Biased recall in anxiety: competing forces of emotional avoidance and information processing biases.

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BIASED RECALL IN ANXIETY:
COMPETING FORCES OF EMOTIONAL AVOIDANCE
AND INFORMATION PROCESSING BIASES

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CHAPTER I

INTRODUCTION

The work of Beck and colleagues suggests that information processing biases may be influential in the etiology and maintenance of depression (Beck, Rush, Shaw, & Emery, 1979) and anxiety (Beck & Emery, 1979; Beck, Emery, & Greenberg, 1985). Beck’s schema theory posits that depression is characterized by predominantly negative cognitive associations of the self, world, and future, and predicts that these schemata affect the interpretation of newly assimilated information (Beck, Rush, Shaw, & Emery, 1979). Greenberg and Beck (1989) suggest that schematic processing in anxiety is typified by a tendency to attend to and recall anxiety-related stimuli. Similarly, Beck and Emery (1979) proposed a cognitive model of anxiety which states that anxious individuals selectively attend to and process environmental stimuli that suggest personal danger or threat.

Bower’s associative network model attempts to explain how memory functions to maintain certain emotional states (1981). According to this theory, emotions are associated with a “specific node or unit in memory that... is also linked with propositions describing events from one’s life during which that emotion was aroused...Activation of an emotion node also spreads activation throughout the memory structures to which it is connected” (Bower, 1981, p.135). This model predicts the occurrence of mood congruent memory (MCM), which refers to the facilitated recall of affectively congruent material from memory.

A predominating sad mood may cause negative memories to be more accessible, leading to facilitated recall of these memories and maintenance of the depressed state.
(Teasdale, 1983), while a chronic anxious state may result in the increased accessibility and retrieval of threat and anxiety-related memories. Although mood-congruent recall has been well established in depression (for review, see Blaney, 1986; Bower, 1987; Dalgleish & Watts, 1990), efforts to determine if it exists in anxiety have yielded equivocal results. McNally, Foa, and Donnell (1989) found a mood congruent effect in panic disorder patients, and some evidence exists for the biased recall of phobic-related words in agoraphobia (Nunn, Stevenson, & Whalan, 1984), but efforts to replicate the findings have failed (Pickles & van den Broeck, 1988). Negative findings suggesting that anxious individuals exhibit poorer memory for mood-congruent material have been reported. Foa, McNally, and Murdock (1989) found that recall for anxiety-related words in test anxious subjects was lower in those who experienced an increase in heart rate, suggesting that memory becomes increasingly poor with higher levels of anxiety.

Providing some support for MCM in anxiety, Richards and Whitaker (1990) found that participants high in trait anxiety recalled autobiographical memories cued by anxiety-related words faster than low trait anxious participants. From a clinical perspective, it is reasonable to speculate that individuals with anxiety disorders which represent chronic trait anxiety (for example, generalized anxiety disorder) rather than circumscribed state anxiety (specific phobia, panic disorder) would be more likely to exhibit a recall advantage for anxiety-related material. It is likely that individuals with trait anxiety would encode and retrieve more information while in an anxious state, so that an MCM effect would be more pervasive and generalized, while it may be more difficult to detect an MCM effect in individuals who experience anxiety in more specific and circumscribed situations. In this study the investigators used an analogue sample of
individuals who endorsed diagnostic criteria for generalized anxiety disorder (GAD), and reported persistent, severe, and global worry.

Another plausible explanation for the mixed results is that many of the studies that fail to provide support for MCM in anxiety utilized stimulus material that was not personally meaningful or did not reference the participant. In his review of the literature, Blaney (1986) suggests that MCM effects can be demonstrated only if the to-be-remembered material allows for self-referenced processing, and in fact, MCM effects are difficult or impossible to obtain if the material negates self-referencing.

For example, while Burke and Mathews (1992) found that participants with GAD were better able to recall anxiety-related autobiographical events than other memories, Mogg, Mathews, & Weinman (1987) found that patients with GAD exhibited poorer memory for threatening material relative to controls. The latter study utilized a word list paradigm, in which the participants were asked to recall a list of words that did not facilitate self-referenced processing. A predominance of the literature addressing MCM in anxiety has utilized strict laboratory procedures that may not generalize to memory for actual personal events. Burke and Mathews (1992) suggest that the recall tasks typically used (for example, word list recall) may not be sensitive to memory biases for naturally occurring personal experiences, and they propose the use of more naturalistic methods. The recall task in this study will reference naturally occurring personal experiences that are relevant to the participant.

This study was designed to test two opposing theoretical perspectives. First, Williams, Watts, MacLeod, & Mathews (1988) suggest that the contradictory and mixed results may be a result of an early attentional bias toward threat cues which has no
influence on later retrieval due to a subsequent avoidance of the negative emotional material. In other words, although anxious individuals may selectively attend to threat cues in the present, they will subsequently avoid elaborative processing of them, consequently eradicating facilitated recall of this material. Foa & Kozak (1986) refer to this tendency for anxious individuals to avoid elaborative processing of threat stimuli as "cognitive avoidance". Dalgleish & Watts (1990) suggest that "...there may indeed be a mutual antagonism between emotional arousal and elaborative processing" (p. 591). According to this view, the emotional arousal associated with anxiety that prevents elaborative processing of mood congruent material could result in a nullification of MCM in anxious individuals.

On the other hand, some researchers have reported an observed increase in memory for material eliciting emotional arousal over time, whereas neutral material is best recalled immediately after encoding, and with decreasing efficiency over time (Kleinsmith & Kaplan, 1963; Parkin, Lewinsohn, & Folkard, 1982). From this perspective, long-term autobiographical memories are "consolidated" over time, and a recall bias toward anxiety-related material should increase as the delay between encoding and retrieval increases.

These two theories predict opposite effects of time (immediate versus delayed retrieval) on MCM. The present study was designed to test these rival hypotheses, and determine if a recall bias might increase or decrease over a selected period of time (one week and one month). The competing forces of attentional and memory biases toward threat stimuli and cognitive avoidance of anxiety-related events could result in one of two outcomes at the one week and one month intervals: (1) They will nullify each other,
resulting in no observable differences between anxious and non-anxious groups on recall. This would suggest that while facilitated recall of threatening emotional material may be apparent immediately after encoding, a gradual forgetting ensues due to later avoidance of this material, resulting in decreasing recall advantage over time. (2) One force is stronger than the competing force, resulting in either enhanced or deficient memory of affectively congruent events and threatening stimuli. If memory for anxiety-related information is enhanced, this would indicate that memory for affectively congruent material increases over the one week and one month intervals as the memories are “consolidated” over time. If memory for anxiety-related personal experiences is deficient, this would suggest that emotional avoidance and inhibited processing interfere with recall of affectively congruent information.
CHAPTER II

METHOD

Participants

Participants were 31 female and 5 male undergraduate students ranging in age from 18 to 22 years (mean age = 20) enrolled in psychology courses at a large northeastern university. The majority (n = 26) were Caucasian, followed by Asian American/ Pacific Islander (n = 2), Latino/ Hispanic (n = 2), African American (n = 1), Native American (n = 1), and other (n = 4). For their participation, they earned extra credit towards a psychology course and were entered into a drawing for $100. As part of the requirements for their psychology course, these students participated in a mass screening for which they were asked to complete a packet of questionnaires. Participants were chosen based on their score on the GAD-Q-IV, and were placed in either the ‘anxious’ group (N = 15) or the ‘non-anxious’ group (N = 21). Students who scored above 1 standard deviation from the mean of the massed screening sample were included in the ‘anxious’ group (M = 29.47, sd = .60); these students endorsed criteria for GAD on the GAD-Q-IV. Students scoring below 1 standard deviation were included in the ‘non-anxious’ group (M = 1.52, sd = .36); these students did not endorse criteria for GAD.

