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Development and Initial Examination of a Brief Intervention for Heightened Anxiety Sensitivity Among Heroin Users

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Anxiety sensitivity (AS) recently has been identified as a potential cognitive vulnerability underlying substance use problems, with some evidence specifically indicating its relevance to heroin. Focusing on the potential utility of interventions centered on increasing willingness to have anxiety-related sensations reduce vulnerability for relapse following substance use treatment, the current article describes the development of a brief (6 session) behavioral treatment for heightened AS among heroin users. The treatment consists of the following components: (a) psychoeducation about anxiety; (b) interoceptive exposure exercises; and (c) skills-training focused on heightening emotional acceptance, tolerance, and nonevaluative awareness (to facilitate willingness). Preliminary data on this treatment are provided in the form of a case study with a 46-year-old African American man in an inner-city residential substance use treatment facility. Results indicate reductions in AS (especially physical concerns), as well as corresponding decreases in heroin cravings and improvements in emotion regulation.

Keywords: anxiety sensitivity; distress tolerance; emotional acceptance; heroin; treatment; vulnerability
Anxiety sensitivity (AS) may be considered as an individual difference variable representing the tendency to fear anxiety-related sensations (e.g., increased heart rate, shortness of breath) because of beliefs that the sensations will have negative somatic, cognitive, or social consequences (Reiss, 1991). Historically, AS has been viewed as a cognitive vulnerability factor underlying the pathogenesis of panic disorder–related symptomatology. In support, studies consistently have found higher levels of AS among individuals with panic disorder, compared to those with other anxiety disorders and healthy controls (see Cox, Borger, & Enns, 1999), and AS has been predictive of the later development of spontaneous panic attacks (e.g., Schmidt, Lerew, & Jackson, 1997, 1999; Zvolensky & Eifert, 2001). However, recent evidence suggests that AS may underlie other psychiatric conditions as well, including depression (Otto, Pollack, Fava, Uccello, & Rosenbaum, 1995; Taylor, Koch, Woody, & McLean, 1996), borderline personality disorder (Gratz, Tull, & Gunderson, 2006), and certain types of substance use patterns (see Otto, Safren, & Pollack, 2004; Stewart & Kushner, 2001; Zvolensky & Schmidt, 2004).

Specific to substance use, the majority of the extant research has focused on alcohol-related problems (see Stewart, Samoluk, & MacDonald, 1999, for a review) and smoking (see Zvolensky, Feldner, Leen-Feldner, & McLeish, 2005, for a review). However, building from evidence that individuals who regularly use heroin exhibit a heightened risk for elevated levels of anxiety and anxiety disorders (Darke & Ross, 1997; Darke, Swift, & Hall, 1993; Grenyer, Williams, & Swift, 1992), Lejuez, Paulson, Daughters, Bornovalova, and Zvolensky (2006) compared levels of AS among heroin users with no crack/cocaine use, crack/cocaine users with no heroin use, users of both heroin and crack/cocaine, and individuals with no use of heroin or crack/cocaine. They found that primary heroin users evidenced higher levels of AS than all other groups, even when controlling for demographic variables, depressive symptoms, and the use of other drugs (e.g., alcohol, marijuana, etc.), thereby suggesting a unique relationship between heroin use and AS. Although the exact mechanisms underlying the relationship between AS and heroin use remain unexamined, there is evidence to suggest...
that individuals high in AS report using substances to self-medicate negative affective states, such as anxiety (Novak, Burgess, Clark, Zvolensky, & Brown, 2003; Stewart, Karp, Pihl, & Peterson, 1997; Stewart, Zvolensky, & Eifert, 2002; Zvolensky et al., 2006). Given that heroin functions to dampen central nervous system activity (Goodman & Gilman, 1991), this may be a particularly effective means of self-medication, providing relief from aversive anxiety-related bodily sensations in the short term.

