Attentional Bias in Depression and Anxiety: The Effects of Negative Mood Induction on Emotional Processing

Kayla L. Cox

Central Michigan University

Abstract

The purpose of this study was to investigate the ability of mood induction to change subsequent emotion-relevant visual perception. An effort was made to recruit individuals with high levels of depression/anxiety symptoms. Participants were selected based on a pre-screening survey used to identify individuals with high symptoms of depression; however, due to difficulties in recruitment, we opened the study to the wider population of students who completed the screening. Thirty two participants completed the laboratory study which included reaction time trials of morphing facial videos that transformed from neutral to an emotion (e.g. sad, happy, surprised, disgust, and angry). Addition subsets of indeterminate emotion faces were created consisting of blended angry and sad faces and others of blended happy and disgust faces were used to determine if participants would tend to see sad or disgust faces after a negative mood induction procedure. In between sets of 90 morphing trials, participants responded to a series 15 open ended questions intended to induce a negative mood. Participant's accuracy and reaction time on facial morphing trials were analyzed before and after the mood induction. Accuracy and reaction time data were also analyzed as a function of reported levels of depression and anxiety. The distressing questions failed to influence accuracy or reaction times on post-induction morphing trials. However, the negative mood induction appeared to cause the desired tendency to label ambiguous happy/disgust faces as disgust. Those reporting higher levels of depression shifted from seeing most happy/disgust faces as happy prior to the mood manipulation to seeing more post manipulation faces as disgust. The results provide some support for the hypothesized relationship between mood induction and attentional bias and suggest a relationship

between greater depression reports and the tendency to view ambiguous faces as displaying a negative emotion.

Attentional Bias in Depression and Anxiety: The Effects of Negative Mood Induction on Emotional Processing

Depression is more than a mood state. In its diagnostic form, depression includes a cluster of associated symptoms and complaints such as feelings of low self-worth, hopelessness, poor concentration, recurring thoughts of death and even thoughts of suicide. Depressed individuals also often report a diminished interest or pleasure in previously enjoyable activities (Kazdin, 2000). Anxiety disorders share a number of core symptoms with depression such as high levels of distress and negative self-views, and the two sets of symptoms frequently occur together.

Relationships between Anxiety and Depression

A common model used to explain the relationship among anxiety and depression is the tripartite model presented by Clark and Watson (1991). This model groups anxiety and depression symptoms into three basic subtypes. First, the characteristics that are apparent in both anxiety and depression are grouped into a broad category called Negative Affect (characterized by indicators of general distress) and include; anxious and depressed mood, insomnia, poor concentration, etc. Although depression and anxiety share common symptoms these two syndromes have specific clusters of symptoms that are exclusive from each other. Anxiety is marked by specific symptoms of somatic tension and hyperarousal (including physiological symptoms like shortness of breath and lightheadedness); whereas depression includes specific manifestations of diminished pleasure and the general absence of Positive Affect (e.g. loss of interest and experiencing feelings that suggest nothing is enjoyable) (Mineka, Watson & Clark, 1998).

Attentional Bias in Depression and Anxiety

Theories regarding depression and anxiety include salient questions such as 'What are the effects of distressed mood on emotional experiences?'. A number of researchers have sought to clarify how depression and anxiety alters emotional reactivity (e.g., Rottenberg, Gross, & Gotlib, 2005). Rottenberg et al. proposed that depressed individuals have reduced emotional reactions to all kinds of stimuli that cause both pleasant/unpleasant emotional responses. However, other theorists propose that depression is associated with a specific reduction in pleasant reactions or increased responses to negative stimuli.

According to the positive attenuation hypothesis when a depressed individual is exposed to positive stimuli they will exhibit attenuated emotional reactivity (Clark & Watson, 1991). On the other hand the negative potentiation hypothesis states that an individual with depression symptoms exposed to negative stimuli will exhibit potentiated emotional reactivity (Rottenberg et al., 2005).

Other studies have shown that depressed individuals demonstrate an attentional bias towards mood congruent information (e.g., Bradley, Mogg & Williams, 1995; Denny & Hunt, 1992; Watkins et al., 1992). Prior research examining attentional bias towards mood congruent information in depression have used pictorial stimuli to represent sadness and loss and reveal that depressed individuals spend more time looking at emotionally sad images compared to the times spent looking at other kinds of negative stimuli such as picture depicting anger or fear (Gotlib, Krasnoperova, Yue, & Joorman, 2004). Other studies have shown that depressed and anxious people have better recall for negative words in memory tests and have greater proportions of sad and anxious memories during recalled events (Denny & Hunt, 1992). Attentional bias can raise and heighten anxiety levels through an increase of encoding threatening material (Koster, De Raedt, Goeleven, Franck, & Crombez, 2005). Attentional bias in depression and anxiety appears to be an important process in understanding how those with high levels of negative affect symptoms view the world and how their attentional style may influence their cognitions and behaviors (Mogg, Millar, & Bradley, 2000). Attentional bias may be a temporary phenomenon which can be induced in the lab or reflect an ongoing tendency, thus reflecting a trait-like problem.