Materials

Generalized Anxiety Disorder Questionnaire - IV (GAD-Q-IV). The GAD-Q-IV is a self-report questionnaire that parallels the diagnostic criteria of the DSM-IV (American Psychiatric Association, 1994) for generalized anxiety disorder. The GAD-Q-IV (Roemer, Borkovec, Posa, & Borkovec, 1995) was developed for use as a screening instrument to select analogue GAD samples. This measure inquires about aspects of
worry, including duration, severity, and controllability, as well as topics of worry and accompanying physical symptoms. Newman and colleagues (in press) found that the GAD-Q-IV demonstrated 89% specificity and 83% sensitivity. The GAD-Q-IV also showed convergent (.66) and discriminant validity (.45 and .34). Test-retest reliability analyses yielded a kappa agreement of .64 between Time 1 and Time 2. Kappa agreement between a structured interview for anxiety disorders (ADIS-IV) and the GAD-Q-IV was .67.

Journal. Participants were given a journal to record the most positive, negative, anxiety-provoking, and neutral event each day for one week (See Appendix A). They were given brief descriptions of each type of event, as follows: 1) A positive experience is an event that you regard as pleasurable or enjoyable that results in a positive feeling such as joy, happiness, peacefulness, love, or comfort; 2) A negative experience is an event that caused you to experience an unpleasant emotion, such as sadness, depression, or disappointment; 3) An anxiety provoking experience is an event that caused you to feel uneasy, apprehensive, threatened, scared, or worried. Often when people are very anxious, they may experience a rapid heartbeat, sweating, nausea, dizziness, and trembling. 4) A neutral event is an experience that you regard as evoking no specific emotion.

Ten lines were allotted for each event and instructions were given to describe the experience in detail and fill up the space that was given. Each page was dated and instructions were given to complete the journal each evening from April 10, 2000 to April 16, 2000. In addition to the descriptions, participants were asked to respond to the following questions after each description: 1) What was the strongest emotion you
experienced as this event occurred; 2) How would you rate the intensity of this emotion at the time you experienced the event (-5 = not at all intense, 0 = somewhat intense, 5 = extremely intense); and 3) Please rate how positive or negative this event was (-5 = very negative, 0 = neither positive or negative, 5 = very positive).

Procedure

One week and one month following completion of the journal, participants were asked to attend a “questionnaire session”, held in a small, quiet classroom setting. During these sessions, memory tests were administered, testing for recall of events that were described in the journal.

For the one-week memory tests, participants were instructed to recall as many of the experiences that they wrote about in their journals as possible, write one sentence briefly summarizing the main idea of each experience, and indicate whether it was a positive (POS), negative (NEG), anxiety-provoking (AP), or neutral (N) event. These data will be referred to as “main idea sentences”. Participants then were asked to judge the strength of these memories, and circled 2 POS, 2 NEG, 2 AP, and 2 N experiences that met the following criteria: 1) both either moderate or strong memories, and 2) both recalled in about the same level of detail. They then chose one experience from each circled pair and were given ten lines to generate as much remembered detail about the experience as possible. These data will be referred to as “free-recall descriptions”. Participants responded to the same three questions following each free-recall description as in the original journal, providing an emotion label, intensity rating, and positive valence rating for each experience.
For the one-month memory test, participants were instructed to generate one sentence briefly summarizing each experience they were able to recall (main idea sentences), and indicate what type of experience it was (POS, NEG, AP, N). Participants were cued with the second brief sentence of each circled pair they generated in the first memory test. This was done to ensure that the memory was of equal strength as the memory tested in the one-week test. Cues were given for one POS, NEG, AP, and N event, and again participants were given ten lines to generate as much remembered detail about the event as possible (free-recall descriptions). They then responded to the same three questions following each free-recall description as in the original journal.
CHAPTER III
RESULTS

Dependent Measures

Recall checklist. A recall checklist was developed to judge the amount of detail included in the free-recall descriptions (see Appendix B). Free-recall descriptions were assigned one point for each of the following aspects that were included: emotions, thoughts, actions, people, place, time, dialogue, sensations, time orientation, value, surroundings, process, outcome, perspectives, and history. Trained coders compared the memory test free-recall descriptions to the events described in the original journals, and matched the descriptions in the memory tests with the corresponding original description given in the journal. The checklist was completed for each free-recall description in both the one week and one month memory tests, as well as the corresponding journal events. Difference scores were calculated by subtracting the checklist points in the journal description from the checklist points in the memory tests (e.g. 8 points in memory test #1 - 10 points in original description = difference score of -2. This indicates that the participant described 2 fewer aspects of the event in the one-week memory test). The correlation between two independent raters on this measure using a subset of the data demonstrated adequate inter-rater reliability ($r (54) = .736, p < .01$). The intra-class correlation coefficient (ICC), which is a measure of inter-rater reliability designed for event based codes that are on a continuous scale, was .821 ($p < .01$).

Word count. The number of words generated for each free-recall description in the journal and memory tests was obtained. Trained coders compared the memory tests to the original journals, and matched the descriptions in the memory tests with the
corresponding original description given in the journal. Difference scores were calculated by subtracting the number of words in the journal description from the number of words generated in the memory tests (e.g. 65 words in memory test #1 - 110 words in original description = difference score of -45. This indicates that the participant wrote 45 words less than the journal description when recalling and describing the event in the memory test).

**Number of memories.** This measure refers to the number of “main idea sentences” each participant generated during each memory test when asked to briefly summarize each experience they were able to recall from the journal. Trained coders judged whether the sentences corresponded accurately to an experience described in the journal. The total numbers of POS, NEG, AP, and N experiences recalled were calculated. This was used as a measure of free recall of POS, NEG, AP, and N events. The correlation between two independent raters on this measure for a subset of the data was .928 (p < .01). The ICC was calculated, and demonstrated high agreement between raters (ICC (1, 16) = .960, p < .01).

**Intensity rating.** This measure is a number ranging from -5 to 5 which indicates the intensity of the emotion experienced during the event (-5 = not at all intense, 5 = extremely intense). In addition to the raw score, difference scores were obtained by subtracting the original rating of intensity reported in the journal from the rating reported in each memory test (4 rating in memory test - 3 rating in journal = difference score of 1; this indicates that the participant’s rating of intensity increased by 1 unit).

