress
• High rates of comorbidity between GAD and mood disorders
• Borkovec’s Avoidance Theory of Worry
  – Borkovec, Alcaine, & Behar (in press)
• Emotion Regulation Deficit Model of GAD

So if that was this story behind the story, here’s my cover story.

• Conceptual overlap between worry and rumination. Both are verbal linguistic activities we do when distressed or aroused.

• Although conventional wisdom connects worry to anxiety and rumination to depression, there are studies showing that worry is related to both anxiety and depression and rumination to both depression and anxiety.

• There’s also a high comorbidity between GAD and mood disorders--interestingly with GAD being temporally primary most of the time.

• There’s also the work of Tom Borkovec and associates who have offered us so much information about the nature and function of pathological worry.

• And finally, there is the work that we have recently brought to bear on the topic--that is the development and evaluation of an emotion regulation deficit model of GAD.

• I’ll be saying a little bit more about those theories a little bit later in this talk.
Background:
First Order Rumination Factors

Fresco et al. (2002)
• Sampled 784 undergraduates who completed measures of worry and rumination
  – Penn State Worry Questionnaire (PSWQ)
  – Response Styles Questionnaire (RSQ)
• Assessed mood and anxiety symptoms
  – Mood and Anxiety Symptom Questionnaire (MASQ)
• Conducted Exploratory Factor Analysis (EFA) on PSWQ and Rumination Scale (RRS) of RSQ

First, a little background. Earlier this year, we published a study examining distinct and overlapping features of worry and rumination.

In the study, we sampled almost 800 college students on measures of worry, rumination, depression and anxiety symptoms.

The worry measure was the Penn State Worry Questionnaire or PSWQ, developed by Borkovec and colleagues.

The rumination measure was the Response Styles Questionnaire or RSQ, developed by Nolen-Hoeksema and colleagues.

Symptoms were assessed with the Mood and Anxiety Symptoms Questionnaire developed by David Watson and Lee Anna Clark.

We submitted the 16 PSWQ items and the 22 Rumination Subscale items to exploratory factor analysis.
**Background:**

**First Order Rumination Factors**

*Fresco et al. (2002)*

- EFA results indicated that Worry and Rumination load onto to distinct factors
  - **RRS:** Dwelling & Active Appraisal
  - **PSWQ:** Worry Engagement & Absence of Worry
- Dwelling and Worry Engagement strongly correlated ($r = .46$) and similarly correlated to depression and anxiety
- Dwelling more strongly correlated to depression and anxiety as compared to Active Appraisal

Our findings were as follows.

1. The factor analysis results suggested that we retain a four factor solution.
2. PSWQ items loaded onto two worry factors and RRS items loaded onto two rumination factors.
3. Worry and Rumination items loaded onto to distinct factors—no cross loading of items.
4. Based on item content, we called the two Rumination factors Dwelling and Active Appraisal.
5. We called the two Worry factors Worry Engagement and Absence of Worry. Worry engagement was comprised of the 11 PSWQ items endorsing the presence of worry. Absence of worry was comprised of the 5 PSWQ reverse scored items.
6. In this sample, Dwelling correlated .46 with Worry Engagement and both scales showed similarly strong correlation with levels of depression and anxiety symptoms from the MASQ.
7. One finding that jumped out was that Dwelling was more strongly correlated with depression and anxiety symptoms than was Active Appraisal. The difference in dependent correlations ranged in magnitude from about .35 to .67 using Cohen’s d effect size statistic—so hovering on either side of a medium effect size with .50 representing Cohen’s definition of a medium. So, it seemed as though much of the wallop in rumination was being accounted for by Dwelling.
8. One problem, which has been raised by some researchers including Jon Roberts, and Suzanne Segerstrom. Rumination items are essentially confounded by the measurement of depression. Many of them mention the syndrome of depression or symptoms of depression, which may account for strong correlations between rumination and depression symptoms. Our solution, although seemingly better than treating the RRS as a solitary construct did not address this problem.
Unconfounding Rumination and Depression

Treynor, Gonzalez, & Nolen-Hoeksema (in press)

• Rationally eliminated all but 10 RRS items because of affective content in the item
• Conducted EFA and derived two 5-item factors
  – Brooding
  – Pondering
• Brooding mediated the relationship between gender and depression whereas Pondering did not
• Brooding predicted both current and future depression
• Factor structure replicated with EFA and CFA by us
  – Fresco, Armey, Heimberg, Mennin, & Turk (2002)

So, a new offering from Nolen-Hoeksema’s group may go far to address these concerns. They have a paper in press that will be coming out in Cognitive Therapy and Research in the not too distant future.

