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Empirical Research

Beyond symptom severity: The differential impact of distress tolerance and reward responsiveness on quality of life in depressed and non-depressed individuals

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ABSTRACT

Economic and patient-centered research highlights the role of quality of life outcomes above and beyond symptom severity as a key target of depression treatment. Thus, research investigating processes related to the etiology and treatment of depression needs to consider such outcomes in addition to symptom-specific measures. The current study evaluated two such processes, derived from operant conditioning principles of reinforcement: distress tolerance (DT) and reward responsiveness (RR). We examined the direct effects of these processes on quality of life in a sample of depressed (n = 34) and non-depressed (n = 33) participants, and conducted an exploratory analysis of their potential interaction. Results indicated that higher levels of RR and DT were associated with higher overall quality of life regardless of diagnostic status. We did not find the expected interaction between DT and RR, though results indicate a potential trend suggesting DT may provide a protective influence for individuals with low RR. Results highlight the importance of both tolerating distress and responding to rewards for individuals along the quality of life continuum. While this investigation focused on the highly heterogeneous diagnosis of depression, future investigations should extend such work to consider mixed diagnostic samples to further enhance the validity of such processes as potential treatment targets in real-world clinical settings.

1. Introduction

Depression is a chronic and debilitating illness, resulting in a yearly economic burden of over $200 billion per year in the United States (Greenberg, Fournier, Sisitsky, Pike, & Kessler, 2015). While the vast majority of depression research focuses on symptom severity as the primary outcome of interest, quality of life, commonly defined as an individual's subjective view of their functioning across various life domains (Gladis, Gosch, Dishuk, & Crits-Christoph, 1999; Rapaport, Clary, Fayyad, & Endicott, 2005), may better capture both the economic burden of this illness (Greenberg et al., 2015), as well as patients' own priorities for treatment outcomes (Zimmermann et al., 2013). In light of findings indicating that reductions in depressive symptoms are not conclusively linked with improved emotional functioning (Bohlmeijer, Lamers, & Fledderus, 2015; Nierenberg, Bentley, Farabaugh, Fava, & Deckersbach, 2012), such measures may better capture the continuum of the human experience. Such aims align closely with broader theories suggesting that suffering may be normative, and quality of life and valued living are more useful indices to consider when examining psychopathology (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Constructs linked to basic reinforcement processes, which are associated with multiple mental health diagnoses as well as broader processes, such as perceived stress (Pizzagalli, Bogdan, Ratner, & Jahn, 2007), may hold the most value for informing our understanding of the continuum from suffering to wellness.

Processes related to positive reinforcement have long-established links with depression (Ferster, 1973), and treatments for mood disorders that focus on reinforcement principles have demonstrated strong support (e.g., behavioral activation, Dimidjian et al., 2006; Ekers et al., 2014). One positive reinforcement process linked to depressive symptomology is reward responsiveness (RR). RR is the tendency to respond to opportunities for positive reinforcement in the environment, and is thought to be responsible for positive affect experiences such as happiness and hope, which are central to quality of life (Carver & White, 1994). Depressed individuals show lower levels of RR compared to healthy controls (McFarland & Klein, 2009), and RR is linked to the severity and course of depressive symptoms (Bress & Hajcak, 2013; Kasch, Rottenberg, Arnow, & Gotlib, 2002; Pizzagalli, Iosifescu, Hallett, Ratner, & Fava, 2008). Low levels of RR are also implicated in related disorders, including PTSD (Nawijn et al., 2015), as well as broader

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constructs including acute and chronic stress (Berghorst, Bogdan, Frank, & Pizzagalli, 2013; Dillon et al., 2009).

While the majority of depression research has traditionally focused on positive reinforcement processes such as RR, behavioral models of depression have historically described a potential role for negative reinforcement processes in depression as well. Such models posit that behaviors under aversive control (i.e., those that are driven by avoidance of or relief from aversive stimuli) may work to prevent access to opportunities for positive reinforcement (Ferster, 1973; Kanter, Busch, Weeks, & Landes, 2008). Despite this proposed theoretical interactive influence, positive and negative reinforcement processes are rarely considered together (though see MacPherson et al., 2010 for an exception). Rather, RR is typically considered in tandem with punishment sensitivity (Carver & White, 1994; Kasch et al., 2002). This omission has likely limited our understanding of the differential and potential interactional impact of these processes.

One negative reinforcement process that may interact with RR and be particularly relevant to quality of life is the perceived or actual ability to tolerate distress, known in the literature as distress tolerance (DT; Simons & Gaher, 2005). Individuals with low DT experience emotional distress as intolerable, and are likely to respond to opportunities for relief from it. The majority of DT research has focused largely on anxiety and substance use disorders (Daughters et al., 2005; Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010; Leyro, Zvolensky, & Bernstein, 2010). This connection makes intuitive sense, as these disorders are typically characterized by a drive to escape discomfort. However, theorists have also hypothesized a potential role for low DT in depression, noting that depressed individuals exhibit beliefs that emotional distress is intolerable and show an accompanying unwillingness to experience it (Clen, Mennin, & Fresco, 2011). In support of this theory, studies have begun to show links between depression and DT in clinically depressed samples (Ellis, Vanderlind, & Beevers, 2013; Williams, Thompson, & Andrews, 2013), and depressive *symptoms* have been linked to DT in a variety of other clinical populations (e.g., Borderline Personality Disorder, Iverson, Follette, Pistorello, & Fruzzetti, 2012; eating disorders, Anestis, Selby, Fink, & Joiner, 2007; problematic substance use, Buckner, Keough, & Schmidt, 2007).

