

**DISTRESS TOLERANCE, EMOTION DYSREGULATION, AND ANXIETY AND DEPRESSIVE
SYMPTOMS AMONG HIV+ INDIVIDUALS**

A Thesis

Presented to

The Faculty of the Department

Of Psychology

University of Houston

In Partial Fulfillment

Of the Requirements for the Degree of

Master of Arts

By

Charles P. Brandt II

May 2013

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ABSTRACT

A disproportionately high percentage of HIV infected individuals experience clinically meaningful symptoms of anxiety and depression. To date, few studies have examined cognitive-affective factors that may account for these high rates of anxiety and depressive symptoms. The current study examined the mediational effects of emotional dysregulation in terms of the relation between perceived distress tolerance and anxiety and depressive symptoms among HIV+ individuals. Participants included 176 HIV+ adults (21.6% female, $M_{\text{age}} = 48.40$ years, $SD = 8.66$). Results indicated that distress tolerance was significantly related to greater depressive and anxiety symptoms (panic, social anxiety) among this sample of HIV+ individuals. Results also indicated that emotion dysregulation mediated this association. Findings were statistically significant above and beyond the variance accounted for by CD4 T-cell count, race, gender, education level, and marijuana use status. Findings are discussed in relation to the potential explanatory utility of distress tolerance and emotional dysregulation in terms of psychological well-being among HIV+ individuals.

TABLE OF CONTENTS

Chapter	...Page
I. Background and Significance.....	1
HIV/AIDS: Prevalence and Global Impact	1
Psychological Distress among Persons Infected with HIV	2
Anxiety and Depressive Symptoms and Disorders: Prevalence among the General and HIV/AIDS population	4
Relevance of Cognitive Risk Factors for psychopathology in the HIV/AIDS Population.....	6
Distress tolerance: Conceptualization and Operational Definition, Measurement, and Relation to Psychopathology.....	7
Emotion Dysregulation: Conceptualization and Operational Definition, Measurement, and Relation to Psychopathology.....	11
II. Present Study: Aims and Hypotheses.....	13
III. Methodology.....	14
Sample.....	14
Measures.....	15
Data Analytic Plan.....	17
IV. Results.....	18
V. Discussion.....	20
VI. References.....	24
VII. Graphs and Figures.....	40
Figure I.....	40
Table I	41
Table II.....	42
Figure II.....	43
VIII. Footnotes.....	44

BACKGROUND AND SIGNIFICANCE

HIV/AIDS: Prevalence and Global Impact

The human immunodeficiency virus (HIV) is an infectious disease that compromises the human immune system, allowing opportunistic infections and cancers that would otherwise be easily suppressed, to thrive. HIV is transmitted by bodily fluids (e.g., blood, semen) and can go undetected in individuals for years before AIDS-defining illnesses appear (e.g., Gandhi, Skanderson, Gordon, Concato, & Justice, 2007). Today the HIV virus and its progression to acquired immunodeficiency syndrome (AIDS) is recognized as a worldwide pandemic by the World Health Organization (UNAIDS & WHO, 2007). Over 33 million individuals are currently infected and the disease is estimated to be responsible for approximately 2 million deaths annually (UNAIDS & WHO, 2007). Although in the United States HIV/AIDS once primarily affected White gay and bisexual men (Kelly & Murphy, 1992), it is now increasingly more common among heterosexual men and individuals in minority ethnic groups (CDC, 2008). Estimates from 33 states with long-term, confidential name-based HIV/AIDS databases indicate that there are approximately one million two hundred thousand individuals living with HIV/AIDS in the United States today (CDC, 20012).

Alarming, it is estimated that 1 in 5 (20%) of HIV infected individuals are not aware of their HIV-serostatus (CDC, 2012). As such, despite improvements in disease education and treatment, transmission rates today remain relatively stable. There are approximately 56,300 new cases of HIV/AIDS being reported in the U.S. annually (95% confidence interval 48,200-56,300; CDC, 2008). Of these new cases, the largest proportion exists among men who have sex with men (MSM; 53%) followed by persons infected through heterosexual contact (31%; CDC, 2008). Almost half (45%) of these new HIV/AIDS cases are among people identifying with a minority ethnic group, an alarming statistic given that such individuals make up 13% of the population in reporting states (CDC, 2008). Despite the high number of new diagnoses annually

(approximately 37,000 per year from 2002-2006), the number of deaths due to AIDS has begun to decrease. For example, approximately 16,500 per year from 2002 to 2005 to approximately 14,000 deaths in 2006 (CDC, 2008). This decrease in deaths has been assumed to be a product of greater efficacy of AIDS-related treatment options (Lima et al., 2007; see next Section for a further discussion of this matter).

Psychological Distress among Persons Infected with HIV

Advances in highly active antiviral therapy (HAART; the primary treatment regimen prescribed to those with HIV) have enabled individuals to live much longer with the disease (Hogg, Yip, Kully, Carib, et al., 1999; Palella, Delaney, Moorman, Loveles, Fuhrer, et al., 1998; Paterson et al., 2000) and HIV is now viewed as a “chronic disease” as opposed to a “terminal disease” (Beaudin & Chambre, 1996). As these individuals are able to live full lifespans with effective disease management, efforts to understand the psychosocial consequences of HIV are beginning to emerge. Specifically, it is estimated that HIV-related medical costs will rise due to the provision of ongoing care over greater periods of time (Schackman et al., 2006). Thus, current work relating to individuals infected with HIV is shifting in focus toward issues such as quality of life, medication management, and containment of healthcare costs (see Holtgrave, Hall, Wehrmeyer, & Maulsby, 2012).

In an effort to understand these and similar consequences of HIV infection empirical work has begun to address psychological factors related to HIV/AIDS. This research increasingly suggests that this disease may be linked to clinically meaningful affective symptoms and problems (Leserman, 2003). There are a number of separate yet interrelated lines of work examining these associations. In this section of the proposal, key sources of scientific evidence supporting a linkage between HIV/AIDS and negative psychological symptoms and distress are briefly summarized. This work broadly informs and serves as the explanatory context for the current study and its hypotheses.