To address the issue of affective confounding, all but 10 RRS items were rationally eliminated for having affective content.

These items were submitted to exploratory factor analysis and a two factor solution was retained. Both factors are comprised of 5-items each. Treynor and colleagues called these factors Brooding and Pondering.

In that study, the authors found that Brooding accounted for differences in levels of depression between men and women whereas Pondering did not.

They also found that Brooding predicted current and future levels of depression.

Finally, I do not have time to go into the details, but my colleagues and I have used both exploratory and confirmatory factor analysis procedures to essentially replicate the factor structure of Brooding and Pondering.

So for the remainder of this talk, I will be defining rumination in terms of brooding and pondering from our factor analytic work.
Borkovec’s Avoidance Theory of Worry

Worry in GAD

“Worry [is] phenomenologically experienced primarily as a negative, verbal linguistic (as opposed to imaginal) activity. When we worry, we are talking to ourselves in anxious ways.”

-Borkovec, Alcaine, & Behar (in press)

–Before I tell you about the current study, let me briefly talk about Borkovec’s avoidance theory of worry. He defines worry as ....

• In essence, worry involves talking to ourselves a lot about negative things, most often about negative events that we are afraid might happen in the future.
–Twenty plus years of research from the Borkovec group has taught us much about the nature of worry and the function that it serves.
Emotion Regulation Deficits in GAD


GAD Individuals
- Difficulty with emotional intensity, negative expression, and mood repair
- Difficulty identifying, understanding and accepting emotion
- Difficulty accepting, understanding, and influencing emotions following mood priming challenges
- Emotion regulation predicts GAD diagnosis, even beyond the effects of anxiety, depression, and worry

—So, if worry serves an avoidance function, what is that folks with GAD try to avoid?
—Our work suggests that what individuals with GAD are trying to avoid are intense or aversive emotional experiences.
—Specifically, we found the participants with GAD:
  -
  -
  -
  -
The Current Study: Hypotheses

1. **Brooding** will be more highly associated with emotion regulation deficits as compared to **Pondering**
2. Participants with GAD, compared to participants without GAD will evidence higher levels of **Brooding**
3. Participants with GAD will not differ from non-GAD participants on **Pondering**

• So, the current study follows from the work I have just describe to you.
• It is well established that people with GAD worry and that it serves an avoidance function
• Our recent work shows that they have profound difficulties with their emotions
• In essence, we wished to investigate how Brooding and Pondering relate to emotion regulation and GAD status
• Perhaps it is that Brooding functions as another avoidance and control strategy for individuals with GAD. The current study is an attempt to begin to address that question
• Our specific hypotheses were …
The Current Study: Method

Sample

• 296 (200 women) unselected college students
  – 35% Caucasian, 29% African-American, 10% Asian, 2% Latino/Hispanic, 7% mixed racial heritage, 17% ‘Other’
  – 19.9 years (SD = 3.6)

• Participants completed self-report measures of emotion regulation and GAD status

• Participants received partial course credit

Our sample consisted of 296 unselected college students

- Ethnically diverse
- Roughly 20 years old

- Participants completed a packet of self-report measures of depression, emotion regulation and GAD status and returned them for partial course credit
Emotion Regulation Measures
• Berkeley Expressivity Questionnaire (BEQ)
• Trait Meta-Mood Scale (TMMS)
• Toronto Alexithymia Scale - 20 item version (TAS)
• Affective Control Scale (ACS)
• Acceptance and Action Questionnaire (AAQ)

Other Measures
• Response Style Questionnaire (RSQ)
• Penn State Worry Questionnaire (PSWQ)
• Beck Depression Inventory (BDI)
• GAD-Q-IV

• Here are the measures we administered.
• I will say a little more about each one as I present the results
The Current Study: Results

Test of Dependent Correlations

<table>
<thead>
<tr>
<th></th>
<th>Brooding</th>
<th>Pondering</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwelling</td>
<td>.82</td>
<td>.49</td>
<td>1.14</td>
</tr>
<tr>
<td>Active Appraisal</td>
<td>.60</td>
<td>.87</td>
<td>1.18</td>
</tr>
<tr>
<td>BDI</td>
<td>.46</td>
<td>.13</td>
<td>.72</td>
</tr>
<tr>
<td>PSWQ</td>
<td>.32</td>
<td>.11</td>
<td>.43</td>
</tr>
</tbody>
</table>