**Positive Valence Rating.** This measure is a number ranging from -5 to 5 which indicates the positive valence of the event (-5 = very negative, 5 = very positive). In
addition to the raw score, difference scores were obtained by subtracting the original rating of the positive valence reported in the journal from the rating reported in each memory test (-3 rating in memory test – -2 rating in journal = difference score of -1; this indicates that the participant’s rating of the positive valence decreased by one unit).

Pre-existing differences between groups

Univariate Analyses of Variance (ANOVAs) were used to examine baseline differences between the high and low anxious groups for each dependent variable using the journal data. The absence of pre-existing differences between the groups would rule out some alternative explanations of significant findings. For example, if the high anxious group rated anxiety-related journal events as more intense or more negative, differences in memory for anxiety-related experiences between the groups could be attributed to the finding that anxious individuals either experience more intense and negative anxiety-related events, or perceive these events as more intense and negative. As this example demonstrates, of most interest is the interaction between group and event type, as this would most substantially limit the conclusions that could be drawn from the analyses which test the main hypotheses.

There were pre-existing differences between the high and low anxious groups on ratings of intensity. The anxious participants rated emotions experienced during events described in their journals as more intense (M = 2.64) than the non-anxious group (M = 1.68; F(1, 235) = 12.29, p = .001). However, there was no significant interaction between group and event type (F(3, 235) = 1.61, p = .772); both the anxious and non-anxious groups rated anxiety-related events as most intense (M = 3.96 and 2.83,
respectively), followed by positive (M = 3.85 and 2.63), negative (M = 3.59 and 2.61), and neutral events (M = -0.86 and -1.33).

With regards to the journal valence ratings, although overall, the anxious participants rated events as more negative (M = -.405) than the non-anxious group (M = -.255), this difference was not statistically significant (F(1,235) = .601, p = .439). There was a significant interaction between group and event type (F(3, 235) = 3.67, p = .013). Although the groups did not differ significantly on their valence ratings for positive and anxiety-related events, the anxious group rated negative events as significantly more negative (M = -4.00) than the non-anxious group (M = -3.26; t(63) = 2.335, p = .022), and neutral events as significantly more positive (M = 1.00) than the non-anxious group (M = 0.23; t(59) = -2.069, p = .043).

**Manipulation check**

Univariate ANOVAs were conducted to examine baseline differences in intensity and valence ratings of emotions experienced during positive, negative, anxiety-provoking, and neutral journal events. For intensity ratings, it was expected that emotions associated with positive, negative, and anxiety-provoking events would be rated as more intense than emotions experienced during neutral events. With regards to valence ratings, it was expected that emotions associated with negative and anxiety-related events would be rated as negative, emotions felt during positive events would be rated as positive, and emotions related to neutral events would be rated as neither significantly positive or negative.

As predicted, emotions experienced during positive, negative, and anxiety-related events were rated as more intense than those experienced during neutral events.
(M_{POS} = 3.24, M_{NEG} = 3.10, M_{AP} = 3.40, M_{N} = -1.10), and this effect was statistically significant (F(3, 235) = 62.39, p = .000). Also expected, emotions associated with positive events were rated positively (M = 4.14); emotions experienced during negative and anxiety-provoking events were rated as negative (M_{NEG} = -3.63, M_{ANX} = -2.37); and emotions associated with neutral events were rated as more neutral than the other events (M = 0.64). This effect of event type on ratings of valence was statistically significant (F(3, 235) = 334.58, p = .000).

Number of Memories

A 2x2 repeated measures ANOVA was conducted, with number of memories retrieved during the ‘main idea sentence’ task as the dependent variable, retrieval interval (one week and one month) and memory type as the within-subjects factors, and group as the between-subjects factor. Differences between the groups on free recall of positive, negative, anxiety-provoking, and neutral personal experiences at one week and one month delay were examined. This analysis was designed to test the main hypotheses of the study.

There was a significant effect for memory type on number of memories recalled (F(3, 102) = 9.06, p = .000), with the group as a whole retrieving more positive memories (M = 3.31), followed by negative (M = 2.81), anxiety-provoking (M = 2.45), and neutral (M = 2.15). The interaction between memory type and group was also significant; the anxious group recalled more positive, negative, and anxiety-provoking events than the non-anxious group, but fewer neutral events (F(3, 102) = 2.69, p = .050). The anxious group was better able to retrieve emotionally-laden events than neutral events.
(M_{POS} = 3.43, M_{NEG} = 3.13, M_{AP} = 2.5, M_{N} = 1.83). The non-anxious group exhibited better recall of positive events (M = 3.19), and nearly equivalent recall of negative (M = 2.48), anxiety-provoking (M = 2.40), and neutral events (M = 2.38). The interaction between group, memory type, and time was not statistically significant (p = .787). See Table 2 for the descriptive and inferential statistics of this test.

Missing Data

Binomial probabilities were calculated to examine if the missing data from the one month memory test were systematically missing. Specifically, tests were done to explore the following questions: 1) For the whole group, were anxiety-provoking experiences more likely to be missing than positive, negative, and neutral experiences?, 2) Were anxiety-provoking events more likely to be missing for the anxious group?, and 3) Were anxiety-provoking events more likely to be missing for the non-anxious group?

For the group as a whole, out of 36 total data points, 3 were missing from the positive events, 5 from negative events, 13 from anxiety-provoking events, and 8 from neutral events. Given the probability of missing data for positive, negative, and neutral events (.185), observing the 13 missing anxiety-provoking responses represents a highly improbable event (P = .0062). This was true for the non-anxious group analyzed separately as well; out of 21 total responses, the non-anxious group was missing 4 positive, 3 negative, 9 anxiety-provoking, and 2 neutral. Given the probability of missing data for positive, negative, and neutral events (.143), observing 9 missing anxiety-provoking data points represents a highly improbable event (P = .0014). However, the anxious group did not differ significantly in missing data for anxiety-provoking events. Out of 15 possible responses, the anxious group was missing 3 positive, 2 negative,
4 anxiety-provoking, and 6 neutral. Given the overall probability of missing data (.244), observing 4 missing anxiety-provoking responses does not represent an improbable event (P = .2231). These analyses demonstrate that the non-anxious participants were more likely to produce missing data when asked to recall anxiety-related experiences.

Time 1 Only

Given the substantial amount of missing data from the time two memory test, separate analyses were done using only the one-week memory test data. A Repeated Measures ANOVA was conducted, with difference scores of intensity ratings as the dependent variable, memory type as the within-subjects factor, and group as the between-subjects factor. This was done to determine if positive, negative, anxiety-provoking, and neutral experiences were remembered as more or less intense after the one-week retrieval delay, and if this differed between the groups. This analysis yielded no statistically significant findings.

A Repeated Measures ANOVA was conducted using difference scores of valence ratings as the dependent variable, group as the between-subjects factor, and memory type as the within-subjects factor. This was done to examine differences between the groups on changes occurring during the one-week retrieval delay in how positively or negatively emotions associated with positive, negative, anxiety-provoking, and neutral events were recalled. There were no statistically significant results.