However, the use of heroin to self-medicate may have longer term negative consequences in regard to anxiety. For example, this rigid avoidance attempt may interfere with functional exposure and may, therefore, preclude the natural course of reduction in emotional intensity that accompanies exposure (Foá & Kozak, 1986). Furthermore, there is evidence that avoidance may actually have a paradoxical effect, functioning to increase physiological arousal (e.g., Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Feldner, Zvolensky, Stickle, Bonn-Miller, & Leen-Feldner, 2006; Gross & Levenson, 1993, 1997). Finally, the use of substance as a method of avoidance may reinforce fears of anxiety-related symptoms.

Heightened AS among heroin users may also have implications for treatment dropout and relapse following substance use treatment. That is, to the extent that individuals with high levels of AS do not have adequate psychological resources to accept, tolerate, or otherwise regulate anxiety-related distress, they may be more likely to prematurely terminate substance use treatment and/or relapse to heroin use. In support of this, Lejuez, Zvolensky, et al. (2006) found that heightened AS was predictive of residential substance use treatment dropout for heroin-dependent individuals, but not for crack/cocaine–dependent individuals. Furthermore, interoceptive cues (including negative physical and emotional states) have been found to be the primary self-reported contributing factor for relapse among opioid (a drug class including heroin) users (Chaney, Roszell, & Cummings, 1982). Vulnerability for relapse may be further heightened among high AS heroin users in that many of the anxiety-related bodily symptoms feared by individuals high in AS overlap with heroin withdrawal symptoms (e.g., muscle aches, nausea, sweating, increased heart rate; American Psychiatric Association, 1994). To the extent that high AS heroin users have poor awareness of their internal sensations, anxiety-related bodily sensations may be confused with the occurrence of heroin withdrawal. Heroin cravings may then result, motivated by a desire to reduce this negative physical state, potentially leading to the re-initiation of heroin use.

Although earlier treatments for substance use focused on identifying external, contextual cues that could serve as targets for exposure interventions
(e.g., Monti et al., 1993), the above findings suggest the potential utility of developing exposure interventions targeting feared internal sensations (i.e., interoceptive exposure). Studies utilizing cognitive–behavioral methods that include interoceptive exposure have been found to facilitate benzodiazepine discontinuation (Otto, Pollack, Meltzer-Brody, & Rosenbaum, 1992). Furthermore, interoceptive exposure may be particularly useful among high AS heroin users, as a number of studies have demonstrated that AS can be reduced through exposure-based interventions (e.g., Craske, Rowe, Lewin, & Noriega-Dimitri, 1997; Smits, Powers, Cho, & Telch, 2004)—even those that are brief interventions (Barlow, Craske, Cerney, & Klosko, 1989; Schmidt et al., in press; Westling & Ost, 1999).

According to Otto et al. (2004), rather than relying on rigid and extreme avoidance to regulate bodily sensations (e.g., substance use), interoceptive exposure exercises instructing patients to attend to, approach, and be willing to experience distress may be viewed as a way to enhance acceptance of and tolerance for internal sensations perceived as aversive by substance users, thereby facilitating willingness to have these sensations when they occur. This stance may be facilitated by combining interoceptive exposure procedures with skills that aid patients in taking a nonevaluative and nonjudgmental approach to their internal experiences. Procedures designed to increase nonevaluative internal awareness may have particular utility, especially given the cognitive component of the anxiety response among high AS individuals (i.e., beliefs regarding the negative consequences of anxious arousal), and the fact that the use of these strategies has demonstrated success in treatments for clinical conditions that also have a strong cognitive component, such as Roemer and Orsillo’s (2005) mindfulness- and acceptance-based behavioral therapy for generalized anxiety disorder, Mindfulness-Based Cognitive Therapy for Depression (Segal, Williams, & Teasdale, 2002), or Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999) as used with patients with psychotic disorders (Bach & Hayes, 2002; Gaudiano & Herbert, 2006). In addition, there is preliminary evidence that combining interoceptive exposure with acceptance-based approaches may increase patients’ engagement in exposure exercises (Levitt & Karekla, 2005).

Given the suggested utility of interoceptive exposure in reducing AS, as well as the current lack of treatments targeting interoceptive cues for substance use, we developed a brief (six session) intervention designed to target heightened AS among heroin users while in residential substance use treatment, the Anxiety Sensitivity Treatment for Heroin Users (AST-H). This adjunctive treatment combines psychoeducation on anxiety and its relationship to heroin use with interoceptive exposure exercises designed to
facilitate the acceptance and tolerance of internal sensations perceived as threatening. Preliminary findings from a case study of a patient receiving residential substance use treatment for heroin dependence is provided to illustrate the potential utility of this intervention.