Existing research has found that psychological stress related specifically to HIV/AIDS is common (Catz, Gore-Felton, & McClure, 2002; Leserman, 2003; Siegel, Schrimshaw, & Pretter, 2005). People living with HIV/AIDS often report negative affective symptoms and emotional problems arising from biological responses to infection (Tsao, Dobalian, Moreau, & Dobalian, 2004) and side effects from antiretroviral therapy (Lorenz, Cunningham, Spritzer, & Hayes, 2006). In turn, these negative affective symptoms and emotional problems are significantly associated with suboptimal HAART adherence (e.g., Blashill, Perry, & Safren, 2011; Daughters, Magidson, Schuster, & Safren, 2010), which can lead to faster disease progression (Leserman, Petitto, Golden, Gaynes, Gu, et al., 2000). Additional research has indicated that in the HIV/AIDS population there are other common sources of significant personal stress, including disease stigma (Berger, Ferrans, & Lashley, 2001; Bunn, Solomon, Miller, & Forehand, 2007; Gonzalez, Miller, Solomon, Bunn, & Cassidy, 2009) and HIV status disclosure (Chandra, Deepthivarma, Jairam, & Thomas, 2002; Dowshen, Binns, & Garofalo, 2009; Golub, Tomassilli, & Parsons, 2009). Other factors include job loss, interpersonal rejection, and bereavement (Leserman, 2003). Thus, stressors stemming from HIV infection are often omnipresent in this population. Moreover, life stress among HIV+ individuals has been significantly associated with avoidance-oriented coping (Penedo, et al, 2003), increase in substance use (Pence, Miller, Whetten, Eron, & Gaynes, 2006; Ibanez, Purcell, Stall, Parsons & Gomez, 2005), suboptimal adherence to HAART medication (Chesney et al, 2000; Mugavero et al, 2006; Venable, Carey, Blair, & Littlewood, 2006), and more rapid progression to AIDS and AIDS-related opportunistic infections (e.g., Kaposi's sarcoma; Leserman et al., 2002).

Another line of work indicates that HIV/AIDS may be linked to anxiety and depressive states and disorders. Rates of non-trauma related DSM-IV anxiety disorders have been found to be as high as 43% of individuals with HIV (Chandra, Ravi, Desai, & Subbakrishna, 1998; Johnson, Williams, Rabkin, Goetz, et al., 1995; Sewell, Goggin, Rabkin, Ferrando, McElhiney, &

Evans, 2000) while post-traumatic stress disorder (PTSD) rates have been reported as high as 54% (Kelly, Raphael, Judd, Perdices, et al., 1998; Olley, Zeier, Seeday, & Stein, 2005; Tsao, Dobalian, Moreau, & Dobalian, 2004). In a meta-analysis of extant work on mood disorders in this population, Ciesla and Roberts (2001) concluded that persons with HIV/AIDS, across existing studies as a whole, were approximately two times more likely to have a history of major depressive disorder than individuals not infected with the virus. Subsequent investigations have supported a depression-HIV association since the Ciesla and Roberts (2001) meta-analysis (Bing et al., 2001; Cruess et al., 2003; Morrison et al., 2002). For example, Williams et al (2005) found rates of clinical depression among the HIV+ population to be as high as 50%. These rates of depression have been shown to affect disease progression; in a 41-month prospective study, depressive symptoms were linked to greater risk for AIDS-related mortality (Leserman et al., 2007).

Anxiety and Depressive Symptoms and Disorders: Prevalence among the General and HIV/AIDS population

Anxiety and depression in the general population. According to the National Comorbidity Survey Replication (NCS-R; Kessler, Chiu, Demler, & Walters, 2005), anxiety and mood disorders are the two most prevalent classifications of mental disorders in the U.S., affecting approximately 18.1% and 9.5% of the population, respectively. Currently, there are 12 anxiety disorders and 10 mood disorders listed in the DSM-IV-TR, with additional sub-categorizations, which are associated with life disruption and impairment in quality of life (APA, 2004).

The most frequently occurring anxiety disorders are specific phobia (8.7%) and social anxiety disorder (6.8%), followed by posttraumatic stress disorder (3.5%), generalized anxiety (3.1%), and panic disorder (2.7%; Kessler et al., 2005). To complicate the nature and experience of anxiety disorders, individuals with these disorders are often affected by other co-occurring mental health disorders, such as substance use disorders (e.g., Kessler et al., 2005;

Zvolensky, Bernstein et al., 2006). It also should be noted that given the nature of anxiety problems and disorders (e.g., elevated heart rate, dizziness, heart problems), individuals experiencing anxiety often initially present at primary health care facilities with physical health concerns (e.g., emergency room visits; Arikian & Gorman, 2001). As a result, management and treatment of anxiety and its disorders account for high costs to individuals and health care systems (Arikian & Gorman, 2001; DuPont et al., 1996).

The most frequently occurring mood disorders are major depressive disorder (6.7%), Bipolar I and II disorder (2.6%), and Dysthymia (1.5%; Kessler et al., 2005). Individuals with these disorders are often affected by other comorbid or co-occurring mental health disorders, such as substance use disorders (Wolizsky-Taylor, Bobova, Zinbarg, Mineka, & Craske, 2012) and suicide (Nock, Hwang, Sampson, & Kessler, 2010). It has been estimated that individuals suffering from mood disorders cost employers in the billions of dollars due to loss of workdays and productivity (Kessler, Hagop, Minnie, Howard, Greenberg, et al., 2006).

Anxiety and Depression among HIV+ individuals. Empirical literature documents statistically and clinically significant relations between HIV/AIDS and anxiety and depressive symptoms and disorders. Indeed, HIV infected individuals suffer from anxiety and depressive symptoms and disorders at significantly higher rates than the general population (Bing et al., 2001; Campos, Guimaraes, & Remien, 2010; Olley, Zeier, Seedat, & Stein, 2005). For instance, rates of anxiety disorders among HIV+ individuals have been estimated as high as 43% (Chandra, 1998; Perretta et al., 1996). Likewise, depressive symptoms and disorders commonly co-occur with HIV/AIDS, with studies finding over a 50% base rate of clinical depression among adults with HIV/AIDS (Williams et al., 2005). Regarding symptoms of these psychiatric disorders, rates of panic attacks (common across anxiety disorders) have been found to be four times as high in HIV+ individuals than the general population (Bing et al., 2001), and social

anxiety is more common among men who have sex with men (MSM; a high-risk group for HIV infection) than heterosexual men (Gilman, Cochran, Mays, Hughes, Ostrow, & Kessler, 2002).

Elevated negative emotional symptoms also have been found to have an impact on HIV+ disease management. For instance, although the underlying directionality of the anxiety and depressive symptoms and disorders-HIV/AIDS relation remains unclear, research has found that these negative emotional states tend to contribute to non-adherence to HIV medications (Antoni, 2003; DiMatteo, Lepper, & Croghan, 2000; Schönnesson et al., 2006; van Servellen, Chang, Garcia, & Lombardi, 2002), lesser quality of life (Sewell et al., 2000), greater health-care utilization (Joyce, Chan, Orlando, & Audrey, 2005; O'Cleirigh, Skeer, Mayer, & Safren, 2009), and greater incidence of risky sexual behaviors (Hart, James, Purcell, & Farber, 2008; Hatzenbuehler, O'Cleirigh, Mayber, Mimiaga, & Safren, 2011).