Mood Induction in Depression and Anxiety

Mood inductions have been used to alter individuals' behavior into a desired state for examination, for example a sad mood induction may alter behavior similar to the clinical state of depression. Lemoult et al. (2009) took participants with a history of recurrent major depression and a control group of never depressed participants and investigated how each group identified facial expressions of emotion. After presented with a negative mood induction that consisted of participants watching one of three sadness-inducing 6-minute film clips, participants were exposed to faces that gradually transformed from neutral to a full intensity. The findings supported that after a negative mood induction recurrent major depression participants required a greater emotional intensity of happy face stimuli in order to process the stimuli as happy opposed to the control group who recognized the happy face stimuli at a much lower level of intensity (Lemoult, Joorman, Sherdell, Wright, & Gotlib, 2009).

Mood induction has been used across many laboratories when exploring depression and anxiety. Researchers are interested in the relationship between emotion and cognition and thus, leading to inducing temporary mood states. There are many varieties of mood inductions used. Some of the most popular mood inductions include positive mood induction, and ones more relevant to this study are negative mood induction and sad mood induction. There are many different ways in which a mood induction could be carried out. Some examples of manipulations for a negative mood induction would be to have participants write about sad/negative memories, responding to stressful questions, responding to negative/sad emotional images, etc. Ridout, Astell, Reid, Glen, and O'Carroll (2003) found that after exposed to a negative mood induction depressed participants have superior memory for sad faces, opposed to neutral or happy faces, as well as exhibiting enhanced memory for sad faces, while showing impairments of memory for happy faces.

Current Study

In the current study, we sought to determine if a negative mood induction procedure in the form of intrusive and sad open ended questions would affect the accuracy and speed of facial recognition in individuals reporting high levels of depression and anxiety. We hypothesized that people with higher levels of distress symptoms would respond more quickly and accurately to negative emotion faces and less accurately to pleasant or neutral faces compared. We also hypothesized that when shown a blended "indeterminate" face containing aspects of both disgust/happy or both angry/sad features, those reporting greater levels of distress symptoms would differentially identify the face as either disgust or sad respectively.

Method

Participants

Thirty two young adults (51.3% women, age range: 18-22 years, *M* = 20, *SD* = 2.33) were recruited from Central Michigan University's (CMU) psychology subject pool to participate in the study. A pre-screening survey was given at the beginning of spring semester and was used to identify those holding high levels of depression/anxiety symptoms. Participants were recruited from both high scorers and average range scorers and were compensated through extra credit or five dollars. An initial effort was made to recruit those reporting notably high levels of depression; however, after a low rate of participation from this specific group the study was opened to all subject pool participants.

Measures and Stimuli

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used prior to selecting participants to identify those who might have high depression symptoms. The CES-D is a self-report depression scale for research in the general population. It includes items such as, "I felt that I could not shake off the blues even with help from my family and friends" and "I felt that I was just as good as other people". Another CES-D survey was given to the participant before they began the study. The Spielberger State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983), was used to measure levels of trait anxiety. The STAI is also a self-report scale designed to measure ongoing trait like anxiety. It includes items such as, "I feel at ease" and "I lack self-confidence".

There were various other scales used prior to participants' involvement in the study. These scales are as follows; Emotional Regulation Questionnaire (ERQ; Gross & John, 2003), Toronto Alexithymia Scale (TAS; Leising, Grande & Faber, 2009), Social Interaction Anxiety Scale (SIAS; Mattick & Clark, 1998), Schizotypal Personality Questionnaire-Brief (SPQ-B; Raine & Benishay, 1995), Depression Anxiety Stress Scale (DASS; Loyibond & Loyibond, 1995).