In the context of depression, DT may function to prevent individuals from accessing opportunities for positive reinforcement. For example, an individual who once enjoyed team sports may cease to be involved not only because they expect less positive emotion from these events based on recent experience, but also because they have recently found such activities to be more distressing than simply staying home. In this example, both low RR (i.e., low expectation/experience of positive reinforcement) as well as low DT (i.e., low tolerance of emotional discomfort) contribute to reduced interest in previously enjoyed activities. Conversely, the tendency to tolerate emotional distress (i.e., high DT) may be particularly adaptive when one is also responsive to opportunities for positive reinforcement (i.e., high RR), as this may increase individuals' ability to persist through events that may be initially distressing, but provide opportunities to experience positive reinforcement. Thus, while low levels of both RR and DT are theoretically relevant to depression, there is reason to believe that these behavioral patterns cover the continuum from clinically significant impairment to well-being. Indeed, together with the evidence supporting a role for both RR and DT in related disorders, such processes also merit consideration for their potential value as treatment targets in real-world clinical settings, where co-morbidity is the rule rather than the exception, particularly for depressive disorders (Kessler, Chiu, Demler, & Walters, 2005).

Furthermore, previous work that has examined positive and negative reinforcement processes in isolation may be artificially separating co-existing contingencies that are influencing behavior. Indeed, these processes likely interact, such that low levels of DT may prevent even those with high RR from engaging in enjoyable activities. To take our earlier scenario, the inability to tolerate any distress associated with engaging in a team event may prevent the individual from continuing with their team involvement even in the context of normative or high expectation of enjoyment. While this hypothesis aligns with some evidence suggesting that DT and RR interact in their influence on other outcomes (e.g., risky behavior, MacPherson et al., 2010), the extant research is so limited that any hypotheses regarding potential interactional influence on quality of life is exploratory in nature.

1.1. The current study

Given the long history of research within diagnostic classifications, it is a useful first step to consider the impact of processes such as DT and RR on the quality of life continuum together with relevant diagnostic classifications. Thus, the current study assessed the influence of DT and RR on quality of life in a combined sample of depressed and non-depressed participants. In keeping with the importance of considering both processes together, we first hypothesized that both DT and RR would show independent influences on quality of life for the combined sample, such that low DT and low RR would be associated with lower quality of life overall. Second, we aimed to examine the exploratory hypothesis that DT and RR would show an interactive influence on quality of life. Specifically, we expected to find that when RR is low, quality of life would be low regardless of DT levels; whereas individuals with high RR would show a different pattern, with high DT related to higher quality of life than low DT. Finally, we predicted that the pattern of these influences would remain when controlling for depression diagnosis, exhibiting the added value of these relationships above and beyond clinical diagnosis. Such results would provide evidence for the influence of these processes across the quality of life continuum, rather than simply the continuum of impairment.

2. Method

2.1. Participants

Participants were 67 community members (n = 18 depressed, n = 16 non-depressed) and college students (n = 16 depressed, n = 17 non-depressed; total sample: n = 34 depressed, n = 33 non-depressed). Participants were recruited through community advertisements, including physical flyers and online posts to community message boards. Of the 34 depressed participants, 27 met criteria for Major Depressive Disorder (MDD), 5 met criteria for Dysthymia, and 2 for Depressive Disorder Not Otherwise Specified (DDNOS). The mean age of participants was 27.7 years (SD = 12.74 *Range* = 18–63). The majority of participants were female (61.2%, n = 41) and Caucasian (79.1%, n = 53); 3.0% (n = 2) of the participants self-identified as African-American, 7.5% (n = 5) as Asian, 7.5% (n = 5) as Latino, 1.5% (n = 1) as multiracial, and 1.5% (n = 1) "do not wish to disclose."

Interested participants (n = 110) completed a brief phone screen to evaluate preliminary inclusion criteria of evidence or absence of significant depressive symptoms for depressed participants and non-depressed participants, respectively. Preliminary exclusion criteria for both groups included current or past evidence of symptoms of mania or psychosis. Of the participants who were excluded at this phase (n = 28), n = 10 reported a history of mania or diagnosis of a Bipolar Disorder, n = 14 reported subthreshold depressive symptoms, and n = 3 reported a history of psychosis. One potential participant was unable to attend study visits during the available times. Of the remaining n = 82 participants who were scheduled for a study visit, n = 10 did not attend the scheduled appointment and did not return calls to reschedule, for a total of n = 72 participants who attended the study visit.

2.2. Measures

2.2.1. Diagnostic interview

2.2.1.1. Mood Module and the Mood Differential of the Structured Clinical