Relevance of Cognitive-Affective Risk Factors for Anxiety/Mood Psychopathology in the HIV/AIDS Population

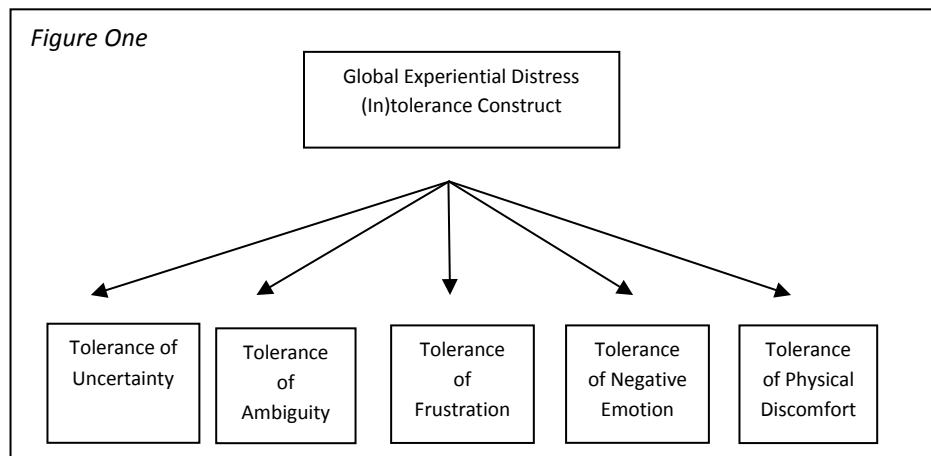
Though existing work has uncovered a link between anxiety/mood psychopathology, HIV infection, and disease management, there is a lack of research identifying the explanatory processes that may underlie such associations. This lack of research is surprising, given the associations that have been made in the general population between existing explanatory processes and HIV infection. The most well-developed aspect of this literature has been focused on coping with the HIV/AIDS illness and other life stressors (e.g., Commerford et al., 1994; Perez et al., 2009; Vosvick, Martin, Smith, & Jenkins, 2010). Yet, there has been little investigation of other cognitive-affective factors related to these negative emotional states. Research examining such cognitive vulnerability factors in other populations including drug users (Daughters, Lejuez, Kahler, Strong, & Brown, 2005) and those with chronic pain (e.g., musculoskeletal pain; Asmundson, Peluso, Carleton, Collimore, & Welch, 2011) suggest that potential explanatory could exist for these constructs in the HIV+ population.

In an attempt to fill the existing gap in the literature, a small number of studies have begun to examine such cognitive vulnerability factors in the HIV+ population. One such study (Gonzalez, Zvolensky, Grover, & Parent, in press) found that anxiety sensitivity was positively related to symptoms of anxious arousal, bodily vigilance, interoceptive fear, and HIV symptom distress while rates of mindful attention were negatively related to symptoms of anxious arousal, interoceptive fear, and HIV symptom distress. Though in this study the main effects of anxiety sensitivity and mindful attention were evident, these variables showed no significant interactive effects. This work extended upon past work examining anxiety sensitivity and anxiety symptoms among an HIV+ sample (Gonzalez, Zvolensky, Solomon, & Miller, 2010) and provides further indication that research on these and other cognitive-affective risk factors in the HIV+ population is necessary to better understand underlying causes of psychopathology.

Distress tolerance: Conceptualization and Operational Definition, Measurement, and Relation to Psychopathology

Conceptualization and operational definition. Scientific attention has increasingly been focused on distress tolerance due to its potential role in the development and maintenance of multiple forms of psychopathology (Leyro et al., 2010; Zvolensky, Bernstein, & Vujanovic, 2011; Zvolensky & Otto, 2007; Zvolensky, Vujanovic, Bernstein, & Leyro, 2010) and as a transdiagnostic clinical target for intervention/prevention programs (Linehan, 1993). Distress tolerance reflects an individual's perceived or behavioral capacity to withstand experiential/subjective distress related to affective, cognitive, and/or physical states (e.g., negative affect, physical discomfort; Simon & Gaher, 2005; Zvolensky et al., 2011). Scholars have therefore suggested it is an individual difference factor for stress responsivity and psychological vulnerability (Linehan, 1993). Conceptual models of distress tolerance suggest that the construct may be hierarchical in nature (Zvolensky et al., 2010). Specifically, there may be one global "experiential distress tolerance" construct incorporating other, specific lower-order

constructs (e.g., frustration intolerance, depressed mood intolerance; please refer to Figure One for an illustrative example from Zvolensky et al., 2010). McHugh and Otto (2011) have recently offered the perspective that distress tolerance can be domain-general while maintaining domain-specific properties.



Measurement. Distress tolerance has been characterized by two distinct conceptual and related measurement perspectives. Specifically, distress tolerance has been studied as: (a) the *perceived* capacity to withstand aversive emotional or physical states (assessed via self-report measures; e.g., Distress Tolerance Scale [DTS; Simon & Gaher, 2005], Discomfort Intolerance Scale [DIS; Schmidt, Richey, & Fitzpatrick, 2006]), and (b) the *behavioral act(s)* of withstanding distressing internal states elicited by some type of stressor (assessed via the latency to discontinue distressing tasks; e.g., mirror-tracing task, breath-holding task; Zvolensky et al., 2011). Accordingly, there have been two methodological literatures, each linked to one of these conceptual perspectives on distress tolerance.

There are numerous self-report measurements of distress tolerance regarding perceived capacity to withstand negative emotions, such as (1) tolerance of ambiguity reflecting the way an individual processes information about a situation when faced with vague, unfamiliar or complicated stimuli (TOA; Frenkel-Brunswik, 1948, 1951, 1959; Hoffeditz & Guilford, 1935;

Furnham & Ribchester, 1995); (2) intolerance of uncertainty reflecting the different emotional, cognitive, and/or behavioral responses people demonstrate when presented with uncertain situations and events (IU; Buhr & Dugas, 2002; Dugas, Buhr, & Ladouceur, 2004); (3) discomfort intolerance defined as the capacity to withstand uncomfortable physical sensations (DIS; Schmidt et al., 2006); (4) distress tolerance defined as an individual's perceived ability to withstand negative emotional states (DT; Simon & Gaher, 2005); and (5) frustration intolerance denoting an individual's beliefs regarding uncertainty, controllability, and aversiveness of emotions (Harrington, 2005). Likewise, there are a variety of behavioral distress tolerance measures such as (1) physical tolerance tasks, measured in a variety of ways, capturing an individual's ability to withstand exposure to a specific type of aversive stimulus (e.g., breath-holding duration; Asmundson & Stein, 1994) and (2) cognitive-based tolerance tasks, also measured in a variety of ways, capturing an individual's ability to complete difficult and frustrating tasks which often require cognitive resources (e.g., mirror-tracing task; Strong et al., 2003).

