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Affective Reactivity and the Tripartite Model in Depression, Anxiety, and Comorbidity: A Tale of Two Models

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ABSTRACT

Affective Reactivity and the Tripartite Model in Depression, Anxiety, and Comorbidity: A Tale of Two Models

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Background: The tripartite model (Clark & Watson, 1991) has been used to represent the substrates of general distress in both depression and anxiety (Negative affectivity [NA]), while also characterizing specific features of decreased positive affectivity (PA) in depression and increased physiological hyperarousal (PH) in anxiety. Core affect characterizes affect by two dimensions: valence, which ranges from unpleasant to neutral to pleasant, and arousal, which ranges from deactivation to activation. Research has shown how an individual's immediate valence and arousal responses to emotional stimuli (termed *affective reactivity*) may be a substrate of psychopathology with suppressed valence and arousal to pleasant stimuli in depression and increased valence and arousal to unpleasant stimuli in anxiety (Bylsma, Morris, & Rottenberg, 2008; Lang & McTeague, 2009). This study compared levels of constructs of the tripartite model and affective reactivity to varied stimuli (words, pictures, sounds) in adults with and without depression and anxiety relative to healthy adults. **Methods**: The sample included depressed (n = 45), anxious (n = 51), comorbid (n = 43), and healthy adults (n = 44) who were recruited via online and paper advertisements from the community. In addition to other self-report measures, participants filled out the Mood and Anxiety Symptom Questionnaire (MASQ, Clark & Watson, 1991) to measure constructs of the tripartite model and completed behavioral computerized tasks to measure constructs of affective reactivity. **Results**: Mixed-design Generalized Linear Models (GLMs) were conducted. Group differences were found on

constructs of the tripartite model. Unpleasant and pleasant stimuli were rated significantly more negatively and less arousing compared to healthy controls. Pictures were rated significantly more negatively than words and sounds. **Conclusions**: Results support the tripartite model indicating that depression is characterized by lower levels of PA; however, this is not reflected in the affective reactivity findings. Rather, results suggested a transdiagnostic effect that neutral stimuli may evoke a more intense arousal reaction in depression and anxiety compared to healthy controls despite being seen as similarly neutral in terms of valence. In particular, this occurs more specifically for visual and auditory forms of neutral stimuli (e.g., pictures and sounds) rather than words.

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CHAPTER 1: INTRODUCTION

Prevalence rates of depression and anxiety are among the highest of all psychiatric disorders (Ansseau et al., 2004; Spitzer et al., 1994). In community samples, prevalence rates range from 4.9% (current) to 10.3% (past 12 months) and 17.1% (lifetime) for depression (Grant et al., 2005; Kessler et al., 2003; Kessler et al., 1994). Prevalence rates differ for each anxiety diagnosis: generalized anxiety disorder (GAD), panic disorder, posttraumatic stress disorder (PTSD), and social phobia are the most common diagnoses, affecting 2-13% of the population (Roy-Byrne et al., 2000; Wittchen, 2002; Gross et al., 2005). Epidemiological studies report that lifetime diagnoses of depression and anxiety co-occur at high rates: approximately 40-75% of the time (Clark, 1989; Kessler et al., 1996). Furthermore, the functional impairment caused by a single disorder alone is high, and is even higher for individuals with both disorders (Kessler et al., 2003; Kessler et al., 1996).

This frequent overlap between depression and anxiety has prompted researchers to develop theories to explain their comorbidity by examining shared and unique symptoms of each disorder. The tripartite model, developed by Clark and Watson (1991), is one such model, and has received support from a variety of studies, including factor analytic, family and twin studies (Kendler, Neale, Kessler, Heath, & Eaves, 1993; Klein, Durbin, Shankman, & Santiago, 2002; Shankman & Klein, 2003). This model uses temperament dimensions of negative affectivity (NA) and positive affectivity (PA) to characterize depression and anxiety. Specifically, NA is related to neuroticism and is indicative of general distress that is common to the diagnoses of both depression and anxiety. Importantly, the core of this dimension is a sensitivity to unpleasant stimuli (Tellegen, 1985), indicating these individuals may have a heightened response to aversive

or unpleasant stimuli compared with other types of stimuli. PA is related to extraversion and traits of PA include enthusiasm, reward-seeking, increased social behavior, and high energy.

Depression is distinguished by low levels of PA, related to the anhedonic component of the disorder (Clark, Watson, & Mineka, 1994_ENREF_12) and manifested in symptoms such as low motivation, decreased energy, loss of interest and lack of reward responsiveness. Conversely, PA does not play a role in the experience of anxiety. Rather, anxiety is characterized by physiological hyperarousal (PH), which includes symptoms such as tachycardia, sweaty palms, dizziness, headaches, and shortness of breath. Unlike NA and PA, PH is not a temperament or personality dimension; it distinguishes the physiological experience of anxiety from other anxiety symptoms (e.g., worry and general distress). Notably, more recent iterations of the tripartite model have posited that PH may be specific to panic disorder while other anxiety disorders (OCD, GAD, social phobia) have their own differentiating characteristics (such as anxious apprehension, Mineka, Watson, & Clark, 1998). This suggests that anxiety disorders are heterogeneous (Zinbarg & Barlow, 1996), though specific factors for each separate anxiety disorder have yet to be well-delineated. Alternatively, PH may be more related to the immediate experience of anxiety in response to emotional stimuli, which may cut across diagnoses. Importantly, the tripartite model predicts differences in how individuals with depression and anxiety emotionally respond both physiologically and behaviorally.

Traditional models of emotion characterize emotions as discrete experiences with differing neural pathways. Differentially, multidimensional views of emotion hypothesize that affective experience involves the properties of valence (ranging from unpleasant to neutral to pleasant) and arousal (ranging from low to high intensity) (Wundt, 1924; for a review, see Scherer, 2000). Recent models have supported this view and describe emotional response as

consisting of varying degrees of these two dimensions (Feldman, 1995; Posner, Russell, & Peterson, 2005; Russell, 1980; Russell & Barrett, 1999). Within these models, core affect is a neurophysiologic function characterized by valence and arousal. Affective reactivity is conceptualized as an individual's immediate valence and arousal responses to emotional stimuli. In particular, the distinction between positive and negative affect (the valence dimension) has found a wealth of support and forms the basis for the tripartite model (Watson, Clark, & Tellegen, 1988). Neuroscience and psychophysiological studies have also supported this characterization, with specific, distinguishable correlates of valence (frontal lobe, facial electromyography [EMG]) and arousal (posterior frontal lobe, skin conductance, heart rate) (Davidson, 1998; Lang, Greenwald, Bradley, & Hamm, 1993; Cacioppo, Tassinary, & Berntson, 2007).

A large body of research has examined differences in affective reactivity between depression and anxiety. Some research suggests depression is distinguished by blunted reactivity to pleasant stimuli, potentially corresponding to anhedonic experience (Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; McFarland & Klein, 2009). Alternatively, depression has also been characterized by heightened reactivity to unpleasant stimuli (Gollan, Pane, McCloskey, & Coccaro, 2008). Many studies have supported the notion that depression is primarily distinguished by blunted reactivity to pleasant stimuli (i.e., manifested in lower valence ratings to pleasurable stimuli; Sloan, Strauss, & Wisner, 2001). Psychophysiologically, depressed participants have shown a blunting of electrical activity in the left prefrontal cortex (measured by EEG), associated with approach/appetitive motivation (Henriques & Davidson, 1991); this corresponds to the decreased experience of pleasure and general decline in goal-related motivation in depression. Furthermore, participants with depression have shown decreased startle

response and skin conductance responses (SCRs) to emotional stimuli (Kaviani et al., 2004; Mardaga & Hansenne, 2009). There have been mixed results in studies with unpleasant stimuli. Though psychophysiological studies have found that depressed participants have exaggerated responses to unpleasant stimuli (e.g., Cook, Davis, Hawk, Spence, & Gautier, 1992; Cook, Hawk, Davis, & Stevenson, 1991), other studies have found normal responses or even a lack of startle potentiation (Allen, Trinder, & Brennan, 1999; Dichter, Tomarken, Shelton, & Sutton, 2004).

Finally, the Emotion Context Insensitivity (ECI) theory hypothesizes that depression is characterized by blunted reactivity to all emotional stimuli, regardless of valence (Rottenberg, Gross, & Gotlib, 2005). A recent meta-analysis of self-report, behavioral, and physiological variables supported the ECI hypothesis, indicating that depression is characterized by blunted reactivity to both pleasant *and* unpleasant stimuli (Bylsma et al., 2008). However, this may vary with severity of symptoms and/or comorbidity. For example, one study showed that depressed patients high on anhedonia showed decreased startle response to both pleasant and unpleasant film clips while those low on anhedonia showed this decreased response only to pleasant clips (Kaviani et al., 2004). Furthermore, the effects of anxiety symptoms within depression on affective reactivity are unclear.

Though depression is distinguished by blunted reactivity, anxiety has been associated with heightened reactivity to threatening or aversive stimuli. This is particularly true for ratings of arousal, evidenced by research demonstrating that anxious participants rated threatening and unpleasant stimuli as more arousing than healthy participants (Lang & McTeague, 2009; Kaviani et al., 2004; Kemp & Felmingham, 2008; Larson, Nitschke, & Davidson, 2007). While depression may occur as a result of a blunted approach system, anxiety may occur due to a

heightened withdrawal system (Davidson, 1994, 1998). This may also explain the vigilance to external threat and the increased general arousal associated with anxiety disorders (Kring & Bachorowski, 1999). Importantly, this correlates with both the NA and PH dimensions in the tripartite model (Clark & Watson, 1991; Mineka et al., 1998; Shankman & Klein, 2003). Psychophysiologically, clinically anxious participants have demonstrated a higher frequency of nonspecific SCRs and a lack of habituation to stimuli compared to healthy and depressed participants (Pruneti , Lento, Fante, Carrozzo, & Fontana, 2010) as well as increased reactivity (SCRs and startle responses) to phobic imagery (Cook, Melamed, Cuthbert, McNeil, & Lang, 1988; Cuthbert et al., 2003). There have also been differences in pervasive, non-specific (e.g., GAD) versus situational (e.g., specific phobia) anxiety. Participants with non-specific, more generalized anxiety have demonstrated diminished physiological flexibility and restricted range in their responses (Hoehn-Saric, McLeod, Funderburk, & Kowalski, 2004; Hoehn-Saric, McLeod, & Zimmerli, 1991; Cuthbert et al., 2003). Notably, while there is a lack of expected heightened physiological reactivity in these individuals, their self-reported ratings in response to aversive stimuli were still higher than healthy controls (Mardaga & Hansenne, 2009; McTeague & Lang, 2012). This indicates a discrepancy between self-reported arousal response and actual physiological arousal response in these individuals.

Few studies have examined affective reactivity in comorbid depression and anxiety. Some limited data have shown that facial EMG and startle blink magnitude were attenuated in anxiety participants with comorbid depression compared to those with anxiety alone (Cuthbert et al., 2003; Lang & McTeague, 2009; McTeague & Lang, 2012; McTeague et al., 2009; Melzig, Weike, Zimmermann, & Hamm, 2007). This is consistent with the finding that depression is primarily characterized by blunted physiological reactivity, even within the context of anxiety.

Ratings of valence and arousal in comorbidity are not well understood, and research on each disorder separately predicts contradictory findings (e.g., higher ratings in anxiety, blunted ratings in depression). Studies examining differential patterns of affective reactivity in a depressed, anxious, and separate comorbid sample are scarce (Bylsma et al., 2008). Rather, studies have examined a primary disorder (depression or anxiety) then subdivided participants into comorbid versus non-comorbid samples, making it difficult to discern the relative contributions of each disorder on valence and arousal dimensions.

Taken together, this suggests a gap in our understanding of how individuals with comorbid depression and anxiety evaluate emotional stimuli, a process that is central to theories of emotion (Davidson, Pizzagalli, Nitschke, & Kalin, 2003). The constructs outlined by these models provide important information on this process, and their concurrent examination in a single sample may refine our knowledge of emotional responding and how this relates to symptoms within depression and anxiety, both together and separately. Furthermore, this supports research efforts to understand pathology in terms of severity of impairment in various areas of functioning, particularly within negative and positive valence systems. This study therefore examined the tripartite model and affective reactivity in a sample of depressed, anxious, comorbid, and healthy adults. In order to understand differences in depression and anxiety, only depressed, anxious, and comorbid groups were compared.