Note. Cohen’s (1988) d, Small = .20, Medium = .50, Large = .80

• Depicts patterns of zero order correlations of Brooding and Pondering with measures of rumination, depression, and worry.
• Third column represents a test of dependent correlation with the magnitude of the difference represented by Cohen’s d effect size.
• Cohen’s conventions for d are .20 is small, .50 is medium, and .80 is large.
• Dwelling and Active Appraisal were computed from the factor solution of our earlier study to compare them to Brooding and Pondering. As you can see Brooding corresponds to Dwelling and Pondering to Active Appraisal.
• Brooding is also significantly more associated with depression and worry than is Pondering.
### The Current Study: Results

#### Test of Dependent Correlations

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<tbody>
<tr>
<td><strong>TAS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diff. Identifying</td>
<td>.42</td>
<td>.22</td>
<td>.43</td>
</tr>
<tr>
<td>Diff. Describing</td>
<td>.26</td>
<td>.10</td>
<td>.32</td>
</tr>
<tr>
<td><strong>AAQ</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>.44</td>
<td>.16</td>
<td>.60</td>
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</tbody>
</table>

Note. Cohen’s (1988) d, Small = .20, Medium = .50, Large = .80

- The Toronto Alexithymia Scale, developed by Bagby, Taylor, and colleagues, broadly assesses the construct of alexithymia. The TAS is comprised of subscales assessing difficulties identifying and describing emotions. Higher scores indicate higher levels of the alexithymia dimensions.
- As you can see, Brooding is more highly associated than is Pondering with Difficulty Identifying and Describing one’s emotions. ES fall between those of a small and medium effect.
- The Acceptance and Action Questionnaire is a measure of experiential avoidance developed by Steve Hayes and colleagues. Higher AAQ scores indicate more experiential avoidance.
- Brooding is more associated with experiential avoidance than is Pondering with an ES exceeding that of a medium effect.
### The Current Study: Results

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<tbody>
<tr>
<td>ACS-Anger</td>
<td>.44</td>
<td>.24</td>
<td>.43</td>
</tr>
<tr>
<td>ACS-Pos. Emotions</td>
<td>.26</td>
<td>.12</td>
<td>.28</td>
</tr>
<tr>
<td>ACS-Depression</td>
<td>.39</td>
<td>.26</td>
<td>.34</td>
</tr>
<tr>
<td>ACS-Anxiety</td>
<td>.39</td>
<td>.17</td>
<td>.48</td>
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Note. Cohen’s (1988) d, Small = .20, Medium = .50, Large = .80

- The **Affective Control Scale (ACS)** was developed by Dianne Chambless and colleagues to assess an individuals’ fears of losing control over their emotions and the behavioral reactions to these emotions.
- The ACS is made up of four subscales: *Fear of Anger*, *Fear of Depression*, *Fear of Anxiety*, and *Fear of Positive Emotion*.
- Higher scores indicate more fear and attempts to control emotional experiences.
- Again, Brooding is more highly associated with dimensions of the ACS than is Pondering with ES ranging from small to almost medium.
### The Current Study: Results

#### Test of Dependent Correlations

<table>
<thead>
<tr>
<th>TMMS</th>
<th>Brooding</th>
<th>Pondering</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aware of Emotions</td>
<td>-.07</td>
<td>.08</td>
<td>.16</td>
</tr>
<tr>
<td>Clarity of Emotions</td>
<td>-.32</td>
<td>-.06</td>
<td>.53</td>
</tr>
<tr>
<td>Repair a Bad Mood</td>
<td>-.15</td>
<td>.00</td>
<td>.29</td>
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</tbody>
</table>

Note. Cohen’s (1988) d, Small = .20, Medium = .50, Large = .80

• The Trait Meta Mood Scale is a measure of emotional intelligence, developed by Salovey and colleagues. It is comprised of three subscales: Awareness of Emotion, Understanding and Analyzing Emotions, which I have labeled, Clarity of Emotions, and Reflective Regulation of Emotions, which I have labeled, Repair a Bad Mood. On this scale, lower scores indicate lower emotional intelligence.
• Here we see that Brooding and Pondering do not differ much on the Awareness of Emotions dimension.
• There is a sizable difference on the Clarity of Emotions dimension with Brooding being associated with less clarity.
• And a small difference between Brooding and Pondering on the capacity to repair a bad mood with Brooding being less related than Pondering.
The Current Study: Results

Test of Dependent Correlations

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<tbody>
<tr>
<td><strong>BEQ</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impulse Strength</td>
<td>.18</td>
<td>.16</td>
<td>.04</td>
</tr>
<tr>
<td>Neg. Expressivity</td>
<td>.02</td>
<td>-.10</td>
<td>.16</td>
</tr>
<tr>
<td>Pos. Expressivity</td>
<td>.03</td>
<td>.05</td>
<td>.04</td>
</tr>
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</table>

Note. Cohen’s (1988) d, Small = .20, Medium = .50, Large = .80

• The Berkeley Expressivity Questionnaire (BEQ) was developed by James Gross and colleagues and is made up of three subscales: Emotional Impulse Strength, Negative Expressivity, and Positive Expressivity.