**Method**

**Patient Description**

The patient was a 48-year-old, single, African American, unemployed, homeless man scheduled for 60 days of inpatient substance use treatment for heroin dependence at a residential treatment facility in Washington, D.C.; the patient completed medical detoxification elsewhere prior to entry into the center (for a brief description of the treatment provided at the facility, see the Treatment section below). The patient met criteria for primary heroin dependence at the time of his baseline assessment (conducted approximately 1 week from his intake into the treatment facility), as determined by the Structured Clinical Interview for DSM-IV (SCID-IV; First & Gibbon, 2004). He reported heroin use beginning at the age of 22, continuing at an average of approximately 8 bags of heroin per day, with his heaviest use period consisting of 16 bags per day. His preferred routes of administration included both smoking and injection. The patient further indicated that although he had undergone detoxification on numerous occasions in an attempt to quit heroin, these attempts were largely unsuccessful, followed very quickly by relapse to substance use. Despite these previous treatment experiences, this was his first experience with a long-term residential substance use treatment program.

The patient did not meet criteria for any mood, anxiety, or personality disorder as determined by administration of the SCID-IV at his baseline assessment. Yet he stated that he has always been an anxious person and “never felt comfortable with himself,” citing such feelings as the reason that he began to use heroin. He stated that he was regularly exposed to heroin use in his neighborhood and was intrigued by heroin’s ability to “take away feelings and worries.” He also reported that he used heroin “in order to feel normal.” However, the patient also recognized that these benefits were only a short-lived “escape,” and his life quickly became focused around attaining heroin to the detriment of other domains of his life, including family, friends, and work. Furthermore, he also was aware that any period of abstinence from heroin would result in symptoms of heightened anxiety and fear, feelings which could be “self-medicated” with heroin.
Procedure

Approximately 1 week after entering the residential treatment facility (this delay limits the influence of lingering drug withdrawal effects following detoxification), the patient was approached to determine his level of interest in participating in additional treatment options during his stay. The patient expressed an interest, and the SCID-IV was administered to assess for current drug dependence, as well as to determine the presence of any current mood, anxiety, psychotic, or personality disorders. Inclusion criteria included meeting current criteria for heroin dependence, as well as not meeting current criteria for mood, psychotic, or personality disorders. The patient met inclusion criteria and was asked whether he would be interested in taking part in a six-session, 2-week intervention (described below) aimed at helping him learn how to better tolerate feelings of anxiety. To aid this decision, further detail was provided regarding the treatment rationale and procedures, including a description of the interoceptive exercises, assessment measures that would be provided across treatment, and any potential risks. The patient indicated that he was somewhat apprehensive yet eager to address his anxiety, especially given that it might aid in his heroin abstinence attempt. The first session of the AST-H occurred approximately 2 weeks postdetoxification. Patient was in residential substance use treatment for the duration of the AST-H.

Treatment

Standard treatment. Standard treatment at the residential treatment center involves a mix of strategies adopted from Alcoholics and Narcotics Anonymous as well as group sessions focused on relapse prevention and functional analysis. The center requires complete abstinence from drugs and alcohol, with the exception of caffeine and nicotine. Regular drug testing is provided, and any use is grounds for dismissal from the center. Typical treatment lasts between 30 and 180 days and, aside from scheduled activities (e.g., group retreats, physician visits), residents are not permitted to leave the center grounds during treatment. As mentioned previously, the patient was scheduled for 60 days of treatment. However, he was permitted to leave the treatment facility 4 days early because of an opening at a halfway house.