A Repeated Measures ANOVA was conducted, with the percent change in words used to describe events as the dependent variable, memory type as the within-subjects factor, and group as the between-subjects factor. Differences between the groups on remembered detail of positive, negative, anxiety-provoking, and neutral personal
experiences at one week delay were examined. This analysis was used to test the main hypotheses. There were no statistically significant differences between the groups.

A Repeated Measures ANOVA was done, using difference scores of checklist points as the dependent variable, memory type as the within-subjects factor, and group as the between-subjects factor. This was done to examine differences between the groups on number of aspects recalled about positive, negative, anxiety-related, and neutral events at the one-week retrieval delay. This analysis yielded no statistically significant results.

Refer to Table 1 for the means, F statistics, and p-values for these analyses.

**Time 1 and 2**

Repeated Measures ANOVAs were done to examine differences over time between the groups in changes in intensity and valence ratings, word count, and checklist points. Because Repeated Measures ANOVA excludes cases with missing values, and due to the large amount of missing Time 2 data, only 11 participants (5 anxious, 6 non-anxious) were used for these analyses. The effects for the two-way interaction between group and memory type (GxM), and the three-way interaction between group, memory type, and time (GxMxT), are reported.

There were no group differences on changes in intensity ratings of emotions associated with positive, negative, anxiety-provoking, and neutral events over time ($F_{GxM} (3, 27) = .850, p = .479; F_{GxMxT} (3, 27) = .172, p = .827$). Likewise, there were no significant differences between the groups on valence ratings ($F_{GxM} (3, 27) = .925, p = .440; F_{GxMxT} (3, 27) = 1.045 p = .380$). The absence of group differences on intensity and valence ratings rules out the explanation that differences in memory are attributable to
differences in intensity or valence of emotions associated with positive, negative, anxiety-provoking, and neutral experiences.

There was not a significant interaction between group and memory type for word count ($F_{GxM} (3, 27) = 1.893, p = .155$), although the pattern was similar to the results of the Time 1 data analysis (Anxious group $M_{POS} = -37\%$, $M_{NEG} = -40\%$, $M_{AP} = -39\%$, $M_N = -37\%$; Non-anxious group $M_{POS} = -30\%$, $M_{NEG} = -37\%$, $M_{AP} = -11\%$, $M_N = -25\%)$.

There was also no significant three-way interaction between group, memory type, and time ($F_{GxMxT} (3, 27) = 1.262, p = .307$).

For the checklist difference scores, there was a trend towards an interaction between group and memory type ($F_{GxM} (3, 27) = 2.84, p = .057$). Anxious participants recalled fewer aspects of anxiety-provoking events (-1.583), than positive (-.417), negative (-.583), and neutral events (-.917). The opposite was true for the non-anxious group, who recalled more aspects of anxiety-provoking events (-.300), than positive (-1.100), negative (-1.200), and neutral events (-1.00). Post-hoc t-tests showed that the differences between the groups approached significance for anxiety-provoking experiences only ($t_{(20)} = 1.998, p = .060$). There was no significant three-way interaction between group, memory type, and time for checklist difference scores ($F_{GxMxT} (3, 27) = .466, p = .708$).
CHAPTER IV

DISCUSSION

There were no significant pre-existing group differences on ratings of intensity and valence for anxiety-provoking events. However, overall the anxious participants rated emotions experienced during events described in the journals as significantly more intense than the non-anxious group. In addition, the anxious group rated these same emotions as even more intense when recalling them during the one-week memory test. This suggests that life events tend to be experienced as more emotionally intense for anxiety-prone individuals.

There were no statistically significant differences between the anxious and non-anxious groups on recall of anxiety-provoking personal experiences. However, based on the findings from this study, it would be hasty to conclude that anxious and non-anxious individuals exhibit equivalent recall for life experiences that provoke anxiety. This study was designed to test the main hypotheses using repeated measures with thirty-six subjects; however, the significant amount of missing data from the one-month memory test precluded this. Therefore, the main hypotheses were tested by analyzing the data from the one-week memory test separately, and performing the planned analyses with only the eleven subjects that had complete data. It is possible that the limited statistical power made it difficult to detect the effects that were predicted.

The data were complete for examining the ‘number of memories’ dependent variable, which was designed to measure the participants’ ability to retrieve different types of life events from memory. This analysis showed that the anxious group was able
to retrieve more negative memories than the non-anxious group, but the groups were virtually identical in the ability to access anxiety-provoking memories.

Interestingly, the binomial analyses that explored whether the data were systematically missing suggested that the anxious group was more likely to retrieve anxiety-related life experiences than the non-anxious group. This is contradictory to the finding that the anxious and non-anxious groups were able to recall about the same number of anxiety-provoking life experiences. However, the missing data points represent ‘free-recall descriptions’ that did not correspond with an event in the journal. It is possible that these events did take place in the participants’ life, but because they did not match up with journal experiences, these data could not be included in the analyses. Furthermore, the participants were cued for these experiences with a short sentence that they provided in the first memory test. In other words, they were cued to describe these events even though they didn’t correspond with the journal. Therefore, the conclusions that can be drawn from this analysis are limited to the extent that they are consistent with other findings or trends.

Even if anxious individuals were equally able to retrieve anxiety-related life experiences, it is possible that the quality of the memory could differ from non-anxious individuals. For example, anxious individuals may be more or less able to elaborate on these experiences, recalling specific details of the event. If so, this measure of simple ‘number of memories’ retrieved would not be sensitive to detecting the differences between the groups.

Unfortunately, the dependent variables that were intended to measure the quality of the memory and amount of detail included (‘word count’ and ‘checklist’) were missing to
a significant degree from the one-month memory test. Because of this, a comparable analysis looking at changes in detail or quality of memories over time could not be performed. These variables were examined using the one-week data separately. Although these analyses did not yield statistically significant results, there were differences between the groups. The anxious group used about the same amount of words when recalling positive, negative, anxiety-provoking, and neutral journal events in the one-week memory test. However, the non-anxious group was more verbose in recalling anxiety-provoking and negative experiences compared to the anxious group, and also compared to their own descriptions of positive and neutral events.

For the checklist measure, the anxious group recalled fewer aspects of anxiety-provoking events than positive, negative, and neutral events. On the other hand, the non-anxious group recalled more aspects of anxiety-provoking events, compared to positive, negative, and neutral events. Although these findings are not statistically significant, the anxious group was somewhat less verbose in their descriptions of anxiety-related life experiences, and recalled fewer details of these events compared to the non-anxious group.

A statistical trend (p = .057) was found when examining differences between the groups over time on the ‘checklist’ measure, although this analysis included only eleven subjects. Specifically, the anxious group recalled fewer aspects of anxiety-provoking experiences than positive, negative, and neutral events, and the opposite was true for the non-anxious group, who recalled more aspects of anxiety-related events. When the same analysis was done for the ‘word count’ measure, although not statistically significant, the
non-anxious group exhibited less deterioration for anxiety-related events (-11%) than the anxious group (-39%).