Interrelations between self-report and behavioral distress tolerance indices. Interestingly, McHugh and colleagues (2011) have found self-report distress tolerance measures and self-report measures of related constructs (e.g., anxiety sensitivity) are highly correlated, as were certain behavioral distress tolerance measures. However, behavioral and self-report measures (conceptualized distinctly) did not exhibit significant associations with one another (McHugh et al., 2011). Similarly, Bernstein, Marshall, and Zvolensky (2011) have indicated that although self-report distress tolerance measures were significantly related to one another and behavioral distress tolerance measures were significantly related to one another; self-report and behavioral measures did not show strong relations.

Existing data suggest that self-report and behavioral distress tolerance indices may possibly not reflect individual differences of a common latent distress tolerance variable. Such

results are in line with the perspective that the distress tolerance literature, as a whole, may be advanced by recognizing the distinction between self-report and behavioral tolerance constructs (Leyro et al., 2010). For example, it may be helpful to conceptualize perceived distress tolerance as related to *antecedent emotion regulation* (i.e., expectancies that effect emotional or self-regulatory processes); and behavioral acts of tolerance as related to *response-focused emotion regulation* in the context of or following the onset of experiential distress (i.e., responses directed at an ongoing emotional response; Bernstein et al., 2011). This type of approach inherently integrates theory and empirical knowledge of the nature of emotional processing and regulation with distress tolerance (Bernstein et al., 2011; Webb, Miles, & Sheeran, in press)

Relations to psychological symptoms and disorders. As reflected in the above perspective on distress tolerance, this construct may theoretically be related to aversive emotional states and may be followed by psychological or behavioral attempts to reduce the distress experienced (Simon & Gaher, 2005). Accordingly, individuals with lower levels of distress tolerance may be more prone to maladaptively respond to distress and distress-eliciting contexts. This type of process is especially relevant in the HIV+ population where rates of life stress and distress from disease infection and medication adherence are problematic and often life threatening (e.g., Antoni, 2003; Bunn et al., 2007; Chandra et al., 2003).

Consistent with this type of perspective, distress tolerance is related to a variety of psychopathological symptoms and disorders in the general population (Leyro et al., 2010). For example, higher levels of perceived distress tolerance for negative emotional and physical stimuli are significantly related to an increased risk of a variety of negative emotional symptoms (Asmundson & Stein, 1994; Boelen & Reijntjes, 2009; Telch, Jacquin, Smits, & Powers, 2003; Timpano, Buckner, Richey, Murphy, & Schmidt, 2009). Other work has similarly begun to link distress tolerance to specific mood and anxiety disorders (e.g., Schmidt, Mitchell, Keough, &

Riccardi, 2011). Furthermore, higher levels of behavioral intolerance for acute episodes of aversive states are related to substance use relapse (Brown et al., 2002) as well as eating psychopathology (e.g., bingeing/purging; Anestis, Selby, Fink, & Joiner, 2007).

To date, only one study has explicitly tested the effects of distress tolerance among an HIV+ population (O'Cleirigh, Ironson, & Smits, 2007). In this investigation, poorer levels of perceived distress tolerance (as indexed by the DTS), under conditions of high degrees of self-rated life stress, were related to significantly greater endorsement of depressive symptoms, use of substances in a coping-oriented manner, increased alcohol and cocaine use in the past month, and number of reported reasons for missing medication dosages (O'Cleirigh et al., 2007). The results of this initial study highlight that there is indeed merit in further exploring the role of perceived distress tolerance among persons with HIV.

Emotion Dysregulation: Conceptualization and Operational Definition, Measurement, and Relation to Psychopathology.

Conceptualization and operational definition. Emotion dysregulation represents an additional integrative construct of increasing scholarly interest in psychopathology and health comorbidity research (Agar-Wilson & Jackson, 2012; Mennin & Fresco, 2010). Emotion dysregulation is posited to reflect difficulties in the self-regulation of affective states and in self-control over affect-driven behaviors (Carver, Lawrence, & Scheier, 1996). Specifically, emotion regulation has been conceptualized as involving a) awareness and understanding of emotions, b) acceptance of emotions, c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and d) the ability to use situationally-appropriate emotion regulation strategies to modulate emotional responses in order to meet specific goals and demands (Gratz & Roemer, 2004). Thus, emotion dysregulation is a multidimensional construct that reflects responding to emotional states through the identification, interpretation, and management of these states. Although poor emotion regulation

(emotion dysregulation) is similar to purported amplification factors such as distress tolerance, it differs in its broader focus on both implicit and explicit processes to alter affective states and has been shown to be an empirically distinct explanatory construct compared to distress tolerance (McHugh, Reynolds, Leyro, & Otto, 2012).

Measurement. Initial conceptualizations of emotion regulation were varied. Some scholars focused on control of emotional experiences (Cortez & Bugental, 1994; Garner & Spears, 2000), while others emphasized the functional nature of emotions (Cole, Michel, & Teti, 1994; Thompson, 1994). However, most theorists agreed that the ability to experience and differentiate emotional experiences is as important to the construct of emotion regulation as abilities to modulate strong emotional states (Cole et al., 1994; Gross & Munoz, 1995; Paivio & Greenberg, 1998).

In an attempt to combine disparate conceptualizations of emotion regulation, Gratz and Roemer (2004) developed a self-report instrument, entitled the Difficulties in Emotion Regulation Scale (DERS), which measures emotional dysregulation as a higher-order construct involving multiple, internally consistent, lower-order dimensions. In this scale, lower-order factors consist of a) nonacceptance of emotional reactions, b) difficulties engaging in goal-directed behavior, c) impulse control difficulties, d) lack of emotional awareness, e) limited access to emotion regulation strategies, and f) lack of emotional clarity, and combine to represent the higher-order emotion dysregulation construct.