Hypotheses were as follows:

1. Depressed participants (with and without anxiety) will have lower levels of PA compared to anxious participants, as measured by the Mood and Anxiety Symptom Questionnaire (MASQ, Clark & Watson, 1991), indicating a greater diagnosis effect

for PA compared to NA. Anxious participants (with and without anxiety) will have higher levels of anxious arousal compared to depressed participants.

2. Depressed participants (with and without anxiety) will give lower valence ratings to pleasant stimuli (pictures, words, and sounds) compared to anxious participants, as measured by bidimensional valence ratings provided immediately after stimulus presentation.
3. Depressed participants (without anxiety) will rate unpleasant stimuli as less negative (words, sounds, and pictures) compared to anxious participants.
4. Depressed participants (with and without anxiety) will give lower arousal ratings to pleasant stimuli (pictures, words, and sounds) compared to anxious participants. Depressed participants (without anxiety) will give lower arousal ratings to unpleasant stimuli (pictures, words, and sounds) compared to anxious participants.
5. Anxious participants will give higher arousal ratings to unpleasant and neutral stimuli compared to comorbid (anxiety with depression) participants.

CHAPTER 2: METHODS

Participants

The sample included 65 male and 144 female participants (ages 18-65 years) who were enrolled in an Institutional Review Board-approved study at Northwestern University Feinberg School of Medicine in the Department of Psychiatry and Behavioral Sciences (Chicago, IL).

Inclusion Criteria: Participants were included in the clinical groups if they met criteria for a current depressive disorder (major depressive disorder, dysthymia, or double-depression; depressed group), a current anxiety disorder (excluding obsessive-compulsive disorder [OCD]; anxious group), or both (comorbid group) as determined by the Structured Clinical Interview for DSM-IV (SCID). Healthy participants were included if they had no psychopathology. Furthermore, clinician-rated and self-report symptom rating scales were used to delineate group membership: the Hamilton Rating Scale for Depression (HRSD), the Beck Depression Inventory, Second Edition (BDI-II), the Hamilton Anxiety Rating Scale (HAM-A), and the Beck Anxiety Inventory (BAI). The depressed group required scores of $\geq$ 14 on the HRSD and $\geq$ 20 on the BDI-II, $\leq$ 10 on the HAM-A, and $\leq$ 15 on the BAI; the anxious group required scores of HRSD $\leq$ 13, BDI-II $\leq$ 19, HAM-A $\geq$ 10, & BAI $\geq$ 15; the comorbid group required scores of HRSD $\geq$ 14, BDI-II $\geq$ 20, HAM-A $\geq$ 10, & BAI $\geq$ 15, and the healthy group required scores of HRSD $\leq$ 14, BDI-II $\leq$ 19, HAM-A $\leq$ 10, & BAI $\leq$ 15.

Exclusion Criteria: Participants were excluded if they endorsed medical illness, bipolar, schizophrenia or any psychotic disorder, OCD, substance abuse/dependence within the last six months, borderline, schizotypal, antisocial personality disorders, pregnancy, medication use, and animal phobia or philia (evoking a biased reaction to pictures). Participants were also excluded if they exhibited evidence of imminent risk of suicide or homicidal behavior (Scale for Suicide

Ideation score > 16 (Beck, Kovacs, & Weissman, 1979), or score 3 on item 3 of the HRSD-17), reported the use of any psychotropic medications that influence emotional functioning within the last two weeks, had a history of any head trauma with loss of consciousness, seizures or other significant neurological conditions, or use of other substances including: sedating antihistamines, melatonin, psychoactive botanicals, and consumption of activating substances such as those found in energy drinks or supplements.

Participants were excluded from analyses if they did not have complete datasets or their data was unreliable or invalid. This excluded 26 participants (23 for missing data, 3 for having lack of variability or fast reaction times in their responses on the affective reactivity tasks) prior to the analyses. The final sample size (N = 183) included 45 depressed participants, 51 anxious participants, 43 comorbid participants, and 44 healthy participants.

Measures

Structured Clinical Interview for the DSM-IV Axis I Disorders, Outpatient Version (SCID; First, Spitzer, Gibbon, & Williams, 1995). The SCID is a semi-structured interview that collects demographic information (age, sex, race, years of education, marital and employment status) and clinical data (lifetime and current DSM-IV Axis I diagnoses, severity, and age of onset). Inter-rater reliability for modules has been reported to be between .7 and 1.0 (First et al., 1995). Our reliability checks yielded kappa coefficients of .83 for the mood and .93 for the anxiety modules.

Structured Interview for DSM-IV Axis II Disorders (SIDP-IV; Pfohl, Blum, & Zimmerman, 1995). The SIDP is a clinical interview that measures Axis II domains of functioning to assess consistent patterns of behavior and cognition and specific personality disorders. Estimates of

inter-rater reliability for the SID-P are reported to be strong with intraclass correlation coefficients (ICC) as high as .88 to .99 (Damen, De Jong, & Van der Kroft, 2004).

Hamilton Rating Scale for Depression (HRSD; Hamilton, 1967). The HRSD is a 17-item clinician-rated scale of depressive symptoms. It is designed to measure severity of symptoms experienced in the past week. Eight items are scored from 0 (not present) to 4 (severe), nine items are scored from 0 to 2. Total scores range from 0 to 50. Inter-rater reliability coefficients have been reported as $\geq$ .84 (Schwab, Bialow, Clemmons, & Holzer, 1967), and are highly correlated with the BDI-II (Beck, Steer, Ball, & Ranieri, 1996).

Hamilton Anxiety Rating Scale (HAM-A; Hamilton, 1959). The HAM-A is a 14-item clinician-rated scale designed to measure the severity of anxiety symptoms. The interviewer provides a rating of the severity of each symptom cluster using a scale ranging from 0 (not present) to 4 (very severe). An overall score is derived by summing all items. Internal consistency estimates range from .77 to .81 (Moras, Di Nardo, & Barlow, 1992) and test-retest reliability is high (r = .96; Kobak, Reynolds, & Greist, 1993).

Beck Depression Inventory, Second Edition (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report measure asking about depressive symptoms in the past two weeks. Each item offers a series of self-evaluative statements ranging from 0 (no presence of the symptom) to 3 (severe form of the symptom). Total scores range from 0 to 63. The BDI-II has demonstrated good reliability (α = 0.91; Beck, Steer, Ball, et al., 1996).

Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988). The BAI is a 21-item self-report measure of anxiety symptoms (somatic and cognitive) in the past week. Possible scores range from 0 to 63. The BAI is psychometrically sound with Cronbach alpha estimates ranging from .92 to .94 and test-retest reliability (one-week interval) of .75 (Beck et al., 1988).

Mood and Anxiety Symptom Questionnaire (MASQ; Clark & Watson, 1991). The MASQ is a 90-item self-report measure created specifically for testing constructs of the tripartite model. Individuals are asked to rate how much they have experienced different feelings, sensations, problems, and experiences in the past week from 1 (not at all) to 5 (extremely). The MASQ has been tested in student, community, and adult patient samples and has demonstrated good convergent and discriminant validity, reliability, and a stable factor structure (Watson, Clark, et al., 1995; Watson, Weber, et al., 1995). There are 5 subscales (General Distress Mixed, General Distress Depression, General Distress Anxiety, Anhedonic Depression, and Anxious Arousal subscales). The General Distress (GD) subscales correspond with NA, the Anhedonic Depression (AD) subscale corresponds with PA and the anxious arousal (AA) subscale corresponds with PH.

Affective Reactivity Tasks

Stimuli Materials. Standardized emotional images from the International Affective Picture Set (IAPS; Lang, Bradley, & Cuthbert, 2008) were presented to participants on a computer screen in a sound-proofed laboratory room. Stimuli fell into one of four valence categories: unpleasant, neutral, pleasant, and threat. Thirty images from each valence category were presented for a total of 120 images[1]. For the purposes of this study, only the unpleasant, neutral, and pleasant stimuli were examined to allow for comparison between tasks for a total of 90 images. For the sounds task, standardized sounds from the International Affective Digitized Sound system (IADS; Bradley & Lang, 1999) were presented to participants, with stimuli falling into one of three

[1] Reported Ms and SDs are from the healthy sample in this study. Normative ratings are available upon request. IAPS IDs: Unpleasant set: 1274, 1275, 2278, 2700, 2717, 3216, 3220, 3300, 5973, 6311, 7359, 7360, 7361, 9041, 9090, 9101, 9265, 9280, 9290, 9300, 9301, 9342, 9373, 9390, 9419, 9424, 9530, 9592, 9630, 9830 (Healthy $M_{valence}$ = -2.09, $SD_{valence}$ = 0.65; $M_{arousal}$ = 4.16, $SD_{arousal}$ = 1.59). Neutral set: 2038, 2191, 2200, 2210, 2215, 2385, 2397, 2441, 2445, 2499, 2512, 2595, 2840, 2850, 5471, 5520, 7006, 7009, 7030, 7037, 7038, 7041, 7050, 7170, 7186, 7235, 7242, 7249, 7500, 9070 (Healthy $M_{valence}$ = 0.43, $SD_{valence}$ = 0.41; $M_{arousal}$ = 2.42, $SD_{arousal}$ = 0.85). Pleasant set: 1590, 2339, 2345, 2346, 4606, 4610, 4617, 4623, 4624, 4625, 4641, 5270, 5450, 5660, 5849, 7250, 7260, 7280, 7289, 7390, 7400, 7430, 7470, 7480, 7508, 8120, 8371, 8461, 8496, 8540 (Healthy $M_{valence}$ = 1.83, $SD_{valence}$ = 0.77; $M_{arousal}$ = 4.08, $SD_{arousal}$ = 1.66).

categories: unpleasant, neutral, and pleasant. Fifteen sounds from each valence category were presented for a total of 45 sounds[2]. Finally, for the words task, standardized words from the Affective Norms for English Words (ANEW; Bradley & Lang, 1999) were presented, with stimuli falling into unpleasant, neutral, and pleasant categories. Six words from each valence category were presented for a total of 18 words[3].

Experimental Design for Affect Task. For each task, stimuli were presented to every subject in a randomized order. In addition, the task order was randomly chosen for each participant. Each trial consisted of a 3 second baseline, 6 second stimulus presentation, 3 second recovery period, and a self-paced rating period. A fixation point appeared at the center of the screen during the baseline and recovery periods, which was replaced by the stimulus centered on the screen during the stimulus presentation period (for the pictures and words task). For the sounds task, the fixation point remained on the screen for the entire presentation. Participants then made two ratings following picture offset: first, participants rated their positive and negative valence reactions to the stimulus content using an Evaluative Space Grid (ESG; Larsen, Norris, McGraw, Hawkley, & Cacioppo, 2009). The ESG is a 5 by 5 matrix that asks the participants to rate both positive and negative content of the picture simultaneously. Positive valence is on the horizontal axis and negative valence is on the vertical axis. The affect matrix was chosen over a traditional bipolar valence scale because its unipolar ratings provide quick and simple indices of positivity and negativity than do extremity scores. In addition, the affect matrix is preferable to existing unipolar measures because it simplifies and speeds the rating procedure for participants; rather

[2] IADS IDs: Unpleasant set: 115, 116, 130, 261, 280, 286, 290, 319, 380, 501, 502, 626, 706, 711, 730 Healthy ($M_{valence}$ = -1.55, $SD_{valence}$ = 0.65; $M_{arousal}$ = 3.8, $SD_{arousal}$ = 1.49). Neutral set: 105, 171, 251, 311, 320, 322, 325, 358, 403, 410, 425, 602, 699, 704, 726 (Healthy $M_{valence}$ = 0.09, $SD_{valence}$ = 0.44; $M_{arousal}$ = 2.84, $SD_{arousal}$ = 1.07). Pleasant set: 111, 112, 200, 216, 221, 226, 352, 360, 370, 401, 415, 601, 802, 810, 820 (Healthy $M_{valence}$ = -1.74, $SD_{valence}$ = 0.81; $M_{arousal}$ = 4.31, $SD_{arousal}$ = 1.54).

[3] ANEW IDs: Unpleasant set: 17, 236, 335, 368, 592, 704 (Healthy $M_{valence}$ = -1.83, $SD_{valence}$ = 0.92; $M_{arousal}$ = 3.23, $SD_{arousal}$ = 1.71). Neutral set: 194, 544, 545, 570, 982 (Healthy $M_{valence}$ = 0.66, $SD_{valence}$ = 0.73; $M_{arousal}$ = 2.78, $SD_{arousal}$ = 1.72). Pleasant set: 200, 209, 282, 226, 358, 517 (Healthy $M_{valence}$ = 1.96, $SD_{valence}$ = 0.86; $M_{arousal}$ = 4.41, $SD_{arousal}$ = 2.29).

than asking two or more questions about each stimulus (cf. Russell, Weiss, & Mendelsohn, 1989); the affect matrix requires one mouse click, making it especially advantageous when participants are required to rate multiple stimuli. Second, participants rated how arousing they felt the picture was using a unidimensional scale. The unidimensional arousal rating scale ranged from "not at all arousing" to "moderately arousing" to "extremely arousing" (raw scores of 1-9).