The faces used to create the morphing videos were selected from a large set of university aged individuals (non-CMU students). The faces were filtered by applying an oval to remove any hair and clothing in an image processing program (Photoshop). Two hundred morphing videos were created (using FantaMorph) and an addition 40 indeterminate face morphing videos were created for this study. Specifically for this study the emotions sad and angry were combined for the sad mood induction for individuals with high levels of depression. For those with high levels of anxiety the two emotions happy and disgust were combined for the negative mood induction. Each video lasted 1 second

There were two separate conditions that were created based on individuals with high levels of depression or individuals with high levels of anxiety. The first condition contained the affect faces of sad, angry, surprised, happy, and the indeterminate face of sad/angry and these affect faces were used for those with high levels of depression. The other condition contained the affect faces of disgust, surprised, angry, happy, and the indeterminate face of happy/disgust, which were used for participants that had high levels of anxiety.

The interview questions used during the mood induction were taken from stimuli created by a group of students from the Theater Department at CMU. Theater students in two classes were approached to assist in this process and were recorded while asking the interview questions. After reviewing the videos the one male was selected and we used his interview questions for the study. Example questions include “What is one thing you regret the most in your past?”, and “What is one of your saddest memories?” They were designed to evoke sad/negative affect in the participants.

To get valid and useful eye movement data, accurate and reliable calibration was essential. The ISCAN RK464 (Iscan, Inc.) eye tracking device contains an infrared camera, two monitors and the computer software for gathering the computerized data (these data were collected but not analyzed for this project). E-Prime (version 2.0) experimental software was used to display morphing faces and the interview stimuli and collected response latencies for each trial of the morphing videos.

The reaction time was measured through a voice sensitive microphone trigger. A separate recorder was used to record the content of the responses to the morphing videos (responses were later checked for accuracy). The voice recorder also recorded the responses to the interview questions.

Procedure

Data was collected in Dr. Quirk’s experimental lab in Sloan 113 on CMU’s campus. Each participant was assigned a subject number to ensure confidentiality and experimenters were blind to participants’ scores on depression and anxiety scales at the time of data collection.

Participants were asked to read and sign the consent form and completed a demographic questionnaire followed by various self-report scales. A standard eye chart was used to assure participants had corrected vision of at least 20/40. After the participant understood the tasks and any questions were answered, headphones were placed on the participant's head and a Velcro strap was adjusted to help keep the participant's head stable. The participant was situated with his/her cheeks on the rests of the eye tracking head rest (an apparatus used to stabilize the head to allow for accurate measurement of eye gaze/movement).

There were three distinct parts to this study. First, participants were asked to look at faces on a computer screen and watch them change from neutral to an emotion (e.g. sad, happy, disgust, angry, or surprised). As the faces morphed from neutral to the emotionally charged face the participant was directed to say the terminal emotion out loud as quickly as possible. After 10 training trials, 90 morphing videos were randomly selected from a pool of 120 (which included 20 indeterminate face videos) and presented to 1 second each with a 2 second pause between each trial. A voice trigger response microphone collected reaction time data. A separate voice recorder was used to record actual responses to allow for accuracy check.

Next, the participant responded to a series of 15 audio interview questions which asked about personal feelings, experiences, and thoughts. The participants were asked to reply to each question out loud and the responses were recorded. After the interview, the participant completed another morphing task consisting of another set of 90 videos selected in the same manner as the initial set. The study was approved by the Institutional Review Board at CMU.

Data analysis

The study was a pre-post within-subjects design that examined the participant's reaction time and accuracy before and after undergoing a negative mood induction. We analyzed the results for reaction time using a 2x2 repeated measures pre-post mood induction. For the morphing trials we excluded any trials of abnormal length (either too quick of a response or too delayed). We identified these outliers by excluding trials more than 2 standard deviations above or below the mean for the individual's trial times. To analyze data for indeterminate face trials, the proportion of negative responses (e.g. angry, sad, or disgust) were divided by proportion of other responses (e.g., happy, surprise) so that greater scores reflected a great proportion of negative responses to the indeterminate face morphs. These ratio data were also used in 2x2 repeated measures analyses. To create grouping variables, we performed a median split of high/low depression and anxiety scores.

Results

We analyzed our results using SPSS 17. Prior to final analyses, initial data reduction was completed in Excel. Participants were assigned ID numbers to safeguard their identities. We only used the ID numbers when working with the results and presenting the findings.

Reaction Time

For the reaction time we conducted a repeated-measures analysis (within-subjects design) pre-post the negative mood induction to test the hypothesis that high depression or anxiety participants would have a decreased reaction time for negative emotional faces after the mood induction. If this hypothesis was supported, we should see significant group by time interaction effects for depression and/or disgust face reaction times. Instead, we found that participants became faster in identifying most faces over the course of the study and we found no evidence of the group by time interaction. For example, participants were quicker at identifying the surprise faces over the course of the study, $F(1,30) = 3.89$, $p = .06$, and time accounted for 11.5% of variance in reaction time speed (perhaps reflecting a learning or training effect). There was no difference between groups in reaction time, $F(1,30) = .41$, $p = .52$, with group accounting for 1.3% of the variance in reaction time. Similarly, no group by time interaction was found, $F(1,30) = .21$, $p = .65$, with this effect accounting for less than 1% of variance.