Relations to psychological symptoms and disorders. There is generally limited work on emotion dysregulation and psychopathological symptoms and disorders. Emotion dysregulation, as measured by the Gratz and Roemer (2004) scale, has been found to be significantly related to increased levels of negative emotional symptoms (Anestis, Bagge, Tull, & Joiner, 2011; Gratz & Roemer, 2004; Kashdan, Zvolensky, & McLeish, 2008; Tull, Rodman, & Roemer, 2008; Tull, Stipelman, Salters-Pedneault, & Gratz; 2009; Vujanovic, Zvolensky, & Bernstein, 2008), coping-

oriented substance use (Bonn-Miller, Vujanovic, & Zvolensky, 2008; Johnson, Farris, Schmidt, & Zvolensky, 2012), self-harm (Gratz & Tull, 2010), and sexual difficulties (Rellini, Vujanovic, Gilbert, & Zvolensky, 2012; Rellini, Vujanovic, & Zvolensky, 2010; Rellini, Zvolensky, & Rosenfield, in press). In past work, emotion dysregulation effects have been found to demonstrate incremental explanatory validity (Rellini et al., 2012). As such, its effects are not attributable to the generalized tendency to experience negative mood or related constructs such as distress tolerance or anxiety sensitivity (Tull et al., 2008).

There is only one study examining the relation between emotion dysregulation and HIV/AIDS. In this investigation emotion dysregulation, as measured by the DERS total score, was found to be significantly related to anxiety and depressive symptoms, pain-related anxiety, and HIV-symptom distress among adults with HIV (Brandt, Gonzalez, Grover, & Zvolensky, in press). Moreover, the observed emotional dysregulation effects were evident above and beyond the variance accounted for by demographic and HIV-specific characteristics (e.g., length of time with HIV), as well as perceived distress tolerance (Brandt et al., in press). Yet, this investigation did not examine whether emotional dysregulation may mediate the relation between distress tolerance and anxiety or depressive symptoms. As informed by integrative theoretical models of HIV/AIDS-psychopathology comorbidity (Gonzalez et al., 2010; Johnson, Williams, Rabkin, & Goetz, 1995; Tsao, Dobalian, & Naliboff, 2004), individuals who are less tolerant of anxiety/depressive symptoms may be more likely to respond to such sensations with greater degrees of emotion dysregulation. For example, perceived distress tolerance may contribute to a failure to identify or implement emotion regulatory strategies in an effective manner. Thus, from this perspective, a formative next research step is to evaluate whether emotion dysregulation mediates the association between distress tolerance and anxiety and depressive symptoms among persons with HIV/AIDS.

Present Study: Aims and Hypotheses

Together, the present study tested the hypothesis that, among individuals with HIV/AIDS, lower perceived distress tolerance (as measured by the DTS) would significantly predict greater anxiety (as indexed by panic and social anxiety symptoms), and depressive symptoms. It also was hypothesized that emotional dysregulation would mediate this association. These particular criterion variables were chosen because (1) there are elevated rates of anxiety and depression among people living with HIV/AIDS (Chandra et al., 1998; Johnson et al., 1995), and (2) empirical work suggests that anxiety and depression are each associated with poor HIV management (Antoni, 2003; Leserman et al., 2005) and risky sexual behaviors among people living with HIV/AIDS (Lawal, 2011; Turner, Latkin, Sonenstein, & Tandon, 2011). Indices of panic and social anxiety were chosen, specifically, because of their direct relevance to the HIV+ population. For example, symptoms stemming from HIV infection and side effects of antiretroviral medications are similar to panic attack symptoms (Lorenz et al., 2006; Tsao et al., 2004) and social concerns often accompany infection (e.g. disease stigma, disease disclosure; Bunn et al., 2007; Chandra et al., 2003). Additionally, the hypothesized associations were expected to be significant above and beyond the variance accounted for by CD4 T-cell count, race, gender, and education level factors. Specifically, CD4 T-cell count was chosen to control for disease stage, while ethnicity, gender, and education were included to adjust for common demographic factors that covary with psychopathology among this population (Tsao et al., 2004). Cannabis group was added as a covariate to control for overarching study design (see Methodology Section; Bonn-Miller, Oser, Bucossi, & Trafton, in press).

Methodology

Sample

The data for the current study were taken from a larger study examining the effects of cannabis use on antiretroviral medication adherence in the HIV population (Bonn-Miller et al., in press). Interested persons responding to flyers posted throughout a VA Medical Center as well as a number of community outpatient HIV clinics in the San Francisco Bay area, contacted the research team and were provided with a detailed description of the study via phone. Participants were then initially screened for eligibility and, if eligible, scheduled for an appointment. Upon arrival to the laboratory, each participant provided written consent to participate in the research study. Next, participants were administered the SCID I-N/P by trained interviewers and then completed a battery of self-report measures. At the conclusion of this appointment, participants were compensated \$50 for their efforts. Following the appointment, medical records for each participant were accessed to obtain most recent CD4 T-cell counts. All study procedures were approved by the Stanford University and Mills-Peninsula Institutional Review Boards (IRB). For inclusion in the study, participants had to be (1) HIV positive, (2) currently prescribed at least one antiretroviral medication, and (3) undergoing treatment at an outpatient HIV treatment clinic.

Participants were 176 HIV positive individuals (38 female; $M_{\text{age}} = 48.40$ years, $SD = 8.66$). In terms of ethnicity, 38.6% of participants identified as Black/Non-Hispanic, 29% as White/Caucasian, 13.6% as Black/Hispanic, 11.9% as Hispanic, 1.1% as Asian, and 5.7% as "Other". Please see Table 1 for current and lifetime psychiatric diagnoses in this sample. In addition, approximately one-third of the sample ($n = 56$) met DSM-IV criteria for current cannabis dependence¹, approximately one-third ($n = 61$) were non-dependent cannabis users (use in the past 30 days), and approximately one-third ($n = 59$) reported no cannabis use within the past 6 months.

Measures

Structured Clinical Interview-Non-Patient Version for DSM-IV (SCID-N/P; First, Gibbon, Hilsenroth, & Segal, 2004). Diagnostic assessments were conducted using the SCID-I-NP

(Non-Patient Version; First et al., 2004). The SCID-I-N/P was administered by trained research assistants, interviews were audio-recorded, and diagnoses were confirmed by the Dr. Bonn-Miller following a review of recorded interviews. The SCID-N/P was employed to document psychopathology in the sample.

Distress Tolerance Scale (DTS; Simons & Gaher, 2005). The DTS is a 15-item self-report measure on which respondents indicate, using a 5-point Likert-type scale (1 = *strongly agree* to 5 = *strongly disagree*), the extent to which they perceive that they can experience and withstand distressing emotional states (Simons & Gaher, 2005). The DTS has evidenced convergent validity with measures assessing emotion regulatory processes (Coughe, Bernstein, Zvolensky, Vujanovic, & Macatee, in press; Simons & Gaher, 2005). In the current investigation, the DTS-total score was used as a global index of individual ability to tolerate emotional distress, as has been done in the previous study employing this construct among an HIV sample (O'Cleirigh et al., 2007). As in past work (e.g., Anestis, Selby, Fink, & Joiner, 2007), the total DTS-total score evidenced good internal consistency in the present sample (Cronbach $\alpha = .88$).