Procedure

Participants were recruited from community advertisements and screened for eligibility by trained research assistants who provided a study description and assessed for symptoms over the phone. If eligible, prospective participants were invited for an on-site assessment at Northwestern University's Department of Psychiatry and Behavioral Sciences. During this assessment, prospective participants provided written informed consent, passed a urine toxicology screen and completed self-report measures. During the study day, trained research assistants administered clinical interviews and affective reactivity tasks in addition to other computer tasks. Participants received $160 in compensation for completion of Day 1 and Day 2 of the study ($80 for completion of Day 1 only) and the enrollment period began 06/2006 and ended 12/2009.

CHAPTER 3: ANALYTIC PLAN

Data Cleaning

Descriptive and frequency statistics of all measures of interest were examined prior to data analysis to determine any outliers within the healthy group prior to creation of Z-scores. Outliers were defined as those with scores at least three standard deviations (SDs) above or below the mean for that measure. Of the participants remaining after exclusion of those with invalid or missing datasets, three healthy participants had scores that were three SDs above or below the mean (one on negative valence ratings for words, one on neutral valence ratings for words, and one on the anxious arousal subscale of the MASQ). Their scores for those measures were truncated to the value three SDs above or below the mean. Z-scores were then created for all groups based on the means and standard deviations of the healthy group (after scores were truncated) for each measure. After creating Z-scores, clinical groups were examined for outliers that were three SDs above or below the mean. Four clinical participants (depressed $n = 2$, anxious $n = 2$) had scores that were three SDs above the mean, and scores were truncated to the value that was three SDs above the mean prior to the analyses being conducted.

Descriptive statistics were conducted using Chi-square tests and One-Way ANOVAs to test for group differences in demographic characteristics such as gender, age, race, ethnicity, employment status, and education level.

Group Differences in the Tripartite Model

A two-way mixed-design Generalized Linear Model (GLM) was used to examine differences in the differences between groups on general distress (GD; calculated by pooling and summing all items from the general distress subscales [mixed, anxious symptoms, depressive

symptoms] to create a single general distress scale and representing the NA dimension of the tripartite model), anxious arousal (AA, representing the PH dimension of the tripartite model), anhedonic depression (AD, representing the PA dimension of the tripartite model). The design was a 3 (tripartite domain: general distress, anxious arousal, and anhedonic depression) x 3 (group: depressed, anxious, comorbid) GLM with tripartite domain as the within-subjects factor and group as the between-subjects factor. Z-scores were used as opposed to raw scores. This overall GLM was followed-up with relevant pair-wise post-hoc analyses on the main effects and interaction terms. All analyses were two-tailed at the .05 level of significance.

Group Differences in Affective Reactivity Variables

A three-way mixed-design GLM was used to examine differences in the differences between groups on dimensions of the valence and arousal components of affective reactivity, as well as any differences in stimulus modality (task type). The design was a 3 (valence: negative, neutral, positive) x 3 (task: pictures, words, sounds) x 3 (group: depressed, anxious, comorbid) GLM with valence and task as within-subject factors and group as the between-subjects factor. Z-scores of valence and arousal ratings were used as opposed to raw scores. Three-way interactions (valence x task x group) were followed up with subsequent analyses to explicate the nature of this interaction as well as differences in the differences of any significant interactions between group. Pair-wise post-hoc analyses were conducted on the main effects and interaction terms. All analyses were two-tailed at the .05 level of significance.

CHAPTER 4: RESULTS

Demographic and Clinical Data

Demographic and clinical information are presented in Table 1. Chi square analyses revealed no group differences in sex ($\chi^2(3) = 2.18$, $p = .54$), race ($\chi^2(15) = 13$, $p = .60$), attained education ($\chi^2(12) = 12.1$, $p = .44$), or marital status ($\chi^2(18) = 25$, $p = .12$). There were group differences in employment status ($\chi^2(15) = 34.73$, $p < .01$), such that there were significantly more unemployed participants in the clinical groups compared to the healthy group. A one-way ANOVA revealed no group differences in age ($F(3, 182) = 1.69$, $p = .17$).

Tripartite Model

Means and SDs of raw and Z-scores for each group for factors of the tripartite model can be found in Table 2 and overall effects can be found in Table 5. There was a main effect of the tripartite factor ($F(1.298, 176.51) = 52.39$, $p < .001$, $\eta_p^2 = .28$), such that the GD subscale score was significantly higher than the AA subscale score, which was significantly higher than the AD subscale score. There was also a main effect of group ($F(2, 136) = 26.77$, $p < .001$, $\eta_p^2 = .28$), such that the comorbid group had higher scores compared to both the depressed and anxious groups (see Table 6 and Figures 1 and 2 for main effects). These main effects were qualified by an interaction effect of tripartite factor by group ($F(2.596, 176.51) = 20.01$, $p < .001$, $\eta_p^2 = .23$), such that for the GD subscale, the comorbid group had higher scores than the depressed group, who had higher scores than the anxious group; for the AA subscale, the comorbid group had higher scores than the anxious group, who had higher scores than the depressed group; for the AD subscale, the depressed group had higher scores than the comorbid group, who had higher scores than the anxious group (see Table 9 and Figure 3).

Table 9 also provides details of the two-way interaction effect. In particular, the magnitude of the difference between the AA and AD subscales was greater in the anxious and comorbid group versus the depressed group (e.g. the AA scores were higher than the AD scores in the anxious and comorbid groups). The magnitude of the difference between the GD and AA subscales was also greater for the depressed group compared with the anxious and comorbid groups (e.g., the GD scores were higher than the AA scores in the depressed group).

Affective Reactivity – Valence Ratings

Means and SDs of raw and Z-scores for each group for valence ratings can be found in Table 3 and overall effects can be found in Table 5. There was a main effect of valence (F(1.67, 226.58) = 3.72, p = .03, η_p^2=.027) such that unpleasant and pleasant stimuli were rated significantly lower (more negative) than the mean of the healthy group compared with ratings of neutral stimuli, which were rated more similarly to the healthy mean. Additionally there was a main effect of task (F(1.85, 251.74) = 5.82, p = .004, η_p^2=.041) such that words and sounds were rated significantly lower than the healthy mean compared with ratings of pictures, which were rated more similarly to the healthy mean (see Table 7 and Figures 4 and 5). There were no other main or interaction effects.

Tables 10, 12, and 13 show the generalizability of the main effects of valence and task across valence, tasks, and clinical groups.

Affective Reactivity – Arousal Ratings

Means and SDs of raw and Z-scores for each group for arousal ratings can be found in Table 4 and overall effects can be found in Table 5. There was a main effect of valence (F(1.95,

265.63) = 16.46, $p < .001$, η_p^2=.108), such that neutral stimuli were rated significantly more arousing than the healthy mean compared with unpleasant stimuli, which were rated significantly more arousing than the healthy mean compared with pleasant stimuli (see Table 8 and Figure 6). This was qualified by a significant valence by task interaction (F(3.37, 457.95) = 8.28, $p < .001$, η_p^2=.057), such that for pictures and sounds, neutral stimuli were rated significantly more arousing than unpleasant stimuli, which were rated significantly more arousing than pleasant stimuli while there were no valence differences for words (see Table 11 and Figure 7). There were no other main or interaction effects.

Tables 14 and 15 show the generalizability of the main effect of valence across task and clinical group. Table 15 also shows details of the valence by task interaction effect within each diagnostic group as well as the magnitude of the differences among groups. This table shows that these patterns appear more consistently in the anxious and comorbid groups compared to the depressed group. In particular, in the anxious group, the magnitude of the difference between ratings of neutral and pleasant stimuli was greater for pictures and sounds versus words (e.g., neutral stimuli were rated higher than pleasant stimuli for pictures and sounds). The magnitude of the difference between ratings of unpleasant and pleasant stimuli was also greater for pictures versus words (e.g., unpleasant stimuli were rated higher than pleasant stimuli for pictures). For the comorbid group, the magnitude of the difference between ratings of neutral and pleasant stimuli was greater for pictures and sounds versus words (e.g., neutral stimuli were rated significantly higher than pleasant stimuli for pictures and sounds). Additionally, the magnitude of the difference between ratings of neutral and unpleasant stimuli was greater for pictures and sounds versus words (e.g., neutral stimuli were rated higher than unpleasant stimuli for pictures and sounds). The magnitude of the difference between ratings of unpleasant and pleasant stimuli

was greater for pictures versus sounds (e.g., unpleasant stimuli were rated higher than pleasant stimuli for pictures). Finally, for the depressed group, the magnitude of the difference between ratings of neutral and pleasant stimuli was greater for words versus sounds (neutral stimuli were rated higher than pleasant stimuli for sounds).

CHAPTER 5: DISCUSSION

Depression and anxiety are the most common psychiatric diagnoses and often overlap. As such, several models have been developed to describe their shared and unique components. In particular, the tripartite and core affect/affective reactivity models make specific predictions about emotional response differences in depression and anxiety. The tripartite model examines negative and positive affect and arousal as dimensions that distinguish each disorder while affective reactivity focuses on the valence and arousal response to emotional stimuli. This study examined both models in a sample of depressed, anxious, and comorbid depressed and anxious adults as compared to healthy controls. Differences were found for all dimensions of the tripartite model by group, demonstrating some support for this model. There were also overall valence differences in ratings of valence and arousal, differences in valence ratings depending on task type, and a valence by task interaction for arousal ratings. These findings indicate some support for research on affective reactivity in depression and anxiety with key differences. Importantly, there were no group differences in affective reactivity, potentially suggesting these findings may be transdiagnostic across depression, anxiety, and their comorbidity.

Depressed participants had higher levels of AD compared to healthy controls than anxious or comorbid participants, while comorbid participants had higher levels of AA and GD. Within anxiety, AA scores were higher than either GD or AD scores. The finding that AD scores were higher in the depressed group supports research that depression is primarily characterized by decreased levels of PA, a pattern not found in anxiety (Clark & Watson, 1991; Pizzagalli, Jahn, & O'Shea, 2005; Shankman & Klein, 2003; Watson, Clark, & Carey, 1988). Additionally, the finding that anxious participants had higher AA scores compared to the other subscales supports research that anxiety is characterized primarily by heightened physiological arousal

(Clark & Watson, 1991; Lang & McTeague, 2009), though AA scores in this group were still lower than in the comorbid group. Differentially, comorbid individuals may be characterized by higher levels of GD (representing negative affectivity [NA]) compared with each disorder alone. This does not support the tripartite model's hypothesis that, as the shared factor of these disorders, individuals with depression and anxiety should show comparable levels of NA. However, it does support research that individuals with comorbid depression and anxiety have higher functional impairment compared to individuals with either disorder alone (Kessler et al., 2003; Kessler et al., 1996); this may be associated with higher levels of NA.

Taken together, these findings suggest that the tripartite model may not accurately reflect characterizations of depression, anxiety, and comorbidity in this sample. GD/NA appears to be highest in the depressed and comorbid groups and lowest in the anxious group, potentially indicating that depression, particularly when it is comorbid with anxiety, is characterized by higher levels of NA compared with anxiety alone. Some research has suggested that there is variability in the nonspecific factor of NA across different diagnoses (Watson, 2005, 2009). Within this sample, it is possible that the comorbid group had disproportionately more high-NA diagnoses while the anxious group had low-NA diagnoses. Another explanation is that symptoms in individuals with pure anxiety may manifest more heavily in AA (e.g., somatic/physiological hyperarousal) rather than NA, yet this may still lead to functional impairment and other symptoms (i.e., as measured by other self-report questionnaires).