Adjunctive treatment: AST-H. The patient took part in the AST-H as an adjunct to standard substance abuse treatment at the residential treatment center. The therapist was a doctorate-level clinician (M.T.T.). The AST-H consisted
of six sessions, each lasting approximately 90 minutes and spanning the course of 2 weeks (i.e., three sessions per week). In general, each session consisted of the following components: (a) psychoeducation on the anxiety response, with a focus on increasing awareness of the ways in which the patient interprets or evaluates that response; (b) assistance in developing healthy emotion regulation strategies that can be used to increase acceptance and tolerance of the anxiety response (including associated catastrophic thoughts), as well as understanding the consequences associated with avoidance or control of anxiety; (c) a minimum of three interoceptive exercises tailored to activate feared anxiety-related sensations; and (d) daily homework assignments (i.e., daily anxiety monitoring and interoceptive exercises). A description of the content of each session follows:

Session 1: Therapeutic rationale and the process of anxiety. At the beginning of the first session, patients receive a thorough description of the rationale underlying AST-H. Specifically, patients are told that AST-H will teach them strategies that can aid in increasing awareness, acceptance, and tolerance of emergent withdrawal and anxiety symptoms, thereby potentially reducing the likelihood for dropout and/or relapse. The concepts of AS, catastrophic evaluations of anxiety-related sensations, and heroin as a maladaptive way of regulating (i.e., avoiding) anxiety and anxiety-related distress are also discussed.

In this session, particular attention is placed on highlighting a model wherein AS may contribute to a forward-feeding cycle of anxiety. In particular, catastrophic evaluations of, and secondary emotional reactions (e.g., fear, shame) to, anxiety-related sensations function to further heighten anxiety, increasing the likelihood of rigid regulation attempts aimed at avoiding anxiety (i.e., heroin use), which may paradoxically serve to increase anxiety and reinforce fears of anxiety-related symptoms. In the context of discussing this model, patients are encouraged to discuss their specific beliefs surrounding the potential harmful consequences of experiencing anxiety, as well as the ways in which heroin use might have been intertwined with those beliefs. To facilitate this discussion, an imaginal exposure exercise is conducted, wherein patients are asked to think of a moderately stressful past event during which they experienced anxiety. In this exercise, patients are instructed to describe (a) what they felt (with particular attention to bodily sensations, as well as emotional responses to those sensations), (b) catastrophic thoughts regarding the experience of anxiety-related sensations, and (c) what they did (or felt an urge to do) in response to those feelings and thoughts. In addition to illustrating the
forward-feeding cycle model of anxiety, this exercise assists patients in increasing their awareness of both what anxiety feels like in the body and evaluations of that anxiety. The exercise also serves to demonstrate standard ways of responding to and regulating anxiety.

At the end of this session, patients are provided with a monitoring form for homework. Patients are instructed to write down any situation occurring prior to the next session that was associated with the experience of anxiety. In addition to describing the situation, patients are asked to rate their level of anxiety, as well as their level of distress in response to that anxiety, on a scale from 0 to 100. To facilitate increased awareness of anxiety, patients are also instructed to describe how the anxiety felt in their body. Finally, patients are to write down what they did (or wanted to do) in response to the anxiety, as well as to indicate whether any heroin cravings were experienced.

Session 2: Psychoeducation about anxiety, interoceptive exposure, and acceptance skills. Session 2 emphasizes the benign nature of anxiety in regard to its immediate effects on the body by describing (a) the nature of anxiety, (b) effects of anxiety on the body, and (c) the relation between anxiety and physiological arousal. Patients are then provided with psychoeducation regarding the consequences of classically conditioned fear in response to internal cues. Interoceptive conditioning processes and the purpose of the behavioral exercises are then explained. In particular, patients are told that by producing bodily sensations often associated with anxiety in-session, the behavioral exercises can assist them in “unlearning” the previously held belief that anxiety-related bodily sensations are threatening and should be avoided at all costs. To this end, the interoceptive exercises are used as a method for enhancing emotional acceptance and tolerance with the ultimate goal of increasing willingness to have anxiety when it occurs. That is, rather than trying to avoid or escape anxiety-related bodily sensations, patients are asked to attend to and allow the experience of anxiety (including any associated distress and catastrophic thoughts), allowing it to dissipate on its own. To aid in this, patients are assisted in taking a nonjudgmental/nonevaluative stance toward their internal experience.