Next we looked at reaction time for the condition of happy-disgust, first we looked at the anger affect again using a repeated-measures analysis (within-subjects design) pre-post the negative mood induction. For anger we found that participant also were faster to recognize anger faces over the course of the study and there was a main effect for time, $F(1,19)= 8.61$, $p =.009$, time accounted for 31.2% of variance in reaction speed. There was no difference between groups in reaction time, $F(1,19) = .864$, $p =.36$, with group accounting for 4.4% of the variance in reaction time. Similarly, no group by time interaction was found, $F(1,19) =.011$, $p = .92$, time accounted for .1% of the variance in reaction time.

We also found that participants in the disgust-happy condition were slower to responding to the happy stimuli which supports one of our hypothesis, $F(1,19) = 4.71$, $p =.043$, time accounted for 20% of the variance in reaction time. There was no difference between groups in reaction time, $F(1,19)=.13$, $p=.73$, with group accounting for .7% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,19)=.071, *p*=.79, time accounted for .4% of the variance in reaction time.

Lastly, participants in the happy-disgust condition were quicker to responding to the disgust faces (see Figure 2), *F*(1,19) = 4.25, *p* = .053, time accounted for 18.3 % of the variance in reaction time. There was no difference between groups in reaction time, *F*(1,19)=. 34, *p*=.57, with group accounting for 1.8% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,19) = .027, *p* =.87, time accounted for .1% of the variance in reaction time.

Next we looked at the reaction time of the condition sad-angry and conducted a repeated-measures analysis (within-subjects design) pre-post the negative mood induction. For the happy affect we found no effect for time for the sad-angry trials, *F*(1,9) = 1.03, *p*=.34, time accounted for 1.2% of the variance in reaction time. There was a non-significant difference between groups in reaction time, *F*(1,9)=2.22, *p*=.17, but group membership accounted for a substantial amount (19.8%) of the variance in reaction time. Similarly, whereas no group by time interaction was found, *F*(1,9) = 2.84, *p* = .13, but this effect approached significance and accounted for 24% of the variance in reaction time.

For the sad-angry condition and the sad affect faces accuracy did not differ pre to post induction, *F*(1,9) = .08, and time accounted for .9% of the variance in reaction time. There was no difference between groups in reaction time, *F*(1,9) = .10 with groups accounting for 1.1 % of the variance in reaction time. Although, no group by time interaction was found, *F*(1,9) = 3.01, *p*=.12, this effect was substantial and accounted for 25% of the variance in reaction time.

When we reviewed the results for the anger affect, accuracy improved but at a non-significant level, *F*(1,9) = 1.75, *p*=.22, time accounted for 16.3% of the variance in reaction time. There was no difference between groups in reaction time, *F*(1,9)= .411, *p*=.538, with groups accounting for 4.4% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,9)=2.30, *p*=.16, time accounted for 20.3% of the variance in reaction time.

Accuracy

The hypothesis that individuals with high levels of depression would show an increase in bias (errors) in emotional discrimination was not supported. For the surprise affect face (which included the entire sample because it appears in both conditions) participants were very high in accuracy for the pre and post trials with average accuracy over 93% at both times, *F*(1,30)=.104, *p*=.75, time accounted for .3% of the variance in reaction time. There was no difference between groups in accuracy, *F*(1,30)=.003, *p*=.96, with groups accounting for no variance in reaction time. Similarly, no group by time interaction was found, *F*(1,30)=.000, *p*=1.00, and time accounted for no variance in reaction time.

When examining the condition of sad/angry and the affect face of sad there was a main effect for time for high and low levels of depression, *F*(1,9)=10.24, *p*=.011, time accounted for 53.2% of the variance in accuracy time. There was no difference between groups in accuracy, *F*(1,9)=.554, *p*=.476, with group accounting for 5.8% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,9)=.661, *p*=.437, time accounted for 6.8% of the variance in reaction time.

When looking at the sad/angry condition, more specifically the affect face of anger participants improved on accuracy, *F*(1,9)=6.06, *p*=.036, time accounted for 40.2% of the variance in reaction time. There was no difference between groups in accuracy, *F*(1,9)=.154, *p*=.704, with groups accounting for 1.7% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,9)=.448, *p*=.520, time accounted for 4.7% of the variance in reaction time.

