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Major depression duration reduces appetitive word use: An elaborated verbal recall of emotional photographs

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ABSTRACT

Introduction: Major depressive disorder (MDD) is characterized by cognitive biases in attention, memory and language use. Language use biases often parallel depression symptoms, and contain over-representations of both negative emotive and death words as well as low levels of positive emotive words. This study further explores cognitive biases in depression by comparing the effect of current depression status to cumulative depression history on an elaborated verbal recall of emotional photographs.

Methods: Following a negative mood induction, fifty-two individuals (42 women) with partially-remitted depression viewed – then recalled and verbally described – slides from the International Affective Picture System (IAPS). Descriptions were transcribed and frequency of depression-related word use (positive emotion, negative emotion, sex, ingestion and death) was analyzed using the Linguistic Inquiry and Word Count program (LIWC).

Results: Contrary to expectations and previous findings, current depression status did not affect word use in any categories of interest. However, individuals with more than 5 years of previous depression used fewer words related to positive emotion ($t(50) = 2.10$, $p = .04$, ($d = 0.57$)), and sex ($t(48) = 2.50$, $p = .013$ ($d = 0.81$)), and there was also a trend for these individuals to use fewer ingestion words ($t(50) = 1.95$, $p = .057$ ($d = 0.58$)), suggesting a deficit in appetitive processing.

Conclusions: Our findings suggest that depression duration affects appetitive information processing and that appetitive word use may be a behavioral marker for duration related brain changes which may be used to inform treatment.

1. Introduction

Major Depressive Disorder (MDD) is a rapidly growing public health concern that affects an estimated 16.2% of people at some point in their lifetime (Kessler et al., 2003). Additionally, MDD is highly persistent and carries a high (>80%) probability of recurrence, the risk of which increases with each subsequent episode (Judd, 1997; Mueller et al., 1999). MDD is characterized by high negative affect, low positive affect, suicidal thoughts and anhedonia – a deficit in hedonic or appetitive desires and behaviors, such as eating and sex (*DSM-IV-TR*, American Psychiatric Association, 2000).

MDD is also characterized by biases in the way information is processed. For example, individuals with depression have impaired memory for positive/neutral stimuli and enhanced memory for negative stimuli (Bradley et al., 1996; Bradley et al., 1995a,b; Dalgleish et al., 2003; Gotlib et al., 1988). While depression-related cognitive biases are often measured in terms of attention and memory (Burt et al., 1995; Disner et al., 2011; Kellough et al., 2008; Mathews and MacLeod, 2005), these biases also manifest in spontaneous language and word choice (Gotlib and Joorman, 2010). Numerous studies have demonstrated that depressed individuals show distinct linguistic patterns that parallel the symptoms of depression. For example, currently depressed individuals tend to use more negative emotive words (Rude et al., 2004; Veltman, 2006), particularly those related to sadness (Mehl, 2006; Rodriguez et al., 2010; Veltman, 2006), and fewer positive emotive words (Rodriguez et al., 2010; Rude et al., 2004). Depressed

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individuals also tend to use more death-related words (Stirman and Pennebaker, 2001; Veltman, 2006).

Cognitive biases in depression are thought to be associated with underlying differences in brain function and morphology, particularly in the prefrontal cortex (PFC) and limbic system (Beck, 2008; Disner et al., 2011; Frodl et al., 2008). Specifically, cognitive biases are thought to be caused by an imbalance of top-down cortical control and bottom-up subcortical saliency, resulting from poor prefrontal modulation of limbic structures like the amygdala and hippocampus (Beck, 2008; Browning et al., 2010; Davidson et al., 2000; Disner et al., 2011; Mayberg et al., 1999). The result is hyperactivation of the amygdala (Cahill et al., 1995), which is involved in emotional saliency, and impairment of the hippocampus, which is involved in associative memory (Filipini et al., 1991; Gould et al., 1998; Margarinos and McEwen, 1995; Sheline et al., 1999). Thus, the reduced PFC activity in depression may underlie negative biases in attention and memory (Beevers et al., 2010; Fales et al., 2008; Koster et al., 2010).

These depression-related brain differences, however, are more closely linked with duration of illness than current depression severity. For example, total depression duration is associated with decreased volume of the PFC (Frodl et al., 2008; Nolan et al., 2002; Salvadore et al., 2011) and the hippocampus, independent of current mood or severity of depression symptoms (Frodl et al., 2008; Sheline et al., 1999). Furthermore, magnitude of brain volume loss is positively correlated with both frequency of depressive episodes and total illness duration (MacQueen et al., 2003).