Conversely, there were no group differences for the ratings of valence or arousal provided during the affective reactivity tasks. There was a main effect of valence for valence ratings, such that neutral stimuli were rated similarly to the healthy group, but unpleasant and pleasant stimuli were assigned lower valence ratings compared with the healthy group. In

particular, compared with the healthy group, positive ratings were attenuated while negative ratings were potentiated. This supports research that individuals with depression provide lower valence ratings of pleasant stimuli (Eshel & Roiser, 2010; McCabe, Cowen, & Harmer, 2009; Sloan et al., 2001). Additionally, it also supports research that individuals with depression and anxiety appraise unpleasant stimuli as more negative compared to healthy controls (Gollan et al., 2008; McTeague & Lang, 2012). Notably, this does not support the ECI model, which hypothesizes that depression is characterized by blunted reactivity to both unpleasant *and* pleasant stimuli (Bylsma et al., 2008). Importantly, some researchers have argued that lower ratings of emotional stimuli can be interpreted as either less positive *or* more negative, indicating that ratings may not be "blunted," but instead may be more heavily influenced by negative affect (Dunn et al., 2004; Ito, Larsen, Smith, & Cacioppo, 1998; Larsen et al., 2009), thus potentiating negative valence ratings and attenuating positive valence ratings compared to healthy controls. This suggests that negative valence is stronger than positive valence for unpleasant and pleasant stimuli within depression and anxiety, which is consistent with other research (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001).

Additionally, there was an overall task effect such that valence ratings provided by clinical groups for pictures were closer to the healthy mean than ratings for words and sounds, which were significantly lower than the healthy mean. This indicates that stimulus modality influences the valence dimension of affective reactivity in depression and anxiety. This has been shown in healthy controls, such that auditory stimuli (music) evoked greater physiological reactions compared to visual stimuli (from the IAPS; Baumgartner, Esslen, & Jancke, 2006). Research has also yielded consistent findings with emotional versus neutral stimuli of different stimulus modalities for clinical groups. For example, anxiety participants in one study rated

phobic imagery (verbal stories created about a feared event) and cued memory recall as more negative than neutral imagery (Cuthbert et al., 2003). Similarly, anxiety participants in another study rated unpleasant and pleasant visual stimuli (IAPS pictures) as more arousing than neutral stimuli (Aftanas, Pavlov, Reva, & Varlamov, 2003). In the current study, the task finding appears to be driven by unpleasant stimuli, as words and sounds (but not pictures) were rated lower than the healthy mean specifically for unpleasant stimuli. This may indicate that, compared to healthy controls, clinical groups were attuned to viewing unpleasant auditory and words stimuli as more negative, whereas visual stimuli did not evoke as strong a negative response.

Though valence ratings for neutral stimuli were rated most similarly to the healthy mean, arousal ratings for neutral stimuli were significantly higher than the healthy mean compared to arousal ratings of unpleasant and pleasant stimuli, and all were significantly higher than the healthy mean. This supports findings that anxious participants rate stimuli as more arousing than healthy controls (Cuthbert et al., 2003; McTeague & Lang, 2012). However, it does not support research that depressed participants show blunted reactivity compared to either healthy or anxiety participants (Bylsma et al., 2008). One explanation for this finding in other research is that while depressed and anxious participants show differing behavioral and physiological response (withdrawal and decreased startle or skin conductance in depression; fear and heightened startle and skin conductance in anxiety) (Davidson, 1998; Heller, 1993; Heller & Nitschke, 2006), they may initially appraise stimuli as similarly arousing. For example, depressed individuals may register an arousal response, but this does not translate into goal-directed behavior or physiological response (Heller, 1993; Moratti, Rubio, Campo, Keil, & Ortiz, 2008). Conversely, anxious individuals may register an arousal response that translates into a fear reaction (Kemp et al., 2010). This might explain why the clinical groups in this study

demonstrated similar arousal ratings. Additionally, arousal ratings for each valence differed by task. There were no differences in arousal ratings between any stimuli for words while neutral stimuli were rated significantly more arousing than pleasant and unpleasant stimuli for pictures and sounds. This supports research showing that verbal-linguistic processing (as engaged in during worry or rumination) is associated with decreased physiological arousal compared with processing of visual imagery (Borkovec, 1994; Lang, 1985). With regards to affective reactivity, this may lead to similar immediate arousal responses for all types of word stimuli regardless of valence, while auditory and visual stimuli are more easily distinguishable by valence.

Interestingly, compared with their ratings of neutral stimuli, clinical groups rated unpleasant and pleasant stimuli as more negative and less arousing than healthy controls. This suggests that self-reported valence and arousal are independent constructs in clinical groups, supporting the equal-intensity version of the bipolar valence-arousal model (e.g., core affect). This version posits that valence and arousal each has its own intensity and that the two constructs are separable (Russell & Barrett, 1999). Another version of this model posits that arousal is conceptualized as an intensity of valence, suggesting they are inseparable (Bradley, Codispoti, Cuthbert, & Lang, 2001; for a review see Kron, Pilkiw, Banaei, Goldstein, & Anderson, 2015). The arousal-intensity model predicts that unpleasant and pleasant stimuli would be rated more arousing than the healthy group given that they were rated as more negative; however, this was not the case. Additionally, the valence effect for arousal ratings was most consistent for neutral versus pleasant stimuli, which may mean that individuals with depression and anxiety do not find pleasant stimuli as arousing as healthy groups, or they may overreact to neutral stimuli compared with healthy groups. This remains to be fully explored.

Notably, a look at the correlation of these scores within groups indicates significant associations between ratings of valence and arousal for all types of stimuli; this appears strongest and most consistent for the anxiety group (see appendix). This does not support the complete distinction between arousal and valence and indicates these constructs may only be partially separable. An alternative explanation for the findings from this study is that clinical groups rate neutral stimuli more positively than unpleasant stimuli and more negatively than pleasant stimuli; this then evokes a more intense arousal reaction, suggesting valence and arousal may not be mutually exclusive and higher levels of positive or negative valence correspond with increased levels of arousal. Other studies have shown only limited association between self-reports of arousal and valence (e.g., Ito, Cacioppo, & Lang, 1998); though this may differ as a function of diagnosis. For example, there may be a group difference in the mutual exclusivity of valence and arousal such that individuals with anxiety have greater difficulty separating valence and arousal response to emotional stimuli. This should be specifically examined in future studies.

Overall, group differences were demonstrated for self-reported symptoms of NA, PA, and PH with no group differences for ratings of valence and arousal. This may mean that immediate emotional response (measured by ratings of valence and arousal) and more general emotional symptoms, while both describing facets of emotional experience, are separate constructs with separate underlying systems. Additionally, the lack of group differences for valence and arousal ratings indicates these responses may be transdiagnostic across depression and anxiety, suggesting this may be a shared dimensional trait that characterizes the disorders rather than differentiates them. In particular, compared with healthy controls, depressed and anxious participants, regardless of comorbidity, appeared to evaluate unpleasant visual and auditory stimuli as more negative and pleasant visual and auditory stimuli as less positive than neutral

stimuli, while both were viewed as less arousing than neutral stimuli. This has implications for understanding how individuals with depression, anxiety, and comorbidity evaluate emotional and neutral stimuli in different forms. For example, depression and anxiety may share a vulnerability factor for evaluating neutral stimuli (e.g., a chair) as more arousing than healthy individuals, leading to hyperreactivity which then manifests in avoidance/withdrawal or misplaced threat appraisal in depression and anxiety, respectively.

Strengths of this study include a large, unmedicated, and well-delineated sample of depressed-only, anxious-only, and comorbid adults with a diversity of age and socioeconomic status using multi-method diagnostic assessments and thorough characterization via phone screen and in-person interviews. An additional strength is the use of different in-vivo tasks with a variety of stimulus modalities to examine differences in affective reactivity, relying on immediate responses to validated stimuli rather than general symptoms. Limitations include the use of diagnoses, rather than symptom severity, to differentiate between groups rather than and use of stimulus sets based on normative ratings from healthy college students as normative ratings for clinical samples do not exist. Future directions include replication of these results with different stimuli sets and/or task modalities, assessment of additional anxiety-specific domains, and an examination of different anxiety diagnoses rather than pooling all anxiety diagnoses into one group. Future research could also examine neurocognitive correlates of differences in affective reactivity and tripartite constructs or other physiological differences using skin conductance, fMRI, and EEG. This would allow for an understanding of the biological underpinnings of these processes and may further refine these models.

CHAPTER 6: TABLES

Table 1: Demographic and Clinical Characteristics of all Groups

Sociodemographic Characteristics		Depressed (*n*=45) *n* (%)	Anxious (*n*=51) *n* (%)	Comorbid (*n*=43) *n* (%)	Healthy (*n*=44) *n* (%)
Race	Caucasian	26 (57.8%)	35 (68.6%)	24 (55.8%)	27 (61.4%)
	African American	12 (26.7%)	7 (13.7%)	11 (25.6%)	12 (27.3%)
	Asian	0 (0%)	2 (3.9%)	2 (4.7%)	3 (6.8%)
	Hispanic	5 (11.1%)	6 (11.8%)	4 (9.3%)	1 (2.3%)
	Native American	1 (2.2%)	0 (0%)	0 (0%)	0 (0%)
	Other	1 (2.2%)	1 (2.0%)	2 (4.7%)	1 (2.3%)
Sex	Male	11 (24.4%)	15 (29.4%)	13 (30.2%)	17 (38.6%)
	Female	34 (75.6%)	36 (70.6%)	30 (69.8%)	27 (61.4%)
Marital Status					
	Never Married	31 (68.9%)	40 (78.4%)	28 (65.1%)	37 (84.1%)
	Married	8 (17.8%)	6 (11.8%)	5 (11.6%)	4 (9.1%)
	Separated	0 (0%)	1 (2.0%)	3 (7.0%)	0 (0%)
	Divorced	6 (13.3%)	4 (7.8%)	3 (7.0%)	2 (4.5%)
	Widowed	0 (0%)	0 (0%)	2 (4.7%)	0 (0%)
	Common Law	0 (0%)	0 (0%)	2 (4.7%)	1 (2.3%)
Education	Partial High School	0 (0%)	0 (0%)	1 (2.3%)	0 (0%)
	High School	2 (4.4%)	1(2.0%)	3 (7.0%)	3 (6.8%)
	Partial College	14 (31.1%)	18 (35.3%)	19 (44.2%)	13 (29.5%)
	Completed College	21 (46.7%)	28 (54.9%)	16 (37.2%)	19 (43.2%)
	Graduate Training	8 (17.8%)	4 (7.8%)	4 (9.3%)	9 (20.5%)
Employment	Unemployed	20 (44.4%)	14 (27.5%)	20 (46.5%)	5 (11.4%)
	Employed	21 (46.7%)	24 (47.1%)	16 (37.2%)	21 (47.7%)
	Full-time student	3 (6.7%)	11 (21.6%)	6 (14.0%)	17 (38.6%)
	Disabled	0 (0%)	0 (0%)	1 (2.3%)	0 (0%)
	Retired	1 (2.2%)	0 (0%)	0 (0%)	1 (2.3%)
	Not working, not receiving public assistance	0 (0%)	2 (3.9%)	0 (0%)	0 (0 %)
		M(*SD*)	*M*(*SD*)	*M*(*SD*)	*M*(*SD*)
Age	(years)	37 (12.38)	31.9 (10.68)	36.1 (13.06)	33.4 (13.05)
Depression	HRSD-17	19.2 (3.96)	7.35 (3.96)	20.4 (3.87)	1.20 (1.81)
	BDI (day 1)	27.1 (6.86)	7.90 (5.35)	29.8 (6.54)	1.52 (2.52)
Anxiety	HARS	7.44 (2.16)	17.4 (5.08)	19.6 (5.31)	1.27 (1.72)
	BAI (day 1)	6.49 (3.88)	20.5 (7.69)	19 (6.36)	1.16 (1.51)

Table 2: Raw and Z-Score Means of Tripartite Model by Group

Group	General Distress M (SD)	Anxious Arousal M (SD)	Anhedonic Depression M (SD)
Raw Scores			
Depressed	97.87 (17.37)	20.62 (4.82)	86.42 (9.38)
Anxious	77.69 (18.26)	24.98 (6.98)	59.35 (14.22)
Comorbid	116.51 (24.44)	29.26 (9.05)	81.28 (11.28)
Healthy	47.5 (8.66)	17.34 (1.51)	44.77 (12.32)
Z Scores			
Depressed	5.82 (2.01)	2.07 (2.78)	3.38 (0.76)
Anxious	3.49 (2.11)	5.06 (4.63)	1.18 (1.15)
Comorbid	7.97 (2.82)	7.89 (5.99)	2.96 (0.92)
Healthy	0 (1)	0 (1)	0 (1)

Table 3: Raw and Z-Score Means of Affective Reactivity – Valence by Task and Group