The affect face of happy for the sad/angry condition participants stayed the same for accuracy, *F*(1,9)=.344, *p*=.572, time accounted for 3.7% of the variance in reaction time, There was no difference between groups in accuracy, *F*(1,9)=.344, *p*=.572, with groups accounting a for 3.7% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,9)= .256, *p*=.625, time accounted for 2.8% of the variance in reaction time.

When observing the condition of happy/disgust and looking at the affect face of disgust participants stayed the same on accuracy, *F*(.484), *p*=.495, with groups accounting for 2.5% of the variance in reaction time. There was no difference between groups in accuracy, *F*(1,9)=.491, *p*=.492, time accounted for 2.5% of the variance in reaction time. Similarly, no group by time interaction was found, *F*(1,9)=.095, *p*=.761, time accounted for .5% of the variance in reaction time.

Looking at the affect face for angry (disgust/happy condition) there was a main effect for time (participants became more accurate over the course of the study), *F*(1,19)= 8.941, *p*=.008, time accounted for 32% of the variance in reaction time. There was no difference between groups in accuracy *F*(1,19)=.187, *p*=.670, with groups accounting for

1% of the variance in accuracy. Similarly, no group by time interaction was found, $F(1,19)=.027$, $p=.872$, time accounted for 1% of the variance in reaction time.

For the affect face happy participants tended to stay the same for accuracy, $F(1,19)=.420$, $p=.525$, time accounted for 2.2% of the variance in reaction time. There was no difference between groups in accuracy, $F(1,19)=.466$, $p=.024$, time accounted for 2.4% of the variance in reaction time . Similarly, no group by time interaction was found, $F(1,19)=3.206$, $p=.089$, time accounted for 14.4% of the variance in reaction time.

Indeterminate faces

The hypothesis that there would be an increase in responses of “disgust” to the indeterminate face of happy/disgust was supported (greater values represent higher proportion of negative face labeling), $F(1,19)=23.855$, $p=.000$, time accounted for 55.7% of the variance in reaction time. There was no difference between groups, $F(1,19)=.680$, $p=.420$, with groups accounting for 3.5% of the variance in reaction time. There was a group by time interaction, $F(1,19)= 3.555$, $p= .075$, time accounts for 15.8% of variance(this is also represented in Figure 3)

The hypothesis that there would be an increase in “sad” responses to the indeterminate face sad/angry was not supported, $F(1,9)=1.589$, $p=.239$, time accounted for 15% of the variance in reaction time. There was no difference between groups, $F(1,9)=.001$, $p=.975$, with groups accounting for 0% of the variance in reaction time, Similarly, no group by time interaction was found, $F(1,9)=.000$, $p=.999$, time accounted for 0% of the variance in reaction time. The sad/angry indeterminate affect was coded such that greater values represented a tendency to label the face as sad. Overall the tendency was to label the faces as sad but after the negative mood induction we pushed them to label ambiguous sad/angry faces as more angry than sad.

Discussion

Our purpose was to investigate the ability of mood induction to change subsequent emotion-relevant visual perception. Participants completed the laboratory study which included reaction time trials of morphing facial videos that transformed from neutral to an emotion (e.g. sad, happy, surprised, disgust, and angry). We also included subsets of indeterminate faces (one was an angry and sad face meshed together and the other was a happy and disgust face meshed together). These indeterminate faces were used to determine if participants would tend to see sad or disgust faces after a negative mood induction procedure.

When reviewing the results the major hypotheses about group by time interaction were not observed. This suggests that the negative mood induction did not affect the speed of reaction times for mood congruent faces. However, the indeterminate faces showed interesting results. There was a tendency for more depressed individuals to label the happy/disgust faces as a negative face after the negative mood induction was given. The mood induction appeared to have an impac6t on perceptual bias when examined with these indeterminate faces.

In closing, if we could have ran our analyses with a larger sample size we would have seen more significance and this was probably the leading limitation of our study. Another limitation is that the emotional discrimination procedure showed to be a simple task, which yielded high accuracy to begin with. However, this study is a good beginning to potentially explaining how depression and anxiety effects emotions and how depressed/anxious individuals in turn respond to their environment. It also helps to understanding how individuals with high levels of depression and anxiety react to distressing information visually.

References

Berenbaum, H., & Oltmanns, T. F. (1992). Emotional experience and expression in schizophrenia and depression. *Journal of Abnormal Psychology. 101*, 37-44.

Bradley, B.P., Mogg, K., & Williams, R. (1995). Implicit and explicit memory for emotion-congruent information in clinical depression and anxiety. *Behaviour Research and Therapy, 33*, 755-770.