Specifically, psychoeducation was provided on the ways in which catastrophic thoughts may be a conditioned response to anxiety-related sensations and the ways in which “giving in” to those thoughts can further perpetuate anxiety. However, by viewing thoughts as simply a habitual way of responding to anxiety-related bodily sensations rather than an indication of what will actually happen (e.g., that these sensations are indicative of a
heart attack), the forward-feeding cycle of anxiety discussed in Session 1 can be halted. In the context of the interoceptive exposure exercises, these strategies also facilitate emotional acceptance and willingness, such that anxiety-related sensations are seen for what they are (benign, in-the-moment experiences) as opposed to what patients evaluate them to be.

Patients are then introduced to three interoceptive exposure exercises. The specific exercises used are dependent on the particular internal sensations feared. For the patient in the present study, the following interoceptive exposure exercises were used: (a) **Breath holding**: In this exercise, patients are instructed to pinch their nostrils and take a deep breath, holding it as long as they possibly can. This exercise persists as long as patients are able. (b) **Hyperventilation**: Patients are instructed to take deep breaths through their mouth at a rate of one breath every 2 seconds. This exercise persisted for 120 seconds. (c) **Chair-spinning**: Patients sit in a chair and spin in place with their eyes open and head forward for 60 seconds or until extremely dizzy. These are standard interoceptive exercises that reliably produce bodily sensations consistent with the anxiety response. These exercises were specifically chosen to match the physical sensations most feared by the patient (based on his self-report). However, depending on the particular internal sensations reportedly feared by patients, other interoceptive exercises can be used (for an overview, see Schmidt & Trakowski, 2004).

Prior to and following each exercise, patients provide a rating of their distress on a scale from 0 to 100. At the end of the exercise, patients are asked to describe both their feelings (i.e., bodily sensations experienced and any secondary emotional response) and thoughts in response to the exercises. Patients are then instructed to focus on and allow these feelings and thoughts, taking a nonevaluative approach toward their internal experience and refraining from attempts to avoid or control these experiences. Ratings of distress are taken periodically during this time period until distress reaches baseline levels. Particular attention is paid to highlighting how anxiety, left on its own, will dissipate. Patients are asked to discuss how their anxiety changed over time, as well as how the exercises, combined with a nonevaluative, accepting stance, may have assisted in tolerating the anxiety (and any associated emotions or thoughts). The fact that patients’ catastrophic thoughts are not realized is also highlighted, reinforcing the suggestion that these thoughts are merely a conditioned response to the experience of anxiety.

At the end of the session, the daily anxiety monitoring homework is assigned. Patients are also instructed to practice at least one interoceptive exposure exercise out of session prior to the next session.
Session 3: Interoceptive exposure and acceptance/willingness skills practice. In this session, patients’ reactions to the between-session interoceptive exercises are discussed, as well as their ability to tolerate and accept the experience of anxiety, distress, and catastrophic thoughts associated with those exercises. The change in the believability of patients’ thoughts as a result of engaging in the exercises is explicitly discussed and highlighted. Patients then engage in three interoceptive exposure exercises in-session. Again, patients discuss their reactions to these exercises and any changes in their levels of acceptance and ability to take a nonevaluative approach to internal experience since Session 2. Patients are again asked to practice at least one interoceptive exposure exercise out-of-session prior to the next session. Daily anxiety monitoring homework is also assigned.

Sessions 4 to 6: Maintenance. In Sessions 4 to 6, no new information is presented. Instead, attention is paid to heightening patients’ awareness of how their responses to the interoceptive exposure exercises have changed as a result of continued engagement in the exercises, as well as altering their responses to bodily symptoms and thoughts that occur as a result (i.e., acceptance and nonevaluative awareness as opposed to avoidance). Monitoring homework and interoceptive exposure exercises continue to be assigned and reviewed in-session.

Measures

The following self-report questionnaires were administered at the following time points to assess outcome: (a) prior to the first session (pretreatment), (b) prior to the fourth session (midtreatment), and (c) after the last session (posttreatment). In addition, the patient’s level of AS was assessed 2 weeks following discharge from the residential treatment facility (approximately 45 days following his last AST-H session). At this point in time, the patient resided in a local halfway house (a semi-structured setting) and was actively seeking employment.

The Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992) is a 16-item, self-report measure of AS. Using a 5-point Likert-type scale (0 = very little to 4 = very much), participants rate the extent to which they expect negative consequences from a variety of anxiety-related experiences. The ASI has been found to have good internal consistency and test-retest reliability, as well as adequate criterion, construct, and predictive validity (Antony, 2001; Peterson & Reiss, 1992; Schmidt et al., 1997, 1999; Zvolensky, Feldner, Eifert, & Stewart, 2001). Although originally designed
to assess AS as a unidimensional construct, Zinbarg, Barlow, and Brown (1997) found evidence for the ASI to assess a single higher order factor, as well as three lower order factors: (a) Physical Concerns (e.g., “When I notice my heart is beating rapidly, I worry that I might have a heart attack”); (b) Mental Incapacitation Concerns (e.g., “When I cannot keep my mind on a task, I worry that I might be going crazy”); and (c) Social Concerns (e.g., “It is important to me not to appear nervous”). This factor structure has since been replicated across different populations (Zinbarg, Mohlman, & Hong, 1999) and, therefore, was examined in the present study. In addition to the three time points described above (pre-, mid-, and posttreatment), the ASI was also administered to the patient approximately 45 days after his final AST-H session to examine the extent to which potential treatment gains were maintained. To limit any burden on the participant, only the ASI was administered at this time point.

The Reasons for Heroin Use Scale (RHUS; Tull & Lejuez, 2006) is a 20-item questionnaire that assesses the extent to which individuals experience cravings for heroin in response to anxiety-related bodily sensations (e.g., heart palpitations, feeling short of breath, nausea, etc.). The RHUS was creating by modifying the Bodily Sensations Questionnaire (BSQ; Chambless, Caputo, Bright, & Gallagher, 1984), a psychometrically sound measure (Antony, 2001; Chambless et al., 1984) designed to gauge the intensity of fear associated with 17 different physical symptoms of arousal. Instead of rating level of fear associated with each bodily sensation, the RHUS has participants rate the extent to which that sensation is associated with cravings for heroin on a 5-point Likert-type scale (1 = no cravings and 5 = extremely high cravings). Three additional symptoms (i.e., headache, racing thoughts, and difficulty concentrating) were added from the ASI (Peterson & Reiss, 1987) to represent cognitive symptoms of anxiety that might be associated with heroin cravings.

The Albany Panic and Phobia Questionnaire (APPQ; Rapee, Craske, & Barlow, 1994-1995) is a 27-item self-report questionnaire that measures fears of situations and activities often avoided by individuals with panic disorder, panic disorder with agoraphobia, and social anxiety disorder. Participants are instructed to rate the extent to which they fear a number of different situations and activities using a 9-point Likert-type scale (0 = no fear and 9 = extreme fear). From their response, three subscale scores are derived: (a) Agoraphobia (representing fears of situations often avoided by individuals with agoraphobia, such as “going long distances from home” or “staying overnight away from home”); (b) Social Phobia (representing fears of situations often avoided by individuals with social anxiety disorder,
such as “eating in front of others” and “talking to people”); and (c) Interoceptive Avoidance (representing fears of situations that bring about anxiety-related physical sensations, such as “drinking a strong cup of coffee” and “playing an active sport on a hot day”). All three subscales of the APPQ have demonstrated good test-retest reliability, as well as convergent, predictive, and discriminant validity (Rapee et al., 1994-1995).

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item, self-report measure designed to assess individuals’ typical levels of emotion dysregulation, represented by the following dimensions: nonacceptance of emotional responses, inability to engage in goal-directed behaviors when distressed, difficulties controlling impulsive behaviors when distressed, lack of emotional awareness, lack of access to effective emotion regulation strategies, and lack of emotional clarity. The DERS has been found to have adequate construct and predictive validity and good test-retest reliability over a period of 4 to 8 weeks ($\rho = .88$; Gratz & Roemer, 2004) and to be highly correlated with an experimental measure of emotion dysregulation (Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006). Higher scores are indicative of greater emotion dysregulation. Responses across all items were summed to obtain an overall score of emotional dysregulation for each assessment point.