Group	Negative Raw M (SD)	Neutral Raw M (SD)	Positive Raw M (SD)	Negative Z Score M (SD)	Neutral Z Score M (SD)	Positive Z Score M (SD)
Pictures						
Depressed	-2.16 (0.62)	0.46 (0.51)	1.72 (0.91)	-0.11 (0.97)	0.08 (1.26)	-0.14 (1.18)
Anxious	-2.15 (0.70)	0.47 (0.47)	1.74 (0.95)	-0.1 (1.09)	0.09 (1.12)	-0.12 (1.23)
Comorbid	-2.08 (0.61)	0.61 (0.45)	1.75 (0.77)	0.006 (0.95)	0.43 (1.11)	-0.098 (1)
Healthy	-2.09 (0.65)	0.43 (0.41)	1.83 (0.77)	0 (1)	0 (1)	0 (1)
Words						
Depressed	-2.27 (0.83)	0.45 (0.71)	1.79 (1.03)	-0.48 (0.9)	-0.28 (0.96)	-0.195 (1.19)
Anxious	-1.95 (1.24)	0.62 (0.69)	1.96 (1.03)	-0.14 (1.32)	-0.05 (0.95)	-0.004 (1.19)
Comorbid	-2.03 (1.09)	0.87 (0.88)	1.64 (0.93)	-0.22 (1.18)	0.02 (1.20)	-0.37 (1.08)
Healthy	-1.83 (0.92)	0.66 (0.73)	1.96 (0.86)	0 (1)	0 (1)	0 (1)
Sounds						
Depressed	-1.74 (0.75)	0.11 (0.52)	1.68 (0.83)	-0.29 (1.15)	0.01 (1.17)	-0.07 (1.03)
Anxious	-1.89 (0.72)	0.12 (0.56)	1.74 (0.80)	-0.52 (1.11)	0.05 (1.24)	-0.003 (0.99)
Comorbid	-1.78 (0.81)	0.08 (0.76)	1.44 (0.69)	-0.35 (1.24)	-0.04 (1.72)	-0.37 (0.85)
Healthy	-1.55 (0.65)	0.09 (0.44)	1.74 (0.81)	0 (1)	0 (1)	0 (1)

Table 4: Raw and Z Score Means of Affective Reactivity – Arousal by Task and Group

Group	Negative Raw M (SD)	Neutral Raw M (SD)	Positive Raw M (SD)	Negative Z Score M (SD)	Neutral Z Score M (SD)	Positive Z Score M (SD)
Pictures						
Depressed	4.71 (1.66)	2.8 (1.17)	4.48 (1.69)	0.35 (1.04)	0.45 (1.37)	0.24 (1.02)
Anxious	5.26 (1.54)	3.18 (1.34)	4.62 (1.57)	0.69 (0.97)	0.89 (1.57)	0.33 (0.94)
Comorbid	4.83 (1.62)	3.18 (1.05)	4.65 (1.37)	0.42 (1.02)	0.90 (1.24)	0.34 (0.83)
Healthy	4.16 (1.59)	2.42 (0.85)	4.08 (1.66)	0 (1)	0 (1)	0 (1)
Words						
Depressed	3.89 (1.76)	3.26 (1.27)	5.03 (1.74)	0.39 (1.03)	0.28 (0.74)	0.27 (0.76)
Anxious	3.95 (1.47)	3.44 (1.55)	5.23 (1.92)	0.42 (0.86)	0.38 (0.899)	0.36 (0.84)
Comorbid	4.33 (1.8)	3.995 (1.49)	5.53 (1.68)	0.64 (1.05)	0.71 (0.87)	0.49 (0.73)
Healthy	3.23 (1.71)	2.78 (1.72)	4.41 (2.29)	0 (1)	0 (1)	0 (1)
Sounds						
Depressed	4.22 (1.6)	3.32 (1.299)	4.49 (1.73)	0.28 (1.08)	0.45 (1.21)	0.06 (1.12)
Anxious	4.95 (1.65)	3.75 (1.53)	4.96 (1.45)	0.77 (1.11)	0.85 (1.43)	0.42 (0.94)
Comorbid	4.60 (1.599)	3.84 (1.33)	4.6 (1.379)	0.53 (1.07)	0.93 (1.24)	0.19 (0.895)
Healthy	3.8 (1.49)	2.84 (1.07)	4.31 (1.54)	0 (1)	0 (1)	0 (1)

Table 5: ANOVA Source Table with Summary of Effects

Effect	df	F Statistic	p value	Partial Eta Squared
Tripartite				
Tripartite Factor	1.298, 176.51	**52.39**	**< .001**	.28
Group	2, 136	**26.77**	**< .001**	.28
Tripartite Factor*Group	2.596, 176.51	**20.01**	**< .001**	.23
Affective Reactivity - Valence				
Valence	1.67, 226.58	**3.72**	**.033**	.027
Task	1.85, 251.74	**5.82**	**.004**	.041
Group	2, 136	.23	.79	.003
Task*Group	3.699, 251.74	2.07	.09	.03
Valence*Group	3.33, 226.58	0.66	.59	.01
Valence*Task	3.49, 475.11	1.72	.15	.01
Valence*Task*Group	6.99, 475.11	.56	.79	.008
Affective Reactivity - Arousal				
Valence	1.95, 265.63	**16.46**	**< .001**	.108
Task	1.50, 204.36	.71	.46	.005
Group	2, 136	1.68	.19	.024
Task*Group	3.01, 204.36	1.78	.15	.026
Valence*Group	3.91, 265.63	1.33	.26	.019
Valence*Task	3.37, 457.95	**8.28**	**< .001**	.057
Valence*Task*Group	6.74, 457.95	.93	.48	.014

Table 6: Main Effects for Tripartite Model

Effect		GD vs. AA		GD vs. AD		AA vs. AD	
Tripartite Factor	Mean	t	p	t	p	t	p
General Distress	5.76	**2.08**	**.039**	**18.14**	**<.001**	**6.18**	**<.001**
Anxious Arousal	5.01						
Anhedonic Depression	2.51						
		Dep vs. Anx		Dep vs. Como		Anx vs. Como	
Group	Mean	t	p	t	p	t	p
Depressed	3.76	1.21	.23	**5.72**	**<.001**	**7.09**	**<.001**
Anxious	3.24						
Comorbid	6.27						

Note: GD = General Distress (Total), AA = Anxious Arousal, AD = Anhedonic Depression

Table 7: Main effects for Valence

Effect							
		Neg vs. Neu		Neg vs. Pos		Pos vs. Neu	
Valence	Mean	t	p	t	p	t	p
Negative	-0.25	**2.65**	**.009**	0.76	.45	**2.30**	**.02**
Neutral	0.04						
Positive	-0.15						
		Pics vs. Words		Pics vs. Sounds		Words vs. Sounds	
Task	Mean	t	p	t	p	t	p
Pictures	0.005	**3.29**	**.001**	**3.08**	**.003**	0.21	.84
Words	-0.19						
Sounds	-0.18						
		Dep vs. Anx		Dep vs. Como		Anx vs. Como	
Group	Mean	t	p	t	p	t	p
Depressed	-0.16	0.67	.50	0.46	.65	0.19	.85
Anxious	-0.09						
Comorbid	-0.11						

Table 8: Main effects for Arousal

Effect							
		Neg vs. Neu		Neg vs. Pos		Pos vs. Neu	
Valence	Mean	t	p	t	p	t	p
Negative	0.50	**2.32**	**.022**	**3.21**	**.002**	**6.2**	**<.001**
Neutral	0.65						
Positive	0.30						
		Pics vs. Words		Pics vs. Sounds		Words vs. Sounds	
Task	Mean	t	p	t	p	t	p
Pictures	0.51	1.08	.28	0.29	.77	0.75	.45
Words	0.44						
Sounds	0.50						
		Dep vs. Anx		Dep vs. Como		Anx vs. Como	
Group	Mean	t	p	t	p	t	p
Depressed	0.31	1.61	.11	1.57	.12	0.03	.98
Anxious	0.57						
Comorbid	0.57						

Table 9: Two-Way Interactions for Tripartite Model

Effects									
Tripartite Model x Group					GD vs. AA		GD vs. AD		AA vs. AD	
Group		GD M	AA M	AD M	*t*	*p*	*t*	*p*	*t*	*p*
Depressed		5.82	2.07	3.38	**5.94**	**<.001**	**7.76**	**<.001**	1.85	.067
Anxious		3.49	5.06	1.18	**2.66**	**.009**	**7.81**	**<.001**	**5.82**	**<.001**
Comorbid		7.97	7.89	2.96	0.12	.904	**15.59**	**<.001**	**6.80**	**<.001**
Dep vs. Anx	*t*	**4.91**	**3.15**	**11.10**	**7.46**	**<.001**	0.35	.87	**6.39**	**<.001**
	p	**<.001**	**.002**	**<.001**						
Dep vs. Como	*t*	**4.35**	**5.89**	**2.02**	**4.03**	**<.001**	5.32	.39	**6.15**	**<.001**
	p	**<.001**	**<.001**	**.045**						
Anx vs. Como	*t*	**9.32**	**2.95**	**8.89**	1.65	.103	5.91	.34	0.93	.353
	p	**<.001**	**.004**	**<.001**						

Note: GD = General Distress (Total), AA = Anxious Arousal, AD = Anhedonic Depression

Table 10: Two-Way Interactions for Valence

Effects										
Valence x Group					Neg vs. Neu		Neg vs. Pos		Neu vs. Pos	
Group		Negative M	Neutral M	Positive M	*t*	*p*	*t*	*p*	*t*	*p*
Depressed		-0.30	-0.06	-0.14	1.26	.21	0.74	.46	0.51	.61
Anxious		-0.25	0.03	-0.04	1.62	.11	1.04	.30	0.53	.59
Comorbid		-0.19	0.14	-0.28	1.73	.09	0.4	.69	**2.85**	**.005**
Dep vs. Anx	*t*	0.24	0.48	0.52	0.20	.84	0.16	.87	0.01	.99
	p	.81	.63	.61						
Dep vs. Como	*t*	0.57	1	0.75	0.36	.72	0.87	.39	1.78	.08
	p	.57	.32	.46						
Anx vs. Como	*t*	0.34	0.56	1.27	0.17	.87	0.97	.34	1.68	.096
	p	.73	.58	.21						

Task x Group					P vs. W		P vs. S		W vs. S	
Group		Pictures M	Words M	Sounds M	*t*	*p*	*t*	*p*	*t*	*p*
Depressed		-0.06	-0.32	-0.12	**2.51**	**.013**	0.59	.56	1.59	.12
Anxious		-0.04	-0.06	-0.16	0.21	.83	1.21	.23	0.81	.42
Comorbid		0.11	-0.19	-0.25	**2.85**	**.005**	**3.46**	**<.001**	0.46	.65
Dep vs. Anx	*t*	0.10	1.88	0.27	1.60	.11	0.43	.67	1.82	.07
	p	.92	.06	.79						
Dep vs. Como	*t*	1.17	0.89	0.82	0.28	.78	1.90	.06	1.41	.16
	p	.25	.37	.41						
Anx vs. Como	*t*	1.10	0.94	0.58	**2.10**	**.038**	1.75	.08	0.20	.84
	p	.27	.35	.56						

Valence x Task					Neg vs. Neu		Neg vs. Pos		Neu vs. Pos	
Task		Negative M	Neutral M	Positive M	*t*	*p*	*t*	*p*	*t*	*p*
Pictures		-0.07	0.20	-0.12	**2.07**	**.04**	0.34	.73	**3.04**	**.003**
Words		-0.28	-0.10	-0.19	1.31	.19	0.59	.56	0.82	.41
Sounds		-0.39	0.01	-0.15	**2.94**	**.004**	1.68	.096	1.31	.19
Pics vs. Words	*t*	**2.11**	**3.21**	0.74	0.69	.49	0.93	.35	**2.06**	**.04**
	p	**.037**	**.002**	.46						
Pics vs. Sounds	*t*	**3.57**	1.72	0.42	1.02	.31	**2.59**	**.01**	1.28	.20
	p	**<.001**	.087	.67						
Words vs. Sounds	*t*	0.97	0.90	0.41	1.39	.17	0.97	.33	0.49	.63
	p	.33	.37	.68						

Table 11: Two-way interactions for Arousal

Effects										
Valence x Group					Neg vs. Neu		Neg vs. Pos		Neu vs. Pos	
Group		Negative M	Neutral M	Positive M	*t*	*p*	*t*	*p*	*t*	*p*
Depressed		0.34	0.39	0.19	0.47	.64	1.36	.18	**2.05**	**.042**
Anxious		0.63	0.71	0.37	0.76	.45	**2.53**	**.013**	**3.67**	**<.001**
Comorbid		0.53	0.85	0.34	**2.72**	**.007**	1.72	.088	**5.01**	**<.001**
Dep vs. Anx	*t*	1.64	1.51	1.11	0.18	.86	0.80	.43	1.02	.31
	p	.10	.13	.27						
Dep vs. Como	*t*	1.05	**2.08**	0.89	1.61	.11	0.25	.80	**2.27**	**.026**
	p	.29	**.04**	.37						
Anx vs. Como	*t*	0.54	0.65	0.17	1.49	.14	0.46	.64	1.16	.25
	p	.59	.52	.86						