Clark, L.A, & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100,* 316-336.

Denny, E.B., & Hunt, R.R. (1992), Affective valence and memory in depression; Dissociation of recall and fragment completion. *Journal of Abnormal Psychology, 101*, 575-580.

Gotlib, I.H., Kransnoperova, E.,Yue, D.N, & Joormann, J. (2004). Attentional biases for negative interpersonal stimuli in clinical depression. *Journal of Abnormal Psychology*, *113*, 127-135.

Gross, J.J., & John, O.P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348-362.

Hinchliffe, M, Lancashire, & Roberts, F. J. (1970) Eye-contact and depression: A preliminary report. *The British Journal of Psychiatry*. 117, 571-572. doi:10.1192/bjp.*117*, 540.571.

Kazdin, Alan E. (2000). *Encyclopedia of psychology.* American Psychological

Association Washington, D.C.

Koster, E. H. W., De Raedt, R., Goeleven, E., Franck, E., & Crombez G. (2005). Mood-congruent attentional bias in dysphoria: Maintained attention to and impaired disengagement from negative information. *Emotion, 5,* 446-455.

Leising, D., Grande, T., and Faber, R. (2009). The toronto alexithymia scale (tas-20): A measure of general psychological distress. *Journal of Research in Personality,* 43(4):707-710.

Lemoult, J., Joormann, J., Sherdell, L., Wright, Y., Gotlib, I. H. (2009).Identification of emotional facial expressions following recovery from depression. *Journal of Abnormal Psychology. 118,* 828-833.

Lovibond, S.H. & Lovibond, P.F. (1995). *Manual for the Depression Anxiety Stress Scales*. (2nd. Ed.) Sydney: Psychology Foundation.

R.P. Mattick and J.C. Clarke(1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behavior Research and Therapy 36,* 455–470.

Mineka, S., Watson, D., and Clark, L.A. (1998). Comorbidity of anxiety and unipolar mood disorders. *Annual Review of Psychology. 377,* 412.

Mogg, K., Millar, N., & Bradley, B. P. (2000). Biases in eye movements to threatening facial expressions in general anxiety disorder and depressive disorder. *Journal of Abnormal Psychology. 109,*695-704.

Radloff, L.S. (1977) 'The CES-D scale: A self report depression scale for research in the general population'. *Applied Psychological Measurement* 1: 385-401.

Raine, A., Benishay, D., (1995). The SPQ-B: a brief screening instrument for schizotypal personality disorder. *J. Pers. Disord*. 9, 346-355.

Ridout, N., Astell, A. J., Reid, I. C., Glen, T., & O'Carroll, R. E. (2003) Memory bias for emotional facial expressions in major depression. *Cognition and Emotion. 17*, 101-122. doi:10.1080/02699930143000626.

Roelofs, K., Putman, P., Schouten, S., Lange, W., Volman, I., Rinck, M. (in press, 2009). Gaze direction differently affects avoidance tendencies to happy and angry faces in socially anxious individuals. *Behaviour Research and Therapy*. doi:10.1016/j.brat.2009.11.008.

Rottenberg, J., Gross, J. J., & Gotlib, I. H.(2005) Emotion context insensitivity in major depressive disorder. *Journal of Abnormal Psychology, 114,* 627-639.

Spielberger, C. D., Gorsuch, R. L., Lush'ene, R., Vagg, P. R. & Jacobs; G. A. (1983). Manual for the State- Trait Anxiety Inventory (Form Y) ("Self-Evaluation Questionnaire") Consulting Psychologists Press.

Watkins, P.C., Mathews, A., Williamson, D.A., & Fuller, R.D. (1992). Mood-congruent memory in depression: Emotional priming pr elaboration? *Journal of Abnormal Psychology*, *101*, 581-586.