Overall, these opposing patterns between the groups might reflect real differences given sufficient statistical power. However, because the effects did not reach statistical significance, it is difficult to comment on whether the findings support or challenge the two rival theoretical perspectives intended to be tested. It is unclear from the data whether anxiety interferes with ability to retrieve anxiety-related life events; there may be no differences between anxious and non-anxious individuals (as suggested by the ‘number of memories’ analysis), or anxiety-prone individuals may be better able to access anxiety-provoking events (as suggested by the ‘binomial’ test of missing data). But with regards to remembered detail or quality of anxiety-related memories, it seems reasonable to speculate that anxious individuals may avoid elaborative processing of these experiences, suggested by the comparatively poorer remembered detail and less verbosity when recalling anxiety-related life events.

One of the theoretical perspectives proposed to explain the equivocal findings of studies examining MCM effects in anxiety is that anxious individuals demonstrate “cognitive avoidance” and inhibited elaborative processing of anxiety-related information. Proponents of this theory have suggested that although there may be an attentional bias towards threat in the present, which may lead to a recall advantage for anxiety-related material immediately after encoding, the avoidant processing style soon eradicates this effect. It is possible that the one-week memory test was not administered soon enough after encoding to detect this phenomenon. Likewise, the other theory proposed that a recall advantage for threat-related information would increase over time,
relative to neutral information, as the memories were "consolidated". The second memory tests may not have been administered at the proper time to observe this effect.

Some additional limitations of this study are that the dependent variables designed to measure memory, 'word count' and 'recall checklist' are not ideal. It is likely that both measures pick up a lot of noise from other variables, such as verbosity or motivation. One way to avoid this would be to design a structured journal that includes only brief fill-in-the-blank or multiple choice responses. The memory tests would be designed in the same way, so that a direct, quantitative comparison could be made to measure memory retention or deterioration. Another limitation of the study is that the sample includes only undergraduate college students enrolled in a psychology course, and the findings may be different in a clinical sample. Lastly, there was a substantial amount of missing data. This problem could be avoided by cueing the participants with journal events, rather than using cues they provide that may not correspond with events in the journals.

In conclusion, although the data from this study suggest that memory for anxiety-related and other types of life experiences may differ for anxious and non-anxious individuals, the study was limited in a number of ways that restrict the conclusions that can be drawn. Future studies in this area should attempt to collect complete time-series data that would allow for powerful statistical analyses, and should utilize dependent variables that are easily coded and quantified. Understanding processes that contribute to the development and maintenance of anxiety is a important topic for research in clinical psychology because it enhances our ability to design more effective interventions.
### Table 1

**Means, F statistics, and p-values for One-week Memory Test Data**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Dependent Variable (D-scores)</th>
<th></th>
<th></th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
<td></td>
<td><strong>High-anxiety Group (n=11)</strong></td>
<td><strong>Low-anxiety Group (n=15)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intensity Ratings</td>
<td>.205</td>
<td>.567</td>
<td>1.19</td>
<td>.286</td>
</tr>
<tr>
<td></td>
<td>Valence Rating</td>
<td>-.227</td>
<td>.017</td>
<td>2.51</td>
<td>.126</td>
</tr>
<tr>
<td></td>
<td>Word Count</td>
<td>-.32%</td>
<td>-.18%</td>
<td>2.07</td>
<td>.163</td>
</tr>
<tr>
<td></td>
<td>Checklist</td>
<td>-1.00</td>
<td>-.667</td>
<td>1.37</td>
<td>.253</td>
</tr>
<tr>
<td><strong>Memory Type</strong></td>
<td></td>
<td><strong>Positive</strong></td>
<td><strong>Negative</strong></td>
<td><strong>Anxiety</strong></td>
<td><strong>Neutral</strong></td>
</tr>
<tr>
<td></td>
<td>Intensity Ratings</td>
<td>.042</td>
<td>.113</td>
<td>.482</td>
<td>.885</td>
</tr>
<tr>
<td></td>
<td>Valence Rating</td>
<td>.036</td>
<td>-.112</td>
<td>-.497</td>
<td>.152</td>
</tr>
<tr>
<td></td>
<td>Word Count</td>
<td>-.30%</td>
<td>-.21%</td>
<td>-.19%</td>
<td>-.29%</td>
</tr>
<tr>
<td></td>
<td>Checklist</td>
<td>-.842</td>
<td>-.697</td>
<td>-.836</td>
<td>.958</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td></td>
<td><strong>High-anxiety Group</strong></td>
<td><strong>Low-anxiety Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intensity Ratings</td>
<td>-.182</td>
<td>-.021</td>
<td>.364</td>
<td>.636</td>
</tr>
<tr>
<td></td>
<td>Valence Rating</td>
<td>.273</td>
<td>-.091</td>
<td>-.727</td>
<td>-.364</td>
</tr>
<tr>
<td></td>
<td>Word Count</td>
<td>-.30%</td>
<td>-.30%</td>
<td>-.31%</td>
<td>-.36%</td>
</tr>
<tr>
<td></td>
<td>Checklist</td>
<td>-.818</td>
<td>-.727</td>
<td>-1.27</td>
<td>-.118</td>
</tr>
</tbody>
</table>

The table above presents the means, F statistics, and p-values for one-week memory test data, with separate analyses for high-anxiety and low-anxiety groups. The data includes measures such as intensity ratings, valence ratings, word count, and checklist scores, categorized by group and memory type, with interaction effects also reported.
Table 2

Number of Memories Retrieved during ‘Main idea sentences’ Task

<table>
<thead>
<tr>
<th>Effect</th>
<th>M (Sd)</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pos 3.31 (.209)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neg 2.81 (.220)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anx 2.45 (.242)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neu 2.15 (.242)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group x Time</td>
<td>High-anxious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1wk 3.13 (.294)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1mo 2.27 (.272)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low-anxious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.10 (.249)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.18 (.230)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group x Memory Type</td>
<td>High-anxious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.43 (.320)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neg 3.13 (.336)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anx 2.50 (.370)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neu 1.83 (.369)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low-anxious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.19 (.270)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.48 (.284)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.41 (.313)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.48 (.312)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group x Memory Type</td>
<td>High-anxious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pos 3.87 (.388)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neg 3.60 (.356)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anx 2.93 (.396)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neu 2.33 (.396)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low-anxious</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.62 (.328)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.95 (.301)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.95 (.334)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.86 (.335)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

One week test

<table>
<thead>
<tr>
<th>Group x Memory Type x Time</th>
<th>High-anxious</th>
<th>Low-anxious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos 3.00 (.300)</td>
<td>2.76 (.253)</td>
<td>2.00 (.293)</td>
</tr>
<tr>
<td>Neg 2.67 (.347)</td>
<td>2.00 (.293)</td>
<td>1.86 (.346)</td>
</tr>
<tr>
<td>Anx 2.07 (.409)</td>
<td>1.86 (.346)</td>
<td>2.10 (.324)</td>
</tr>
<tr>
<td>Neu 1.33 (.384)</td>
<td>2.10 (.324)</td>
<td></td>
</tr>
</tbody>
</table>