Task x Group					P vs. W		P vs. S		W vs. S	
Group		Pictures M	Words M	Sounds M	*t*	*p*	*t*	*p*	*t*	*p*
Depressed		0.35	0.31	0.26	0.28	.78	1.02	.31	0.35	.73
Anxious		0.64	0.39	0.68	**2.19**	**.03**	0.57	.57	**2.19**	**.031**
Comorbid		0.55	0.61	0.55	0.47	.64	0.01	.99	0.41	.69
Dep vs. Anx	*t*	1.50	0.52	1.93	1.27	.21	1.17	.25	1.79	.076
	p	.14	.60	.056						
Dep vs. Como	*t*	1.03	**2.00**	1.28	0.51	.61	0.67	.51	0.04	.96
	p	.31	**.047**	.20						
Anx vs. Como	*t*	0.43	1.54	0.58	1.95	.054	0.40	.69	1.87	.06
	p	.67	.13	.56						

Valence x Task					Neg vs. Neu		Neg vs. Pos		Neu vs. Pos	
Task		Negative M	Neutral M	Positive M	*t*	*p*	*t*	*p*	*t*	*p*
Pictures		0.49	0.75	0.30	**2.52**	**.013**	**2.16**	**.032**	**4.88**	**<.001**
Words		0.48	0.46	0.37	0.35	.72	1.33	.19	1.28	.20
Sounds		0.53	0.74	0.22	**3.38**	**<.001**	**4.99**	**<.001**	**8.65**	**<.001**
Pics vs. Words	*t*	0.04	**2.76**	1.11	**2.78**	**.006**	0.94	.35	**3.99**	**<.001**
	p	.97	**.007**	.27						
Pics vs. Sounds	*t*	0.81	0.02	1.43	0.52	.61	1.87	.06	1.03	.31
	p	0.42	.99	.16						
Words vs. Sounds	*t*	0.44	**2.83**	1.88	**2.71**	**.008**	**2.14**	**.04**	**5.89**	**<.001**
	p	.66	**.005**	.06						

Table 12: Diagnostic Group by Valence and Within Task, and Valence Within Diagnostic Group Pairwise Contrasts Within Task for Affective Reactivity – Valence Scores

		Pictures									Contrasts Within Group
	N	Neg.	Neu.	Pos.	Neg. vs Neu. *t*	Neg. vs Neu. *p*	Neg. vs Pos. *t*	Neg. vs Pos. *p*	Neu. vs Pos *t*	Neu. vs Pos *p*	
Depressed	45	-0.11	0.08	-0.14	0.84	.402	0.11	.916	1.19	.237	
Anxious	51	-0.10	0.09	-0.12	0.90	.370	0.08	.940	1.22	.225	
Comorbid	43	0.01	0.43	-0.10	1.82	.071	0.40	.692	**2.81**	**.006**	
Dep. vs. Anx	*t*	0.05	0.05	0.09	0.00	.998	0.02	.981	0.03	.976	
	p	.956	.959	.932							
Dep. vs. Comorbid	*t*	0.55	1.42	0.16	0.75	.456	0.23	.820	1.27	.208	
	p	.585	.158	.870							
Anx vs. Comorbid	*t*	0.51	1.41	0.08	0.74	.464	0.24	.813	1.22	.226	
	p	.611	.161	.933							
		Contrasts Within Valence			2-way Interaction Contrasts | Task=Pictures						

		Words									Contrasts Within Group
	N	Neg.	Neu.	Pos.	Neg. vs Neu. t	Neg. vs Neu. p	Neg. vs Pos. t	Neg. vs Pos. p	Neu. vs Pos t	Neu. vs Pos p	
Depressed	45	-0.48	-0.28	-0.20	0.86	.393	1.08	.284	0.46	.648	
Anxious	51	-0.14	-0.05	0.00	0.39	.695	0.53	.599	0.26	.795	
Comorbid	43	-0.22	0.02	-0.37	1.00	.319	0.55	.582	**2.06**	**.041**	
Dep. vs. Anx	*t*	1.47	1.09	0.81	0.38	.708	0.41	.683	0.15	.879	
	p	.145	.277	.420							
Dep. vs. Comorbid	*t*	1.05	1.35	0.72	0.12	.905	1.24	.218	1.76	.083	
	p	.293	.178	.474							
Anx vs. Comorbid	*t*	0.36	0.32	1.54	0.44	.661	0.74	.462	1.75	.083	
	p	.717	.753	.126							
		Contrasts Within Valence			2-way Interaction Contrasts | Task=Words						

		Sounds									Contrasts Within Group
	N	Neg.	Neu.	Pos.	Neg. vs Neu. t	Neg. vs Neu. p	Neg. vs Pos. t	Neg. vs Pos. p	Neu. vs Pos t	Neu. vs Pos p	
Depressed	45	-0.29	0.01	-0.07	1.29	.198	0.87	.383	0.41	.682	
Anxious	51	-0.52	0.05	0.00	**2.55**	**.012**	**2.18**	**.031**	0.25	.802	
Comorbid	43	-0.35	-0.04	-0.37	1.31	.192	0.05	.962	1.56	.122	
Dep. vs. Anx	*t*	0.95	0.12	0.35	0.86	.392	0.83	.407	0.14	.890	
	p	.342	.907	.726							
Dep. vs. Comorbid	*t*	0.24	0.17	1.43	0.03	.975	0.65	.519	0.81	.422	
	p	.809	.869	.154							
Anx vs. Comorbid	*t*	0.69	0.29	1.82	0.74	.464	1.54	.127	0.92	.358	
	p	.490	.775	.070							
		Contrasts Within Valence			2-way Interaction Contrasts | Task=Sounds						

Table 13: Diagnostic Group by Task and Within Valence, and Task Within Diagnostic Group Pairwise Contrasts Within Valence for Affective Reactivity – Valence Scores

		Negative Valence									Contrasts Within Group
		Pics	Words	Sounds	P vs W		P vs S		W vs S		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Depressed	45	-0.11	-0.48	-0.29	**2.11**	**.037**	1.15	.251	0.95	.342	
Anxious	51	-0.10	-0.14	-0.52	0.21	.832	**2.84**	**.005**	**2.07**	**.040**	
Comorbid	43	0.01	-0.22	-0.35	1.27	.207	**2.23**	**.027**	0.65	.517	
Dep. vs. Anx	*t*	0.05	1.47	0.95	1.38	.172	1.08	.281	**2.07**	**.041**	
	p	.956	.145	.342							
Dep. vs. Comorbid	*t*	0.55	1.05	0.24	0.56	.576	0.74	.461	1.13	.261	
	p	.585	.293	.809							
Anx vs. Comorbid	*t*	0.51	0.36	0.69	0.80	.425	0.31	.761	0.94	.347	
	p	.611	.717	.490							
		Contrasts Within Tasks			2-way Interaction Contrasts | Valence=Negative						

		Neutral Valence									Contrasts Within Group
		Pics	Words	Sounds	P vs W		P vs S		W vs S		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Depressed	45	0.08	-0.28	0.01	**2.16**	**.032**	0.34	.731	1.36	.175	
Anxious	51	0.09	-0.05	0.05	0.90	.368	0.25	.800	0.47	.640	
Comorbid	43	0.43	0.02	-0.04	**2.42**	**.017**	**2.32**	**.022**	0.25	.802	
Dep. vs. Anx	*t*	0.05	1.09	0.12	0.93	.353	0.08	.933	0.72	.473	
	p	.238	.277	.907							
Dep. vs. Comorbid	*t*	1.42	1.35	0.17	0.21	.831	1.31	.194	1.11	.269	
	p	.158	.178	.869							
Anx vs. Comorbid	*t*	1.41	0.32	0.29	1.24	.217	1.53	.129	0.48	.632	
	p	.161	.753	.775							
		Contrasts Within Tasks			2-way Interaction Contrasts | Valence=Neutral						

		Positive Valence									Contrasts Within Group
		Pics	Words	Sounds	P vs W		P vs S		W vs S		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Depressed	45	-0.14	-0.20	-0.07	0.33	.740	0.57	.573	0.67	.505	
Anxious	51	-0.12	0.00	0.00	0.72	.473	1.04	.299	0.00	.998	
Comorbid	43	-0.10	-0.37	-0.37	1.58	.117	**2.22**	**.028**	0.04	.971	
Dep. vs. Anx	*t*	0.09	0.81	0.35	0.69	.495	0.31	.759	0.48	.630	
	p	.932	.420	.726							
Dep. vs. Comorbid	*t*	0.16	0.72	1.43	0.93	.353	**2.08**	**.041**	0.44	.659	
	p	.870	.474	.154							
Anx vs. Comorbid	*t*	0.08	0.08	1.82	1.72	.089	**2.21**	**.030**	0.03	.980	
	p	.933	.126	.070							
		Contrasts Within Tasks			2-way Interaction Contrasts | Valence=Positive						

Table 14: Diagnostic Group by Valence and Within Task, and Valence Within Diagnostic Group Pairwise Contrasts Within Task for Affective Reactivity – Arousal Scores

		Pictures									Contrasts Within Group
		Neg.	Neu.	Pos.	Neg. vs Neu.		Neg. vs Pos.		Neu. vs Pos		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Depressed	45	0.35	0.45	0.24	0.56	.579	0.71	.478	1.30	.197	
Anxious	51	0.69	0.89	0.33	1.20	.233	**2.62**	**.010**	**3.80**	**<.001**	
Comorbid	43	0.42	0.90	0.34	**2.57**	**.011**	0.52	.604	**3.40**	**<.001**	
Dep. vs. Anx	*t*	1.66	1.54	0.43	0.41	.683	1.47	.144	1.66	.099	
	p	.098	.125	.665							
Dep. vs. Comorbid	*t*	0.34	1.49	0.50	1.44	.154	0.11	.913	1.66	.100	
	p	.732	.140	.615							
Anx vs. Comorbid	*t*	1.29	0.01	0.09	1.11	.270	1.43	.155	0.07	.948	
	p	.199	.995	.928							
		Contrasts Within Valence			2-way Interaction Contrasts | Task=Pictures						

		Words									Contrasts Within Group
		Neg.	Neu.	Pos.	Neg. vs Neu.		Neg. vs Pos.		Neu. vs Pos		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Depressed	45	0.39	0.28	0.27	0.78	.436	0.79	.432	0.06	.954	
Anxious	51	0.42	0.38	0.36	0.31	.754	0.48	.634	0.23	.818	
Comorbid	43	0.64	0.71	0.49	0.46	.645	1.02	.309	1.88	.062	
Dep. vs. Anx	*t*	0.18	0.60	0.54	0.34	.733	0.24	.814	0.11	.910	
	p	.858	.548	.593							
Dep. vs. Comorbid	*t*	1.21	**2.38**	1.30	0.91	.366	0.17	.863	1.26	.212	
	p	.228	**.019**	.197							
Anx vs. Comorbid	*t*	1.07	1.86	0.81	0.56	.579	0.47	.642	1.31	.193	
	p	.286	.065	.422							
		Contrasts Within Valence			2-way Interaction Contrasts | Task=Words						

		Sounds									Contrasts Within Group
		Neg.	Neu.	Pos.	Neg. vs Neu.		Neg. vs Pos.		Neu. vs Pos		
	N				t	p	t	p	t	p	
Depressed	45	0.28	0.45	0.06	1.51	.135	**2.09**	**.038**	**3.72**	**<.001**	
Anxious	51	0.77	0.85	0.42	0.76	.451	**3.44**	**<.001**	**4.30**	**<.001**	
Comorbid	43	0.53	0.93	0.19	**3.49**	**<.001**	**3.14**	**.002**	**6.88**	**<.001**	
Dep. vs. Anx	*t*	**2.19**	1.49	1.80	0.60	.553	0.87	.387	0.22	.823	
	p	**.030**	.138	.075							
Dep. vs. Comorbid	*t*	1.09	1.74	0.62	1.55	.125	0.74	.461	**2.50**	**.014**	
	p	.279	.085	.535							
Anx vs. Comorbid	*t*	1.04	0.31	1.13	1.89	.062	0.02	.988	**2.11**	**.037**	
	p	.299	.754	.259							
		Contrasts Within Valence			2-way Interaction Contrasts | Task=Sounds						