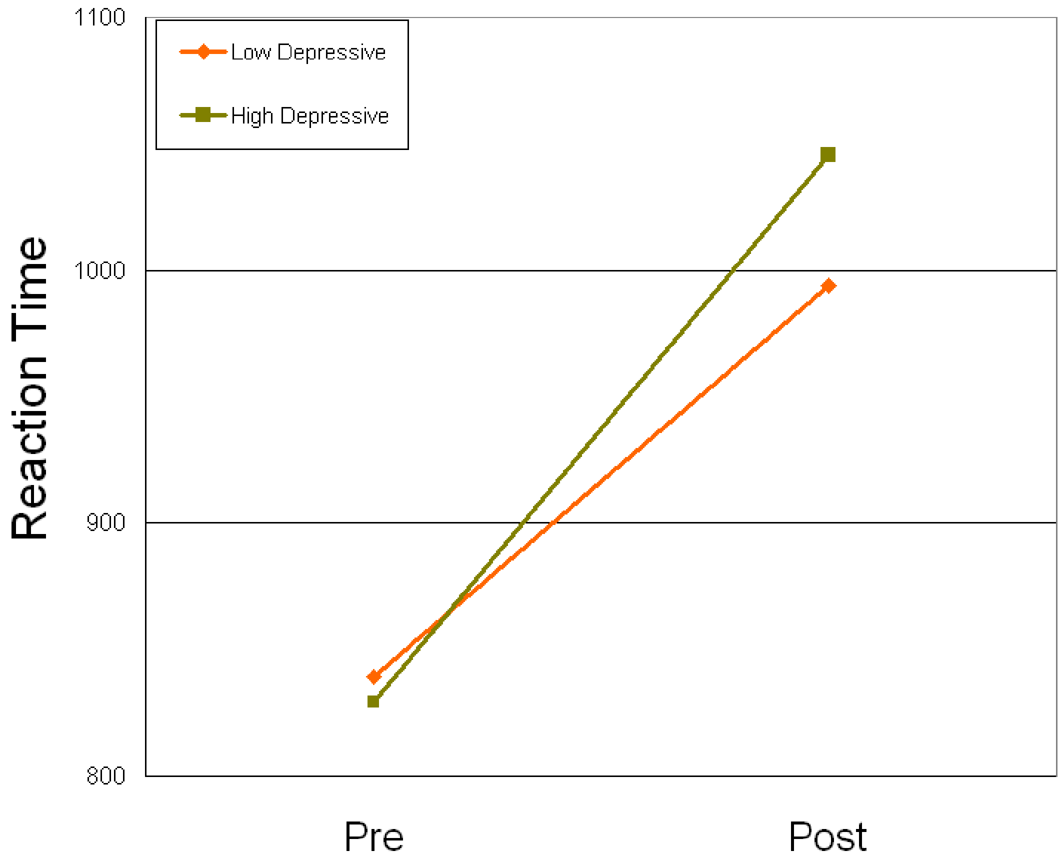

***Figure 1*: This graph shows that participants were slower to respond to the happy stimuli (for the sad/angry condition)**