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS was used to assess emotion dysregulation. The DERS is multidimensional, consisting of 36 items, which comprise six subscales. Items are rated on a 5-point Likert-type scale ranging from 1 ("*almost never*") to 5 ("*almost always*"). In the current investigation, we used the DERS total score to indicate a global composite index of emotion dysregulation (Gratz & Romemer, 2004). Consistent with past work (Gratz & Roemer, 2004), the DERS-total score demonstrated good internal consistency in the current sample (Cronbach $\alpha = .90$).

Inventory of Depression and Anxiety Symptoms (IDAS; Watson et al., 2007). The IDAS is a 64-item questionnaire that assesses dimensions of major depression and anxiety disorders (Watson et al., 2007). The IDAS contains 12 subscales indexing criteria related to DSM-IV-TR

(APA, 2000) anxiety and depression disorders. In the current study three of the subscales were examined to gauge indices of anxiety and depression. The Panic (8 items; e.g. “I was trembling or shaking”), and Social Concerns (5 items; “I was worried about embarrassing myself socially”) subscales served as indicators of anxiety. The General Depression subscale (20 items; e.g. “I felt depressed”) contains items regarding dysphoria, suicidality, lassitude, insomnia, appetite loss, and well-being, thereby serving as an overall index of depressive symptoms (Watson et al., 2007). The three IDAS subscales showed good reliability (range of Cronbach α 's = .77-.89) in the current sample.

Data Analytic Plan

First, a series of zero-order correlations were conducted to examine associations between study variables. Second, to test the association between perceived distress tolerance (as measured by the DTS total score) and each criterion individually, as well as the mediational effects of emotional dysregulation (as measured by DERS total score) on this relation, Baron and Kenny's (1986) recommended test of mediation was employed. Specifically, the test requires a series of hierarchical multiple regressions including: 1) the predictor variable (DTS total score) must significantly predict the criterion variables (Path C); 2) the predictor variable must significantly predict the mediator (DERS total score; Path A); 3) the mediator must significantly predict the criterion variables (Path B); and 4) when the predictor and mediator are entered simultaneously into a multiple regression, the mediator must significantly predict the criterion variables, with the relation between the predictor and criterion variable significantly reducing or becoming non-significant (Path C').

Separate regression analyses will be conducted to examine the mediational effects of DERS-total score on the relation between DTS-total score and each of the three examined subscales of the IDAS. In each regression analysis, CD4 T-cell count, race, gender, education

level, and cannabis group (to control for overarching study design) will be entered in Step 1 as covariates.

As the mediational analyses was conducted among cross-sectional data, there was a need to provide additional analyses indicating that emotion dysregulation does indeed mediate the relationship between distress tolerance and anxiety/depressive symptoms and these are not simply a set of interrelated variables. As such, an additional analysis will be conducted for each significant mediational model, where the proposed mediator and criterion variable was reversed (Preacher & Hayes, 2004; Sheets & Braver, 1999; Shrout & Bolger, 2002). Specifically, for each significant mediational analysis, we also will evaluate whether each respective IDAS subscale mediates the relation between DTS total score and DERS total score. This additional test helps improve confidence in the directionality of the observed relations (Preacher & Hayes, 2004; Sheets & Braver, 1999; Shrout & Bolger, 2002).

Finally, additional tests were used to confirm findings from the Baron and Kenny (1986) mediational tests, specifically bootstrapping and Sobel tests (see Preacher & Hayes, 2004; Sobel, 1982). By utilizing bootstrapping, 5000 new samples were taken from the existing dataset (using replacement) providing a more reliable estimate of the overall mean and deviation of the greater population due to the relatively small sample size (Preacher & Hayes, 2004). The Sobel test provided a more direct test of an indirect effect. Specifically, the Sobel test is conducted by comparing the strength of the indirect effect of the DTS-total score on the outcome variable such that the null equals zero.

Results

See Table 2 for descriptive statistics and zero-order correlations among study variables. Distress tolerance was significantly negatively related to all outcome variables as well as DERS total score. Furthermore, DERS total score was significantly positively related to all outcome variables.

See Table 3 for an overview of mediational analyses. As Path A for each of the 3 mediational analyses was the same (i.e., DTS total score predicting DERS total score), only one regression was conducted for this path. Analyses revealed that, after accounting for the covariates at Step 1, DTS total score was a significant predictor of DERS total score ($\beta = -.56$, $p < .001$).

Regarding IDAS-General Depression, the covariates entered at Step 1 of each regression accounted for 7.9% of the variance in the model with cannabis use status and gender being significant predictors. In terms of Paths C and B, DTS total score was significantly negatively, and DERS total score was significantly positively, related to IDAS-General Depression. When both the predictor and mediator were entered simultaneously (Path C'), DERS total score remained a significant predictor of IDAS-General Depression, while DTS total score did not; with the beta being reduced from $-.35$ to $.01$ when the DERS total score was introduced. The bootstrapped 95% confidence interval with 5000 iterations was $.28 - .50$ (Preacher & Hayes, 2004). The Sobel test (Sobel, 1982) also confirmed the reduction in the relation between DTS and IDAS-General Depression when DERS was introduced into the model ($Z = -6.67$, $p < .001$).

Regarding IDAS-panic, the covariates entered at Step 1 of each regression accounted for 6.3% of the variance in the model with no significant predictors. In terms of Paths C and B, DTS total score was significantly negatively, and DERS total score was significantly positively, related to IDAS-panic. When both the predictor and mediator were entered simultaneously (Path C'), DERS total score remained a significant predictor while DTS total score did not; the beta reduced from $-.31$ to $-.10$ when the DERS total score was introduced, indicating mediation. The bootstrapped 95% confidence interval with 5000 iterations was $.05 - .11$ (Preacher & Hayes, 2004). Additionally, the Sobel test (Sobel, 1982) confirmed the reduction in the relation between DTS and IDAS-panic when DERS was introduced into the model ($Z = -5.04$, $p < .001$).

Regarding IDAS-social, the covariates entered at Step 1 of each regression accounted for 5.4% of the variance in the model with no significant predictors. In terms of Paths C and B, DTS total score was significantly negatively, and DERS total score was significantly positively, related to IDAS-social. When both the predictor and mediator were entered simultaneously (Path C'), DERS total score remained a significant predictor while DTS total score did not. The beta reduced from $-.34$ to $-.05$ when the DERS total score was introduced. The bootstrapped 95% confidence interval with 5000 iterations was $.07 - .14$ (Preacher & Hayes, 2004). The Sobel test (Sobel, 1982) confirmed the reduction in the relation between DTS and IDAS-social when DERS was introduced into the model ($Z = -6.07, p < .001$).