Table 15: Valence by Task and within Diagnostic Group, and Task Within Valence Pairwise Contrasts Within Diagnostic Group for Affective Reactivity – Arousal Scores

		Depressed									Contrasts Within Task
		Neg.	Neu.	Pos.	Neg. vs Neu.		Neg. vs Pos.		Neu. vs Pos		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Pictures	45	0.35	0.45	0.24	0.56	.579	0.71	.478	1.30	.197	
Words	45	0.39	0.28	0.27	0.78	.436	0.79	.432	0.06	.954	
Sounds	45	0.28	0.45	0.06	1.51	.135	**2.09**	**.038**	**3.72**	**<.001**	
P vs W	*t*	0.26	0.92	0.27	1.18	.245	0.06	.951	1.43	.160	
	p	.796	.359	.784							
P vs S	*t*	0.73	0.02	1.86	0.45	.653	1.02	.311	1.36	.180	
	p	.469	.984	.066							
W vs S	*t*	0.59	0.96	1.53	1.96	.057	0.61	.542	**2.68**	**.010**	
	p	.555	.337	.128							
		Contrasts Within Valence			2-way Interaction Contrasts | Group=Depressed						

		Anxious									Contrasts Within Task
		Neg.	Neu.	Pos.	Neg. vs Neu.		Neg. vs Pos.		Neu. vs Pos		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Pictures	51	0.69	0.89	0.33	1.20	.233	**2.62**	**.010**	**3.80**	**<.001**	
Words	51	0.42	0.38	0.36	0.31	.754	0.48	.634	0.23	.818	
Sounds	51	0.77	0.85	0.42	0.76	.451	**3.44**	**<.001**	**4.30**	**<.001**	
P vs W	*t*	1.87	**2.96**	0.32	1.37	.177	**2.77**	**.008**	**3.36**	**.001**	
	p	.064	**.004**	.751							
P vs S	*t*	0.92	0.34	1.02	0.88	.385	0.18	.855	1.08	.284	
	p	.359	.732	.308							
W vs S	*t*	**2.08**	**2.78**	0.48	0.70	.485	1.80	.078	**3.06**	**.004**	
	p	**.040**	**.006**	.633							
		Contrasts Within Valence			2-way Interaction Contrasts | Group=Anxious						

		Comorbid									Contrasts Within Task
		Neg.	Neu.	Pos.	Neg. vs Neu.		Neg. vs Pos.		Neu. vs Pos		
	N				*t*	*p*	*t*	*p*	*t*	*p*	
Pictures	43	0.42	0.90	0.34	**2.57**	**.011**	0.52	.604	**3.40**	**<.001**	
Words	43	0.64	0.71	0.49	0.46	.645	1.02	.309	1.88	.062	
Sounds	43	0.53	0.93	0.19	**3.49**	**<.001**	**3.14**	**.002**	**6.88**	**<.001**	
P vs W	*t*	1.40	1.01	1.30	**2.30**	**.026**	0.51	.613	**2.07**	**.045**	
	p	.163	.316	.197							
P vs S	*t*	1.22	0.27	1.51	0.53	.596	**2.03**	**.049**	1.42	.162	
	p	.225	.788	.133							
W vs S	*t*	0.58	1.24	**2.08**	**2.32**	**.025**	1.49	.143	**5.14**	**<.001**	
	p	.561	.215	**.039**							
		Contrasts Within Valence			2-way Interaction Contrasts | Group=Comorbid						

CHAPTER 7: FIGURES

Figure 1: Main Effect of Tripartite Construct in the Tripartite Model

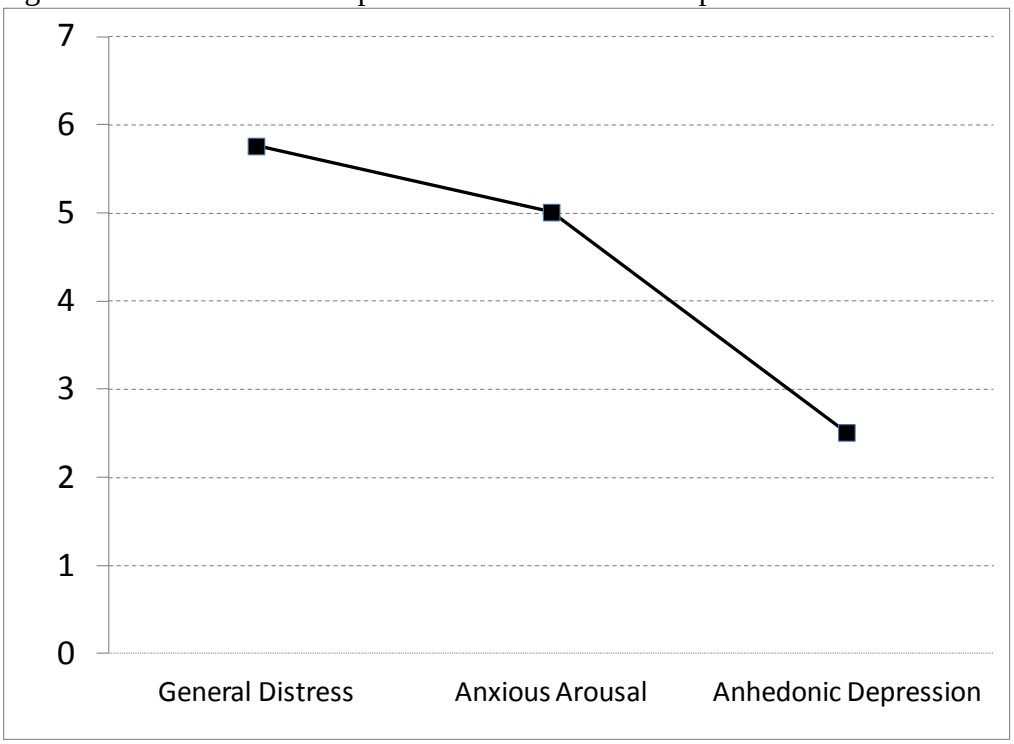


Figure 2: Main effect of Diagnostic Group in the Tripartite Model.

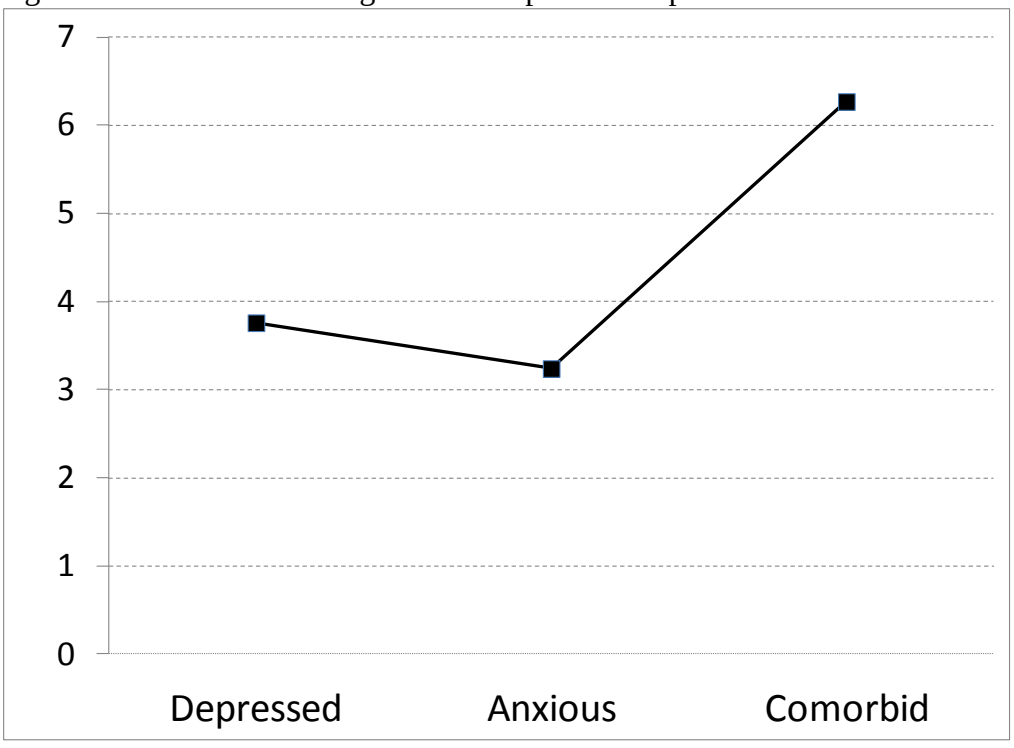


Figure 3: Interaction Effect of Tripartite Factor by Group for the Tripartite Model