Thus, because depression-related cognitive biases are dependent on brain function, cognitive biases should be associated with illness duration more so than with current depression. There is substantial literature that supports this claim: euthymic individuals with a prior history of depression continue to display an attentional bias toward sad faces and away from happy faces, as well as a memory bias for negative words (Fritzsche et al., 2010; Joorman and Gotlib, 2007). Furthermore, these persisting biases appear to be associated with continued brain deregulation, particularly prefrontal underactivation and a hyperactive amygdala (Neumeister et al., 2006).

Unfortunately, much of the literature on cognitive biases and depression duration-related brain dysfunction contains methodological limitations and inconsistent results – the latter likely due to the use of distinct experimental paradigms that cannot be directly compared. Current research suggests that persisting but latent biases in remitted individuals are most consistently and reliably revealed with a mood challenge paradigm (Persons and Miranda, 1992). Under conditions of stress or negative affect, biases can be quickly reinstated, even if these biases appear to subside during remission (Bradley et al., 1997; Teasdale, 1988). This reappearance of depression-related biases suggests that the neural connectivity underlying the biases still remains in a latent form, and can be reactivated under stressful conditions. In the current study, we employ a standard laboratory stressor, the Trier Social Stress Test (TSST, Kirschbaum et al., 1993), as a mood challenge to reveal any latent brain dysfunction and resulting biases.

Second, no prior studies that the authors are aware of have quantified prior depression duration and addressed its relation to cognitive bias (instead, they have looked at the effect of any prior depression). Finally, no prior studies have examined the relationship between previous depression and word use; because word use is directly related to social functioning, persistent word bias is a particularly important area for research.

Thus, the present study compared the effects of current depression level and illness duration on depression symptom-related word use in the elaborated recall of emotional photographs following a mood challenge. Guided by previous findings, we predicted that both current depression and illness duration would be associated with more symptom-related word use when describing photographs. Specifically, we predicted that currently depressed individuals would use more words related to negative emotion and death, and fewer words related to positive emotion, food, and sex, relative to those in remission. We also predicted that individuals with a "long-term" history of depression (>5 years, based on our sample's mean of 5 years of cumulative depression) would use more words related to negative emotion and death, and fewer words related to positive emotion, food, and sex than individuals with a "short-term" history of depression (<5 years).

2. Method

2.1. Participants

Fifty-two individuals (42 women, mean age = 47.4, *SD* = 1.0) with a recurrent form of unipolar depression with varying degrees of remission (BDI *M* = 9.4, *SD* = 5.9) were recruited in Tucson, Arizona. Fliers were posted throughout the community between January 2004 and June 2005, as part of a larger treatment study (for complete details, see Britton et al., 2010; Shahar et al., 2010). A structured clinical interview (SCID-I; First et al., 2001) was administered to determine participant's diagnostic status. Inclusion criteria were a) meeting DSM-IV criteria for major depression within the last 5 years with varying degrees of residual symptoms, b) scoring <20 on the Beck Depression Inventory and c) having no change in type or dosage of antidepressant medication within the last 3 months or during the study. Exclusion criteria included a) history of bipolar or psychotic disorders, persistent antisocial behavior or repeated self-harm, borderline personality disorder, organic brain damage, b) current panic, obsessive-compulsive disorder, eating disorder, or substance abuse/dependence, c) inability to read/write in English or d) current psychotherapy.

Participants were divided into two groups based on their initial BDI scores. Participants with scores of 10 or more (Beck and Steer, 1987) were placed in the currently depressed group (*N* = 27), while participants with scores below 10 classified were classified as in remission (*N* = 25) (Teasdale et al., 2000). Cumulative months of depression (*M* = 60.5, *SD* = 38.2) was used to categorize participants into two groups based on whether they were greater than (*N* = 19, "long-term") or less than (*N* = 33, "short-term") the overall group mean of 60 months (5 years). The 5 year mark is also significant as Sheline et al., (1999) found changes in brain structure and function corresponding to a depression duration of 5 years.

2.2. Procedure

Following screening, participants completed a self-report questionnaire (BDI, Beck et al., 1961), a laboratory-based stress induction (TSST, Kirschbaum et al., 1993) and an emotional memory task. The study protocol was approved by the University of Arizona institution review board, and all participants provided written informed consent for research participation. No adverse events occurred during the trial.

2.3. Measures

2.3.1. Depression symptoms

2.3.1.1. The Beck Depression Inventory (BDI). The BDI (Beck et al., 1961) is a 21-item self report measure that assesses depressive symptomatology, with an emphasis on cognitive symptoms. In order to provide continuity and comparability with previous laboratory studies, the first version of the BDI was used instead of the BDI-II. The BDI is a widely used measure of depressive symptoms