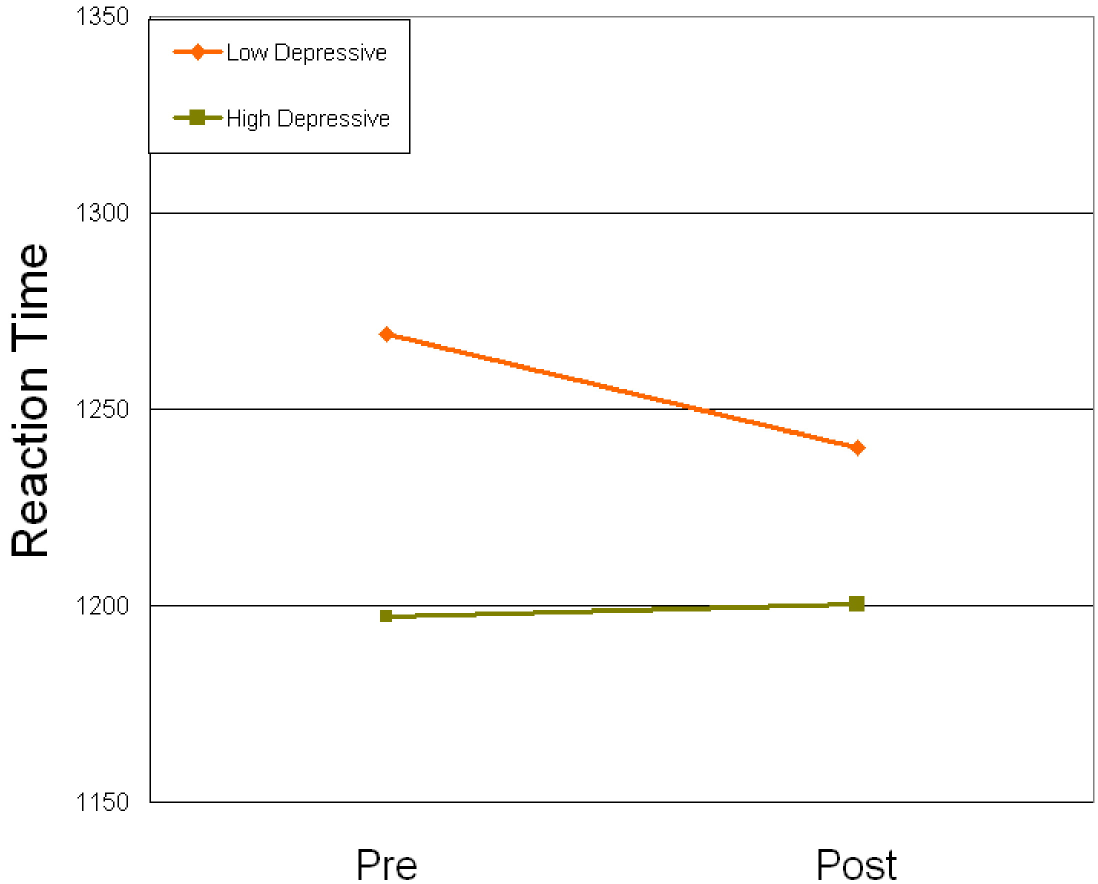

***Figure 2*: This graph represents participants that were quicker to respond to the disgust faces (for the happy/disgust condition)**

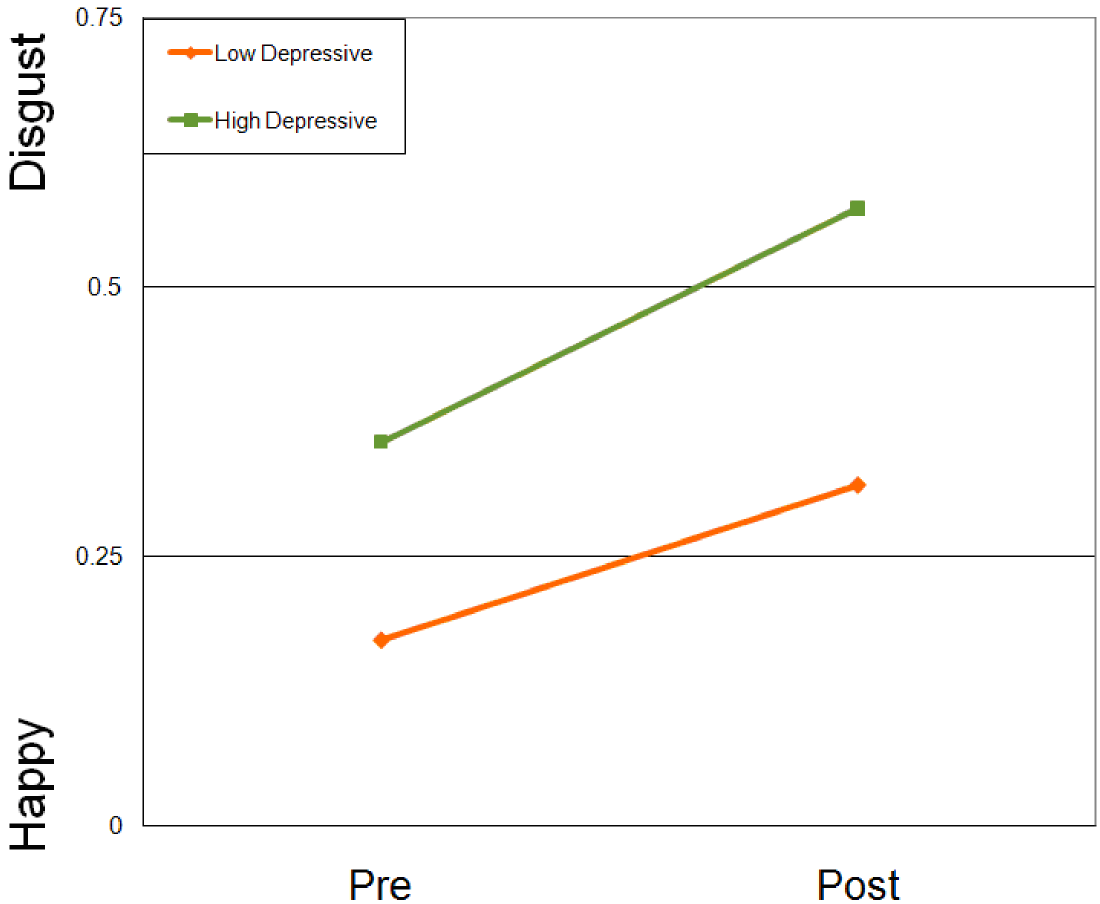

Figure 3: **this Graph represents the significance of negative responses to the indeterminate face of happy/disgust, which was only present in the happy/disgust condition**