• Here we found no differences between Brooding and Pondering.
## The Current Study: Results

<table>
<thead>
<tr>
<th></th>
<th>analogue GAD (n = 35)</th>
<th>Control (n = 361)</th>
<th>Cohen's d</th>
<th>GAD via SCID (n = 19)</th>
<th>Control via SCID (n = 12)</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brooding</td>
<td>6.14 (3.52)</td>
<td>4.53 (2.98)</td>
<td>.34</td>
<td>12.42 (2.19)</td>
<td>10.00 (2.04)</td>
<td>1.14</td>
</tr>
<tr>
<td>Pondering</td>
<td>3.76 (2.35)</td>
<td>3.46 (2.39)</td>
<td>.08</td>
<td>7.94 (1.74)</td>
<td>8.33 (2.27)</td>
<td>.20</td>
</tr>
</tbody>
</table>

*Note. Cohen’s (1988) d, Small = .20, Medium = .50, Large = .80*

- The left hand side of this panel shows the undergraduate sample divided based on GAD status.
- GAD status was determined using a self-report measure called the GAD-Q-IV that essentially inquires about the DSM-IV criteria for GAD in a self-report format.
- The GAD-Q-IV was developed by the Penn State group particularly by Michelle Newman.
- The panel on the right is a separate sample of college students who were screened with the GAD-Q-IV and then assessed with the SCID. So their GAD diagnosis is based in a clinician assessment.
- In both cases we see that individuals with GAD score higher than non-GADs on Brooding, but not on Pondering.
- Here the effect size for the difference is between small and medium using Cohen’s conventions for d.
- Here we see that the difference is larger than large.
- As for Pondering, negligible differences here and a small effect here showing GADs with lower Pondering scores.
The Current Study: Conclusions

- **Brooding** and **Pondering** correspond to Dwelling and Active Appraisal without affective confounding.
- **Brooding** was more highly related to depression, worry, and deficits in emotion regulation than was **Pondering**.
- Individuals with GAD score higher on **Brooding** than control participants.
- **GAD** status not related to **Pondering**.
Future Directions

• Is Brooding another control or avoidance strategy?
• What is the functional relationship between Brooding and emotional experiences in the short run?
• What is the functional relationship between Brooding and chronic emotional problems in the long run?
• How does Brooding relate to physiological correlates of emotion and emotion regulation?

• Is Brooding another control or avoidance strategy? We have a blueprint for studying worry as an avoidance and control strategy from the work of Borkovec. Does Brooding function in a similar fashion?
• So that leads to a couple of specific questions:

  • What is the functional relationship between Brooding and emotional experiences in the short run? Does it serve to dampen emotionally evocative experiences in the short run thereby becoming a way of life, like worry through negative reinforcement?
  • What is the functional relationship between Brooding and chronic emotional problems in the long run?
  • How does Brooding relate to physiological correlates of emotion and emotion regulation? There’s so much creative work going on right now examining brain imaging and EEG as well as other physiological indices (e.g., vagal tone). How is brooding associated to responses to mood and emotion evocation challenges? We need to utilize existing experimental challenge paradigms to examine more precisely the way in which factors such as Brooding function.
Turn off your mind
relax and float down stream
This is not dying
This is not dying

John Lennon (1966)

• So, I started my talk today with a quote from William Shakespeare forecasting the dangers of Brooding.
• Let me conclude with a more contemporary quote from John Lennon who may offer us way out of the cycle of repetitive, automatic thinking that is characteristic of many problems of emotion.
• Thank you.
Emotion Regulation Deficits in GAD


• Replication of Mennin et al.
• Emotion intensity was greater among individuals with GAD than individuals with SAD or controls
• Emotion dysregulation among individuals with SAD also found
• Individuals with SAD reported being less expressive of positive emotions, paying less attention to their emotions, and having more difficulty describing their emotions than individuals with GAD and controls

—As I mentioned, the DSM-IV considers **worry to be the central component of GAD**

• Tom Borkovec and colleagues have produced considerable research on worry
• A recent way of describing worry is on this slide
• *In essence, worry involves talking to ourselves a lot about negative things, most often about negative events that we are afraid might happen in the future.*