Importantly, when the mediator and criterion variables were reversed in each of these analyses, we found that DTS total score remained a significant predictor of DERS total score after controlling for IDAS-general depression ($t = -7.28, \beta = -.41, sr^2 = .13, p < .001$), IDAS-panic ($t = -7.52, \beta = -.47, sr^2 = .18, p < .001$), and IDAS-social concerns ($t = -7.41, \beta = -.44, sr^2 = .16, p < .001$). These results suggest that these variables were not simply interrelated, but that the DERS total score provided a distinct mediational relation between the DTS total score and criterion variables.

Discussion

The present study examined the association between perceived distress tolerance and anxiety and depressive symptoms among adults with HIV. As hypothesized, there was consistent evidence that perceived distress tolerance, as measured by the DTS, was significantly and uniquely associated with anxiety and depressive symptoms. The observed effects were moderate in size, ranging from $-.31$ to $-.35$ (see Table 3), with lower levels of perceived distress tolerance being incrementally associated with greater endorsement of the studied criterion variables. Importantly, the effects for perceived distress tolerance were apparent over and above the significant variance accounted for by CD4 T-cell count, ethnicity,

gender, education level, and cannabis use status. Thus, the results cannot be attributed to these factors (see also footnote # 2). These findings replicate and uniquely extend those reported by O’Cleirigh and colleagues (2007) on the role of perceived distress tolerance among individuals with HIV in terms of a variety of negative health behaviors (e.g., coping-oriented substance use).

Also consistent with prediction, DERS total score showed a significant mediational effect in terms of the relations between DTS total score and the studied anxiety and depression criterion variables. Although the cross-sectional nature of the research design naturally does not allow us to disentangle the causal or directional nature between the predictor and criterion variables, the present findings suggest that difficulties self-regulating certain negative affective states (e.g., anxiety, depression) may, at least partially, explain the previously observed relations between perceived distress tolerance and panic, social anxiety, and depressive symptoms. Importantly, we attempted to strengthen confidence in this observation by evaluating an alternative model, wherein each of the criterion variables mediated the relation between perceived distress tolerance and emotion dysregulation. No support was found for such a model. That is, perceived distress tolerance, emotion dysregulation, and the studied emotional symptom variables were not simply interrelated. Thus, the present findings suggest specificity in terms of the potential mediating role of emotion dysregulation. Accordingly, the current findings highlight that emotion dysregulation is an important construct to consider in the relations between perceived distress tolerance and a number of common and clinically significant anxiety and depressive symptoms among persons with HIV.

Although not the primary aim of the present investigation, at least two other observations deserve brief comment. First, the sample was characterized by high rates of current and lifetime psychopathology (see Table 1). These findings are consistent with past studies documenting that psychological disorders are highly common among the HIV population and are apt to play

important roles in HIV quality of life and disease management (Chandra et al., 1998; Perretta et al., 1996). Second, perceived distress tolerance and emotion dysregulation shared approximately 33% of variance with one another among the present sample. Thus, while these constructs are related, they do not fully overlap. This observation is in accord with past work documenting the distinct construct validities of these two cognitive-affective factors (Brandt et al., 2012; McHugh et al., in press; Zvolensky et al., 2011).

There are limitations of the present study and areas for future research. First, although the sample was diverse in terms of ethnicity, it was limited to an older adult, primarily male group of individuals living with HIV/AIDS who volunteered to participate in a study for monetary reward. While men comprise a large percentage of the HIV/AIDS population (CDC, 2012), future studies would benefit from examining more heterogeneous samples of persons with HIV/AIDS. Moreover, it may be advisable to offer other types of incentives instead of those that are financial in nature to ascertain whether there is any type of sampling bias. Second, the cross-sectional design of the present study does not allow for causal inferences. As such, we cannot infer the directionality between distress tolerance, emotion regulation, and anxiety and depressive symptoms. Future work should aim to test these relations prospectively to explicate their directional effects. Third, the variance shared between distress tolerance and emotion dysregulation could generally suggest some inherent interrelatedness of these constructs as opposed to mediational effects. Thus, future work could benefit from further teasing apart the purported mediational effects using alternative measurement approaches and designs for tests of these constructs.

Fourth, self-report measures were employed to assess the primary study constructs. Findings based on this type of uni-method strategy are potentially influenced by shared method variance. Future research could decrease this risk by utilizing multi-method approaches (e.g., behavioral distress tolerance tasks). Indeed, self-report and behavioral indices of distress

tolerance are often not highly related (Bernstein, Marshall-Berenz, & Zvolensky, 2011; Marshall-Berenz, Vujanovic, Bonn-Miller, Bernstein, & Zvolensky, 2010; McHugh, Daughters, Lejuez, Murray, Hearon, Gorka, & Otto, 2011). Fifth, the study criterion variables were limited to anxiety/depression variables. Future work could potentially benefit by further extending the present work to other health outcome variables such as ART medication adherence and HIV symptoms among persons with HIV/AIDS. It also may be advisable to explore how distress tolerance and emotion dysregulation relate to a broader array of symptoms and disorders, and how they may relate to HIV-specific outcome variables (e.g. CD4 T-cell count, HIV medication adherence). Finally, the present study was a secondary analysis from a larger study exploring the role of cannabis use among an HIV/AIDS population (Bonn-Miller et al., 2012). Thus, as with any secondary analysis of data, it would be important to replicate and extend the findings in the future with an *a priori* research investigation.

Overall, the results of the current study highlight the importance of perceived distress tolerance and emotion dysregulation in terms of elevated rates of anxiety and depression symptoms among an HIV/AIDS sample. Specifically, findings indicated that perceived distress tolerance was significantly related to greater depressive and anxiety symptoms and that emotion dysregulation mediated this association. The present findings therefore suggest that emotion dysregulation may be important in better understanding the link between distress tolerance and certain negative emotional symptoms among people living with HIV. Indeed, it is possible that targeting emotion dysregulation among HIV+ persons via strategies aimed at increasing self-efficacy over the ability to regulate affective states and gaining further control over affect-driven behaviors could be an integral step in efforts to promote greater degrees of psychological health among HIV+ individuals.