One month test

<table>
<thead>
<tr>
<th>Group x Memory Type x Time</th>
<th>High-anxious</th>
<th>Low-anxious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pos 3.00 (.300)</td>
<td>2.76 (.253)</td>
<td>2.00 (.293)</td>
</tr>
<tr>
<td>Neg 2.67 (.347)</td>
<td>2.00 (.293)</td>
<td>1.86 (.346)</td>
</tr>
<tr>
<td>Anx 2.07 (.409)</td>
<td>1.86 (.346)</td>
<td>2.10 (.324)</td>
</tr>
<tr>
<td>Neu 1.33 (.384)</td>
<td>2.10 (.324)</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX A

GAD-Q-IV

1. Do you experience excessive worry?  Yes  No

2. Is your worry excessive in intensity, frequency, or amount of distress it causes?  Yes  No

3. Do you find it difficult to control your worry (or stop worrying) once it starts?  Yes  No

4. Do you worry excessively or uncontrollably about minor things such as being late for an appointment, minor repairs, homework, etc.?  Yes  No

5. Please list the most frequent topics about which you worry excessively or uncontrollably:
   a.
   b.
   c.
   d.
   e.
   f.

6. During the last six months, have you been bothered by excessive worries more days than not?  Yes  No

7. During the past six months, have you often been bothered by any of the following symptoms?  Place a check next to each symptom that you have had more days than not:
   __ restlessness or feeling keyed up or on edge          __ irritability
   __ difficulty falling/staying asleep or restless/unsatisfying sleep  __ being easily fatigued
   __ difficulty concentrating or mind going blank         __ muscle tension

8. How much do worry and physical symptoms interfere with your life, work, social activities, family, etc.? Circle one number:

   0 1 2 3 4 5 6 7 8
   
   None    Mild    Moderate    Severe    Very Severe

9. How much are you bothered by worry and physical symptoms (how much distress does it cause you)? Circle one number:

   0 1 2 3 4 5 6 7 8
   
   No distress    Mild distress    Moderate distress    Severe distress    Very Severe distress
APPENDIX B

JOURNAL

Please describe in detail the most positive experience you had today. A positive experience is an event that you regard as pleasurable or enjoyable that results in a positive feeling such as joy, happiness, peacefulness, love, or comfort.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What was the strongest emotion you experienced as this event occurred (list only one)?

How would you rate the intensity of this emotion at the time you experienced the event?

-5  -4  -3  -2  -1  0  1  2  3  4  5
not at all intense  somewhat intense  extremely intense

Please rate how positive or negative this event was.

-5  -4  -3  -2  -1  0  1  2  3  4  5
very negative  neither positive or negative  very positive

Please describe in detail the most negative experience you had today. A negative or depressing experience is an event that caused you to experience an unpleasant emotion, such as sadness, depression, or disappointment.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What was the strongest emotion you experienced as this event occurred (list only one)?

How would you rate the intensity of this emotion at the time you experienced the event?

-5  -4  -3  -2  -1  0  1  2  3  4  5
not at all intense  somewhat intense  extremely intense

Please rate how positive or negative this event was.

-5  -4  -3  -2  -1  0  1  2  3  4  5
very negative  neither positive or negative  very positive
Please describe in detail the most anxiety provoking experience you had today. An anxiety provoking experience is an event that caused you to feel uneasy, apprehensive, threatened, scared, or worried. Often when people are very anxious, they may experience a rapid heart beat, sweating, nausea, dizziness, and trembling.

What was the strongest emotion you experienced as this event occurred (list only one)?

How would you rate the intensity of this emotion at the time you experienced the event?

-5  -4  -3  -2  -1  0  1  2  3  4  5
  not at all intense  somewhat intense  extremely intense

Please rate how positive or negative this event was.

-5  -4  -3  -2  -1  0  1  2  3  4  5
  very negative  neither positive or negative  very positive

Please describe in detail one neutral event that you experienced today. A neutral event is an experience that you regard as evoking no specific emotion.

What was the strongest emotion you experienced as this event occurred (list only one)?

How would you rate the intensity of this emotion at the time you experienced the event?

-5  -4  -3  -2  -1  0  1  2  3  4  5
  not at all intense  somewhat intense  extremely intense

Please rate how positive or negative this event was.

-5  -4  -3  -2  -1  0  1  2  3  4  5
  very negative  neither positive or negative  very positive

Please sign here to indicate that this information is accurate and complete.
APPENDIX C

MEMORY TEST #1

In your journal you described 4 experiences each day for 7 days, so you should have described 28 different experiences in all (7 positive, 7 negative, 7 anxiety-provoking, and 7 neutral). Please take a moment and try to recall as many of these experiences as you can. Below there are 28 spaces, one for each experience that you described in your journal. Please write one sentence briefly summarizing the main idea of each experience that you are able to recall. In the spaces to the left of the numbers, please indicate what type of experience that sentence describes—mark ‘POS’ for positive, ‘NEG’ for negative, ‘AP’ for anxiety-provoking, and ‘N’ for neutral.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 
11. 
12. 
13. 
14. 
15. 
16. 
17. 
18. 
19. 
20. 
21. 
22. 
23. 
24. 
25. 
26. 
27. 
28. 
Remember, in your journal you described 7 positive, 7 negative, 7 anxiety-provoking, and 7 neutral experiences. You should have written 28 sentences if you are able to remember them all; 7 marked ‘POS’, 7 marked ‘NEG’, 7 marked ‘AP’, and 7 marked ‘N’.

It is likely that some of these experiences you are able to recall in rich detail, others in moderate detail, and others only minimally or not at all. For example, I am able to recall 5 positive experiences: 1.) getting an ‘A’ on my calculus exam, 2.) going to Antonio’s for pizza with a friend, 3.) finding out my mother’s chemotherapy was effective and she will be fine, 4.) getting a really cool new outfit on a shopping expedition at the mall with some friends, and 5.) having a pleasant phone conversation with my best friend from back home. ‘Discovering my mother’s cancer was cured’ is such a highly memorable experience and I am able to recall every detail of the conversation I had with her that night, and I am likely to remember it forever. None of the other experiences are nearly as memorable. I’m unable to recall many details about the experience of ‘getting an A on my calculus exam’ or ‘having a pleasant phone conversation with my best friend from back home’. However, ‘Going to Antonio’s for pizza with a friend’ and ‘getting a really cool new outfit on a shopping expedition at the mall with some friends’ were both moderately memorable experiences about which I recall approximately the same amount of detail.