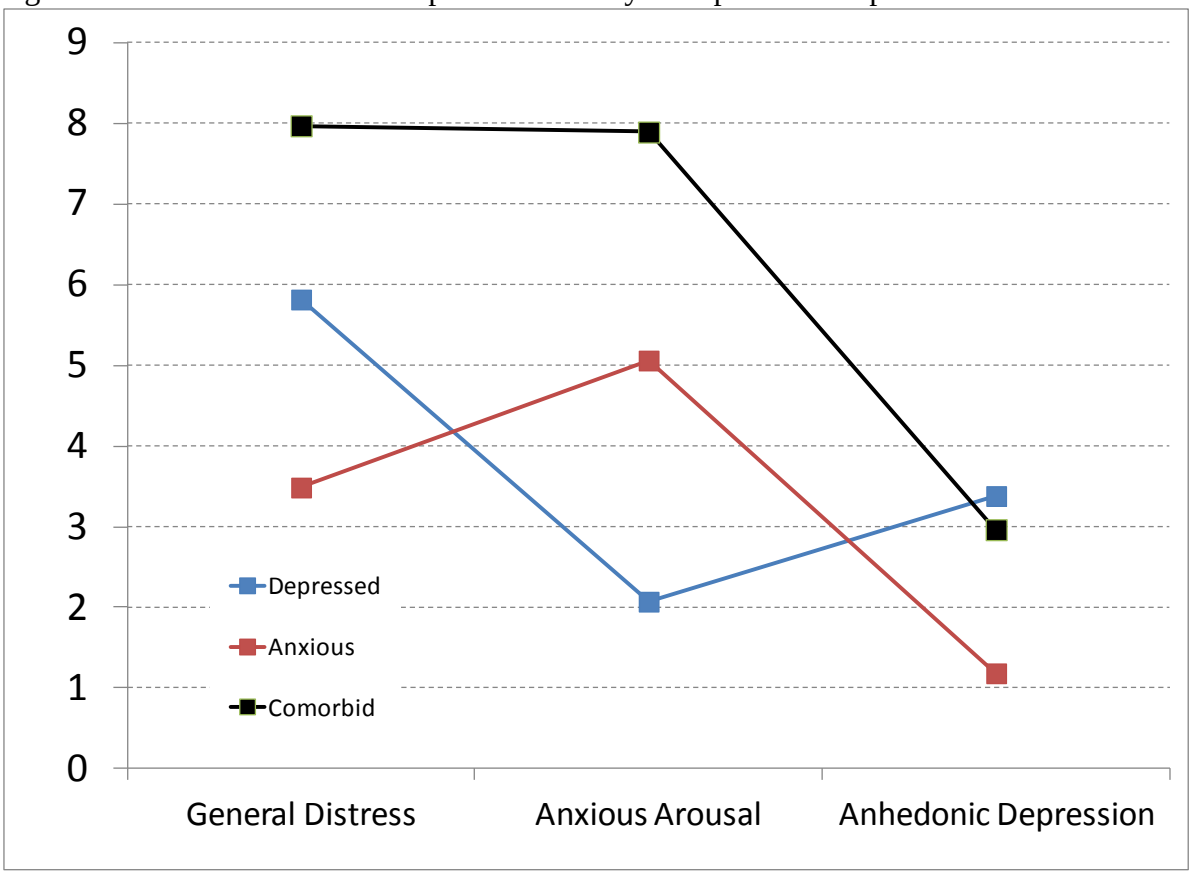


Figure 4: Valence Ratings by Valence

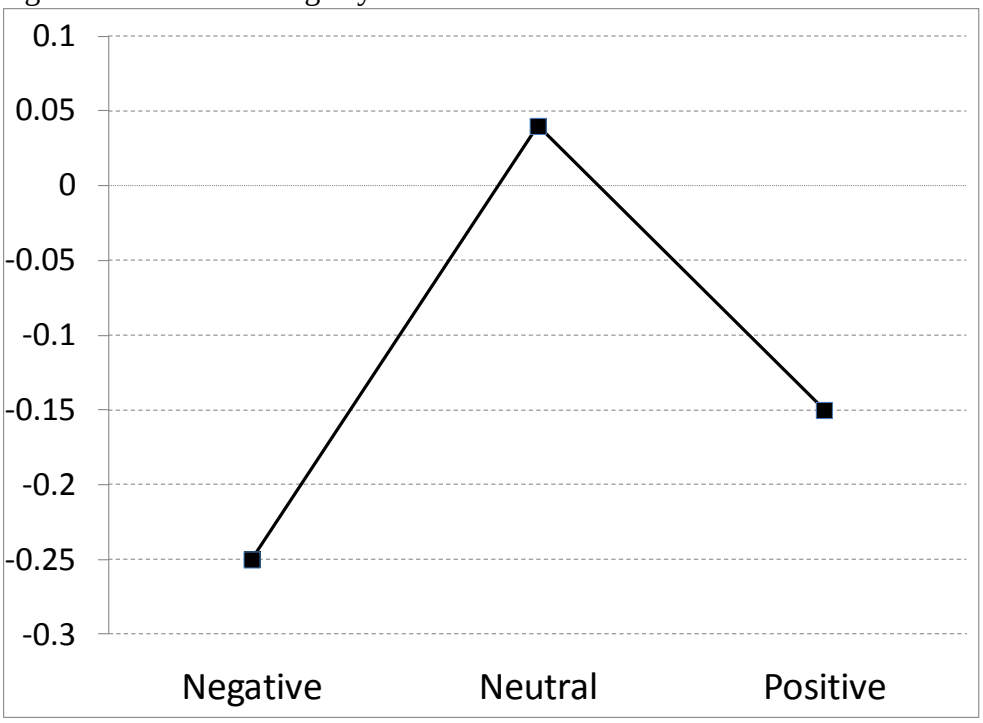


Figure 5: Valence Ratings by Task

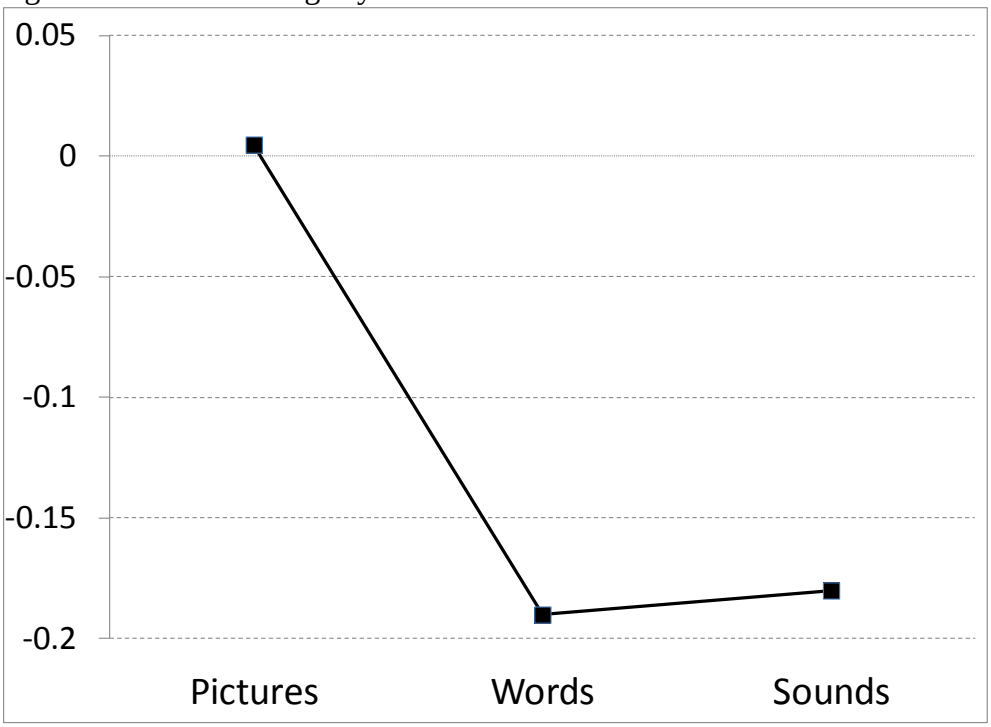


Figure 6: Arousal Ratings by Valence

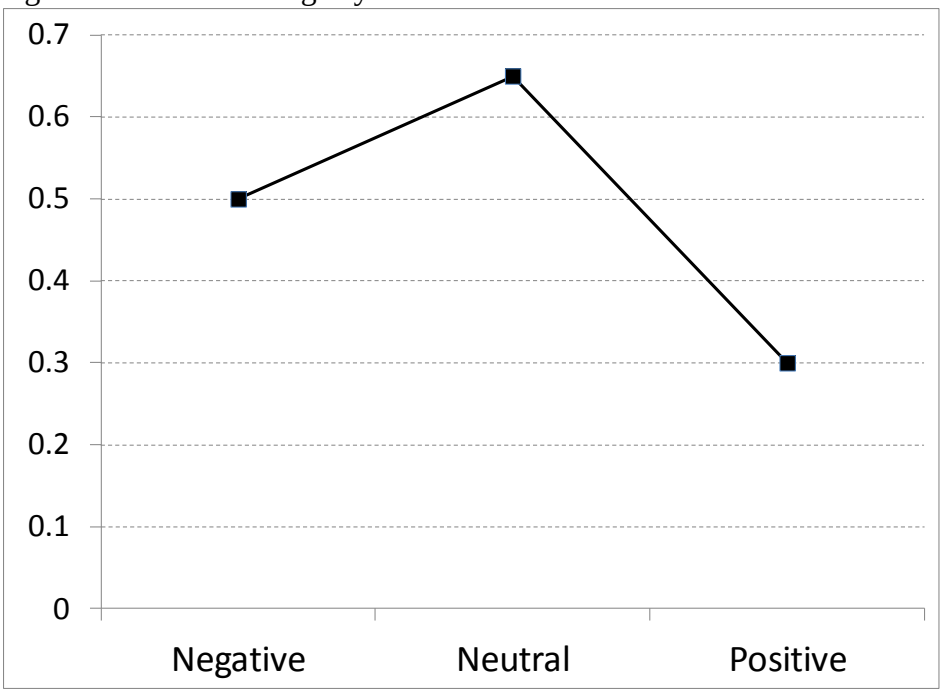


Figure 7: Valence x Task Two-Way Interaction Line Graph Across Groups for Affective Reactivity – Arousal Ratings

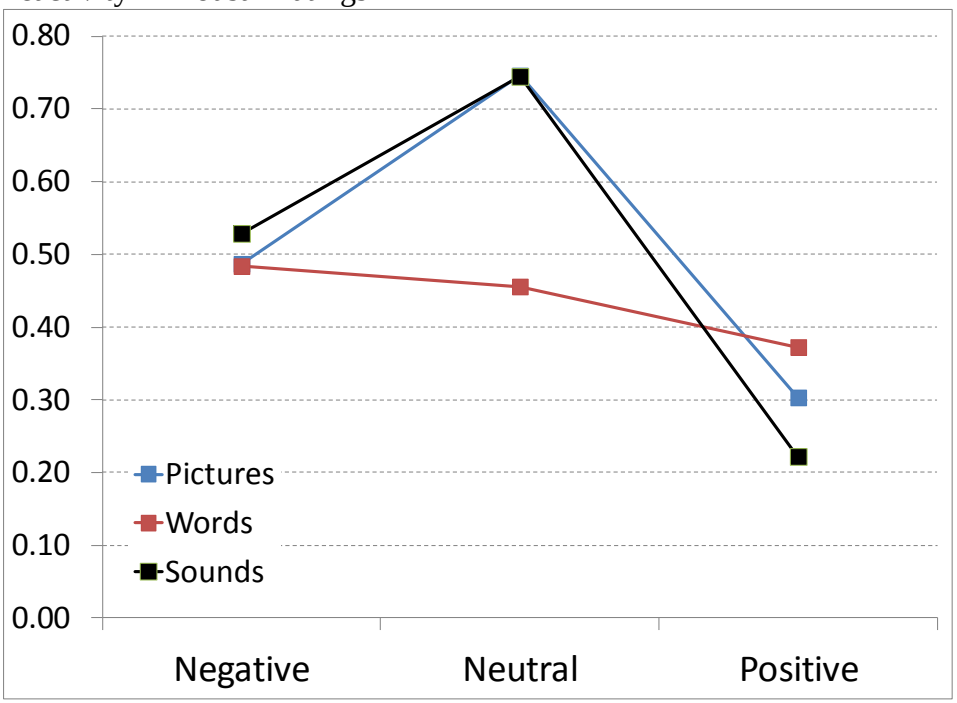
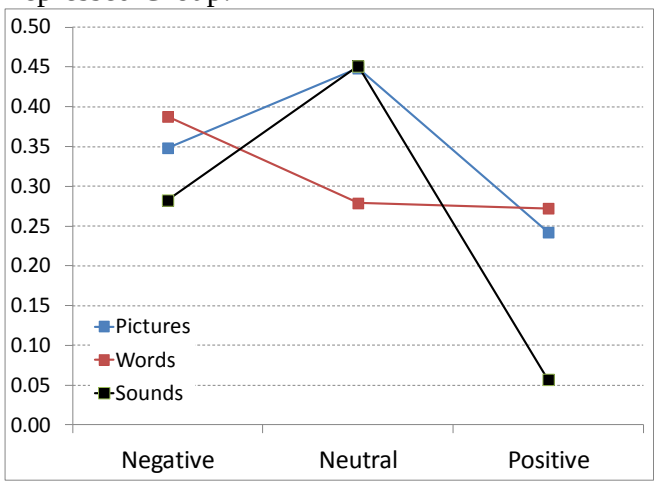
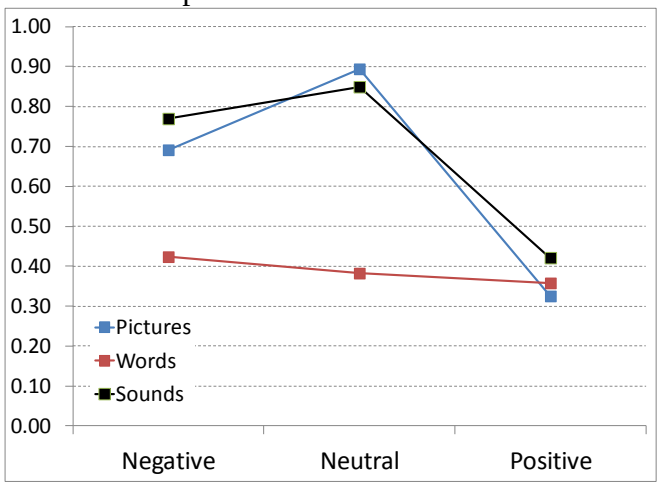


Figure 8: Valence by Task Interaction for Each Group

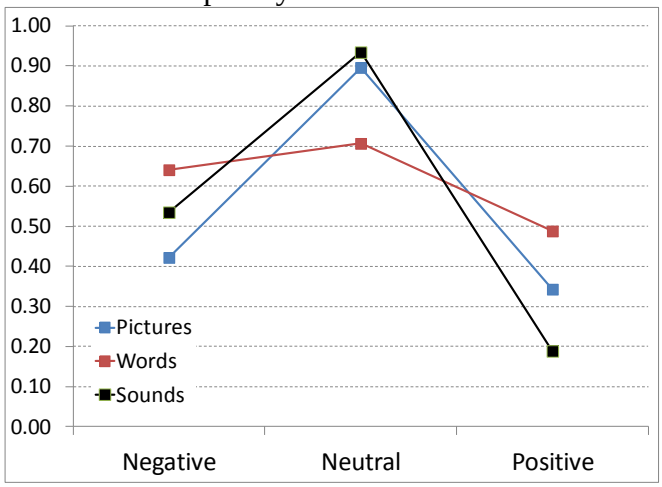
Depressed Group:



Anxious Group:



Comorbid Group Only:



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CHAPTER 9: APPENDICES

Appendix 1 Table 1: Correlations of valence and arousal ratings by group for negative, neutral, and positive stimuli for each task.

Pictures	Negative	Neutral	Positive
Depressed	-.02	.19	.58**
Anxious	-.52**	.34*	.52**
Comorbid	-.08	.37*	.45**

Sounds	Negative	Neutral	Positive
Depressed	-.19	.44**	.62**
Anxious	-.55**	.29**	.47**
Comorbid	-.24	.14	.44**

Words	Negative	Neutral	Positive
Depressed	-.44**	.15	.72**
Anxious	-.50**	.40**	.75**
Comorbid	-.27	.29	.23

Notes: * $p < .05$, ** $p < .01$