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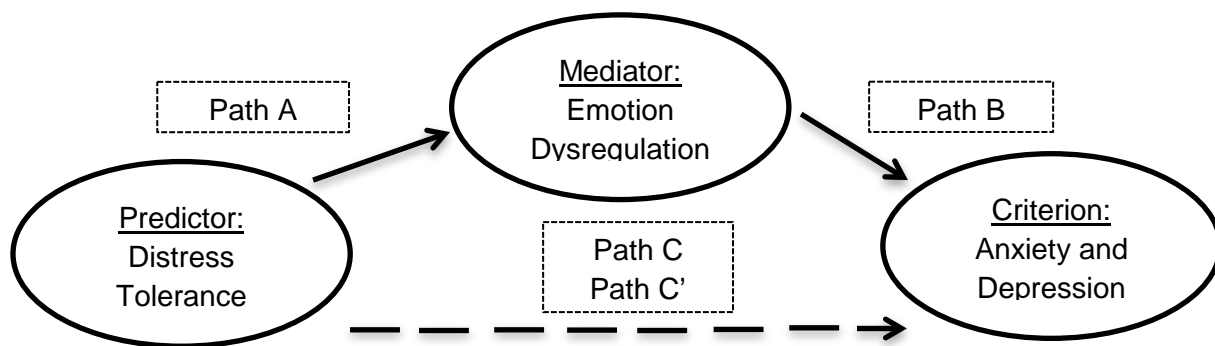


Figure 1. The proposed model; emotion dysregulation as a mediator of the association between distress tolerance and IDAS-General Depression, IDAS-Panic, and IDAS-Social Anxiety.

Table 1. Rates of Current Axis I Anxiety, Mood, and Substance Use Diagnoses

Diagnosis	Current Axis I Diagnoses, Number (%)	Lifetime Axis I Diagnoses, Number (%)
Anxiety Disorders (≥ 1 dx)	63 (36%)	76 (43%)
Panic without Agoraphobia	4 (2%)	6 (3%)
Panic with Agoraphobia	8 (5%)	10 (6%)
Agoraphobia without Panic	3 (2%)	5 (3%)
Specific Phobia	14 (8%)	15 (9%)
Social Phobia	7 (4%)	7 (4%)
OCD	11 (6%)	12 (7%)
PTSD	35 (20%)	41 (23%)
GAD	11 (6%)	15 (9%)
Anxiety Disorder NOS	1 (1%)	1 (1%)
Mood Disorders (≥ 1 dx)	32 (18%)	33 (19%)
MDD	16 (9%)	17 (10%)
Dysthymic Disorder	16 (9%)	18 (10%)
Bipolar	1 (1%)	1 (1%)
Substance Use Disorders (≥ 1 dx)	99 (56%)	147 (84%)
Alcohol	74 (42%)	110 (63%)
Amphetamines	46 (26%)	66 (38%)
Cannabis	75 (43%)	93 (53%)
Cocaine	70 (40%)	105 (60%)
Hallucinogens	22 (13%)	31 (18%)
Inhalant	4 (2%)	5 (3%)
Opioid	26 (15%)	41 (23%)
Sedative	15 (10%)	21 (12%)

Note: Total percentages by disorder type (e.g., anxiety, mood, substance) were recorded as the presence of one or more disorders to account for comorbidity.

Table 2. Descriptive Data and Zero-Order Relations among Study Variables

	1	2	3	4	5	6	Mean (SD) or %	Observed Range
1. Cannabis Use Status ¹	-	-.08	.19*	.19**	.09	.14	33.5% (No Use)	--
2. DTS-total ²		-	-.58**	-.37**	-.34**	-.34**	3.00 (0.89)	1.17-5
3. DERS-total ³			-	.62**	.44**	.55**	82.59 (22.47)	42-146
4. IDAS-Depression ⁴				-	.61**	.63**	43.05 (13.92)	22-86
5. IDAS-Panic ⁴					-	.72**	11.73 (4.62)	4-27
6. IDAS-Social ⁴						-	8.10 (4.32)	1-25

Note: * $p < .05$, ** $p < .01$. ¹Cannabis Use Status coded as 1 = non-use, 2 = non-dependent use, 3 = dependent use; ²Distress Tolerance Scale (Simons & Gaher, 2005); ³Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004); ⁴Inventory of Depression and Anxiety Symptoms (Watson et al., 2007).

Table 3. Summary of Hierarchical Regression Analyses

	ΔR^2	t	β	sr^2	p
	(each predictor)				
Criterion Variable: IDAS-General Depression					
Criterion Variables	7.9				
Gender		2.17	.17	.03	<.05
Ethnicity		-.24	-.02	.00	ns
Education Level		-.89	-.07	.00	ns
CD4 T-cell count		-.71	-.05	.00	ns
Cannabis Use Status		2.40	.18	.03	<.05
Individual Predictors					
DTS-total	11.0	-4.73	-.35	.11	<.001
DERS-total	33.4	9.73	.62	.33	<.001
Mediation	33.5				
DTS-total		.07	.01	.00	ns
DERS-total		7.95	.63	.23	< .001
Criterion Variable: IDAS-Panic					
Criterion Variables	6.3				
Gender		1.84	.15	.02	ns
Ethnicity		-1.86	-.14	.02	ns
Education Level		.00	.00	.00	ns
CD4 T-cell count		1.32	.10	.01	ns
Cannabis Use Status		1.61	.12	.01	ns
Individual Predictors					
DTS-total	8.9	-4.13	-.31	.09	<.001
DERS-total	17.0	6.05	.44	.17	<.01
Mediation	17.6				
DTS-total		-1.12	-.10	.01	ns
DERS-total		4.32	.39	.09	< .001
Criterion Variable: IDAS-Social					
Criterion Variables	5.4				
Gender		-.31	-.02	.00	ns
Ethnicity		-1.21	-.09	.01	ns
Education Level		-1.94	-.15	.02	ns
CD4 T-cell count		.89	.07	.00	ns
Cannabis Use Status		1.66	.13	.02	ns
Individual Predictors					
DTS-total	10.8	-4.59	-.34	.11	<.001

DERS-total	26.4	7.99	.55	.26	<.001
<i>Mediation</i>	26.4				
DTS-total		-.59	-.05	.00	ns
DERS-total		6.14	.52	.16	< .001

Note: In total there are three regression analyses for each criterion variable. Each variable under “Individual Predictor” constitutes a separate regression analysis. The “Mediation” section indicates simultaneous entry of indicated variables.

Footnotes

1) Cannabis dependence was defined with the experience of withdrawal symptom criterion, which is consistent with DSM-5 criteria for dependence (Budney et al., 2004).

2) Analyses were repeated with negative affectivity, as measured by the PANAS (Watson et al., 1998), included as an additional covariate at Level 1. All results remained statistically significant with the inclusion of negative affectivity as an additional covariate. These results can be obtained by contacting Mr Brandt.