Please refer back to the first page and think about the positive experiences you wrote sentences about. Decide which of these are poor, moderate, and strong memories. Circle the numbers of 2 positive experiences that you are able to recall about equally well, that are either moderate memories or strong memories. In the example above, I would choose #2 and #4, because they are both moderately memorable experiences about which I am able to recall about the same amount of detail. I did not choose #3, because this experience is so highly memorable that I recall every detail about it. None of the other experiences are nearly as memorable, so I am unable to match the strength of this memory with any of the other experiences. I can only recall minor details about #1 and #5, so I did not choose them. Even though they are equally memorable, they are poor memories. You are to choose 2 equally memorable experiences that are either moderate or strong memories.

If you have any questions about this, please feel free to talk to the experimenter conducting the session. Once you have chosen 2 positive experiences, please circle the numbers of 2 negative experiences, 2 anxiety-provoking experiences, and 2 neutral experiences that again, you recall about equally well and are either moderately or strongly memorable events.

Once you have completed this, go on to the next page.
Choose one of the positive experiences that you circled on the first page (Sentence #:__). Try to recall as much detail about this experience as you can, and write what you are able to remember below.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

1. What was the strongest emotion you experienced as this event occurred (list only one)?

________________________________________________________________________

2. How would you rate the intensity of this emotion at the time you experienced the event?

-5 -4 -3 -2 -1 0 1 2 3 4 5
not at all intense somewhat intense extremely intense

3. Please rate how positive or negative this event was.

-5 -4 -3 -2 -1 0 1 2 3 4 5
very negative neither positive or negative very positive

Choose one of the negative experiences that you circled on the first page (Sentence #:__). Try to recall what you wrote in your journal about this experience, and write as much as you are able to remember below.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

1. What was the strongest emotion you experienced as this event occurred (list only one)?

________________________________________________________________________

2. How would you rate the intensity of this emotion at the time you experienced the event?

-5 -4 -3 -2 -1 0 1 2 3 4 5
not at all intense somewhat intense extremely intense

3. Please rate how positive or negative this event was.

-5 -4 -3 -2 -1 0 1 2 3 4 5
very negative neither positive or negative very positive
Choose one of the **anxiety-provoking** experiences that you circled on the first page (Sentence#: ____). Try to recall what you wrote in your journal about this experience, and write as much as you are able to remember below.

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

1. What was the **strongest** emotion you experienced as this event occurred (list only one)?

2. How would you rate the intensity of this emotion at the time you experienced the event?

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   not at all intense  somewhat intense  extremely intense

3. Please rate how positive or negative this event was.

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   very negative  neither positive or negative  very positive

Choose one of the **neutral** experiences that you circled on the first page (Sentence#: ____). Try to recall what you wrote in your journal about this experience, and write as much as you are able to remember below.

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

1. What was the **strongest** emotion you experienced as this event occurred (list only one)?

2. How would you rate the intensity of this emotion at the time you experienced the event?

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   not at all intense  somewhat intense  extremely intense

3. Please rate how positive or negative this event was.

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   very negative  neither positive or negative  very positive
APPENDIX D

EXAMPLE OF MEMORY TEST #2

In your journal you described 4 experiences each day for 7 days, so you should have described 28 different experiences in all (7 positive, 7 negative, 7 anxiety-provoking, and 7 neutral). Please take a moment and try to recall as many of these experiences as you can. Below there are 28 spaces, one for each experience that you described in your journal. Please write one sentence briefly summarizing the main idea of each experience that you are able to recall. In the spaces to the left of the numbers, please indicate what type of experience that sentence describes—mark ‘POS’ for positive, ‘NEG’ for negative, ‘AP’ for anxiety-provoking, and ‘N’ for neutral.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 
11. 
12. 
13. 
14. 
15. 
16. 
17. 
18. 
19. 
20. 
21. 
22. 
23. 
24. 
25. 
26. 
27. 
28.
On the next two pages, you will be asked to recall detail about 4 experiences that you listed during the last session. Please try to recall the experience in as much detail as possible, and write as much as you are able to remember in the space provided. Also, please indicate if this experience was positive (POS), negative (NEG), anxiety-provoking (AP), or neutral (N) by circling the appropriate letter where indicated.

You described an experience involving “…talked to grandmother.” Try to recall as much detail about this experience as you can, and write what you are able to remember below. Circle one: POS NEG AP N

1. What was the strongest emotion you experienced as this event occurred (list only one)? ____________________________________________________________

2. How would you rate the intensity of this emotion at the time you experienced the event? ______

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   not at all intense  somewhat intense  extremely intense

3. Please rate how positive or negative this event was. ______

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   very negative  neither positive or negative  very positive
You described an experience involving “...went to movies with Brian.” Try to recall as much detail about this experience as you can, and write what you are able to remember below. Circle one: POS  NEG  AP  N

1. What was the strongest emotion you experienced as this event occurred (list only one)?

2. How would you rate the intensity of this emotion at the time you experienced the event?

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   not at all intense  somewhat intense  extremely intense

3. Please rate how positive or negative this event was.

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   very negative  neither positive or negative  very positive

You described an experience involving “...saw someone from my past that I didn’t want to see.” Try to recall as much detail about this experience as you can, and write what you are able to remember below. Circle one: POS  NEG  AP  N

1. What was the strongest emotion you experienced as this event occurred (list only one)?

2. How would you rate the intensity of this emotion at the time you experienced the event?

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   not at all intense  somewhat intense  extremely intense

3. Please rate how positive or negative this event was.

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   very negative  neither positive or negative  very positive
You described an experience involving “...my mom and I had a fight.” Try to recall as much detail about this experience as you can, and write what you are able to remember below. Circle one: POS NEG AP N

1. What was the strongest emotion you experienced as this event occurred (list only one)?

2. How would you rate the intensity of this emotion at the time you experienced the event? __________

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   not at all intense  somewhat intense  extremely intense

3. Please rate how positive or negative this event was. __________

   -5  -4  -3  -2  -1  0  1  2  3  4  5
   very negative  neither positive or negative  very positive

When you are finished, please bring your materials up front. You will be given a slip for 8 research credits towards one of your psychology courses, which you can turn in on the 4th floor lobby in Tobin. If you prefer to split these credits up, let me know!

Also, please fill out your lottery ticket so you will be included in the drawing for $100 which will be held on Thursday!

Thank you very much for your participation, and I hope you enjoyed the study! If you are interested in the results, be sure to let me know so I can contact you in the fall.
APPENDIX E

RECALL CHECKLIST

___ Emotions/ how the event made them feel
___ Thoughts/ internal dialogue
___ Actions/ overt activities & behaviors
___ People/ who the event involved, who interacted with
___ Place/ where the event took place
___ Time/ day of the week and/or time of day
___ Dialogue/ what was said, details of conversations
___ Sensations/ physiological response, how the body felt
___ Time Orientation/ how the event relates to the past, present, & future
___ Value/ how positive or negative the event was judged
___ Surroundings/ details describing the characteristics of the environment
___ Process/ sequential account of the event as it unfolded, storytelling quality
___ Outcome/ what the primary result of the event was
___ Perspectives/ account of the event from another person’s perspective
___ History/ what led up to the event
APPENDIX F
CODING FORM

MEMORY TEST #1 (one week)  Participant #: ________
“MAIN IDEA” SENTENCE BLURBS

Positive events:  # correct (match w/journal event)____  # wrong (don’t match)____
Negative events:  # correct (match w/journal event)____  # wrong (don’t match)____
Anxiety events:  # correct (match w/journal event)____  # wrong (don’t match)____
Neutral events:  # correct (match w/journal event)____  # wrong (don’t match)____
Total:  # correct (match w/journal event)____  # wrong (don’t match)____

“FREE RECALL” PARAGRAPH DESCRIPTIONS

Positive event:
Does it match w/an event in the journal?  Y  N  If so, which day & what event?  ____
Place a check mark next to each category that the participant includes in the description:

____ Emotions/ how the event made them feel
____ Thoughts/ internal dialogue
____ Actions/ overt activities & behaviors
____ People/ who the event involved, who interacted with
____ Place/ where the event took place
____ Time/ day of the week and/or time of day
____ Dialogue/ what was said, details of conversations
____ Sensations/ physiological response, how the body felt
____ Time Orientation/ how the event relates to the past, present, & future
____ Value/ how positive or negative the event was judged
____ Surroundings/ details describing the characteristics of the environment
____ Process/ sequential account of the event as it unfolded, storytelling quality
____ Outcome/ what the primary result of the event was
____ Perspectives/ account of the event from another person’s perspective
____ History/ what led up to the event  Total:  ____/15

Now complete the checklist below for the corresponding event in the journal.

____ Emotions/ how the event made them feel
____ Thoughts/ internal dialogue
____ Actions/ overt activities & behaviors
____ People/ who the event involved, who interacted with
____ Place/ where the event took place
____ Time/ day of the week and/or time of day
____ Dialogue/ what was said, details of conversations
____ Sensations/ physiological response, how the body felt
____ Time Orientation/ how the event relates to the past, present, & future
____ Value/ how positive or negative the event was judged
____ Surroundings/ details describing the characteristics of the environment
____ Process/ sequential account of the event as it unfolded, storytelling quality
____ Outcome/ what the primary result of the event was
____ Perspectives/ account of the event from another person’s perspective
____ History/ what led up to the event  Total:  ____/15

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Negative event:

Does it match w/an event in the journal? Y N If so, which day & what event? ______
Place a check mark next to each category that the participant includes in the description:

- Emotions/ how the event made them feel
- Thoughts/ internal dialogue
- Actions/ overt activities & behaviors
- People/ who the event involved, who interacted with
- Place/ where the event took place
- Time/ day of the week and/or time of day
- Dialogue/ what was said, details of conversations
- Sensations/ physiological response, how the body felt
- Time Orientation/ how the event relates to the past, present, & future
- Value/ how positive or negative the event was judged
- Surroundings/ details describing the characteristics of the environment
- Process/ sequential account of the event as it unfolded, storytelling quality
- Outcome/ what the primary result of the event was
- Perspectives/ account of the event from another person's perspective
- History/ what led up to the event

Total: ______/15

Now complete the checklist below for the corresponding event in the journal.

- Emotions/ how the event made them feel
- Thoughts/ internal dialogue
- Actions/ overt activities & behaviors
- People/ who the event involved, who interacted with
- Place/ where the event took place
- Time/ day of the week and/or time of day
- Dialogue/ what was said, details of conversations
- Sensations/ physiological response, how the body felt
- Time Orientation/ how the event relates to the past, present, & future
- Value/ how positive or negative the event was judged
- Surroundings/ details describing the characteristics of the environment
- Process/ sequential account of the event as it unfolded, storytelling quality
- Outcome/ what the primary result of the event was
- Perspectives/ account of the event from another person's perspective
- History/ what led up to the event

Total: ______/15

Anxiety event:

Does it match w/an event in the journal? Y N If so, which day & what event? ______
Place a check mark next to each category that the participant includes in the description:

- Emotions/ how the event made them feel
- Thoughts/ internal dialogue
- Actions/ overt activities & behaviors
- People/ who the event involved, who interacted with
- Place/ where the event took place
- Time/ day of the week and/or time of day
- Dialogue/ what was said, details of conversations
- Sensations/ physiological response, how the body felt
- Time Orientation/ how the event relates to the past, present, & future
- Value/ how positive or negative the event was judged
- Surroundings/ details describing the characteristics of the environment
- Process/ sequential account of the event as it unfolded, storytelling quality
- Outcome/ what the primary result of the event was
- Perspectives/ account of the event from another person's perspective
- History/ what led up to the event

Total: ______/15
Now complete the checklist below for the corresponding event in the journal.

- **Emotions**/ how the event made them feel
- **Thoughts**/ internal dialogue
- **Actions**/ overt activities & behaviors
- **People**/ who the event involved, who interacted with
- **Place**/ where the event took place
- **Time**/ day of the week and/or time of day
- **Dialogue**/ what was said, details of conversations
- **Sensations**/ physiological response, how the body felt
- **Time Orientation**/ how the event relates to the past, present, & future
- **Value**/ how positive or negative the event was judged
- **Surroundings**/ details describing the characteristics of the environment
- **Process**/ sequential account of the event as it unfolded, storytelling quality
- **Outcome**/ what the primary result of the event was
- **Perspectives**/ account of the event from another person’s perspective
- **History**/ what led up to the event

Total: /15

**neutral event:**

Does it match w/an event in the journal?  **Y**  **N**  If so, which day & what event? ____

Place a check mark next to each category that the participant includes in the description:

- **Emotions**/ how the event made them feel
- **Thoughts**/ internal dialogue
- **Actions**/ overt activities & behaviors
- **People**/ who the event involved, who interacted with
- **Place**/ where the event took place
- **Time**/ day of the week and/or time of day
- **Dialogue**/ what was said, details of conversations
- **Sensations**/ physiological response, how the body felt
- **Time Orientation**/ how the event relates to the past, present, & future
- **Value**/ how positive or negative the event was judged
- **Surroundings**/ details describing the characteristics of the environment
- **Process**/ sequential account of the event as it unfolded, storytelling quality
- **Outcome**/ what the primary result of the event was
- **Perspectives**/ account of the event from another person’s perspective
- **History**/ what led up to the event

Total: /15

Now complete the checklist below for the corresponding event in the journal.

- **Emotions**/ how the event made them feel
- **Thoughts**/ internal dialogue
- **Actions**/ overt activities & behaviors
- **People**/ who the event involved, who interacted with
- **Place**/ where the event took place
- **Time**/ day of the week and/or time of day
- **Dialogue**/ what was said, details of conversations
- **Sensations**/ physiological response, how the body felt
- **Time Orientation**/ how the event relates to the past, present, & future
- **Value**/ how positive or negative the event was judged
- **Surroundings**/ details describing the characteristics of the environment
- **Process**/ sequential account of the event as it unfolded, storytelling quality
- **Outcome**/ what the primary result of the event was
- **Perspectives**/ account of the event from another person’s perspective
- **History**/ what led up to the event

Total: /15