## Results

### Treatment Process

The patient attended all AST-H sessions and regularly engaged in all homework assignments, often completing more than was assigned. For example, although he was assigned to complete for homework only one of the interoceptive exposure exercises discussed in-session (i.e., breath holding, hyperventilation, chair spinning), on average, he practiced each of these exercises, as well as an additional exercise (running in place, discussed in-session as an alternative exercise). During Session 1, the patient described himself as someone who is always nervous and on edge; however, he demonstrated limited awareness of anxiety, having difficulty associating the experience of certain bodily sensations with the experience of anxiety. Consequently, the imaginal exercise appeared to be of use to this patient in that it provided him with the opportunity to understand what anxiety feels like, as well as to identify catastrophic thoughts associated with particular anxiety-related bodily sensations. Specifically, the patient recognized that he had never allowed himself to fully experience anxiety because
of fears that he may “lose control over his body” or that his distress might “last forever.” Through the imaginal exercise, the patient was also able to increase his awareness of how his interpretations of anxiety have only resulted in increasing the severity of his anxiety, thereby contributing to his heroin use in an attempt to “feel normal.”

In Session 2, the patient was particularly encouraged (and surprised) by the information that anxiety is part of the human condition and, in and of itself, benign. According to the patient, this information increased his motivation to engage in the interoceptive exercises. In addition, despite some lingering concerns about the consequences of experiencing anxiety, the patient reported being willing to allow himself to experience any anxiety (without engaging in any attempts to avoid the experience) that may arise from the exercises. Initially, he reported high levels of subjective distress (i.e., scores of 50 and greater). The patient also reported the presence of negative, evaluative thoughts concerning the experience of anxiety. These thoughts represented fears that he may lose control, have a heart attack and die, pass out, choke, and/or permanently impair his vision (as a result of having difficulty focusing his eyes after the chair-spinning exercise). However, without engaging in attempts to escape or avoid his anxiety, associated distress, and catastrophic thoughts, the patient noticed that they quickly dissipated on their own. The patient observed that the believability of his catastrophic thoughts decreased as his anxiety decreased, thus providing evidence that his thoughts are not indicators of what will happen, but instead, are simply part of his conditioned anxiety response. Recognition of this made it easier for the patient to take a nonevaluative stance toward his thoughts, increasing his acceptance and tolerance of his anxiety response. After the first series of interoceptive exposure exercises in Session 2, the patient stated that this was the first time he had ever allowed himself to sit with anxiety, and he was amazed by how quickly he recovered despite his many fears of what could happen as a result of this emotion.

By the fourth session, the patient evidenced a large decrease in his subjective distress ratings following the interoceptive exposure exercises, ranging from 10 to 15. Furthermore, the patient noted that his anxiety dissipated more quickly as he became more and more accustomed to simply accepting and experiencing both his anxiety and the thoughts associated with his anxiety (while also taking a nonevaluative stance toward these experiences). The patient reported that he continued to experience catastrophic thoughts; however, by viewing them simply as a symptom of anxiety, they were no longer believable and were often not very intense or as intrusive as they had been before this treatment.
At the last session, the patient stated that he had increased his understanding of what anxiety is and how it feels in his body, thereby allowing him to feel more confident in his ability to tolerate it when it occurs. In particular, he stated that “it [anxiety] is nothing but a feeling, and I know I can sit with it without always just reacting to it and using [heroin].” It also appeared as though his acceptance and tolerance of anxiety had generalized to situations out-of-session. He described a highly stressful event that occurred outside of session wherein he experienced high levels of anxiety. Despite this, he stated that he “first saw what it was—anxiety. I didn’t try to go and fix it right away. I just let it be what it is. Just let it happen.” The patient reported that his heightened acceptance and tolerance of anxiety allowed him to respond accordingly to the situation in a healthy way. Finally, the patient stated in the last session that he felt more comfortable with himself and gained the knowledge that anxiety “doesn’t have to be what we think it is going to be,” further demonstrating his ability to take an accepting, nonevaluative stance toward his anxiety and associated symptoms, as well as his heightened willingness to have these internal sensations when they arise.

Outcome Measures

Throughout the patient’s treatment at the residential center and 2 weeks postdischarge from the center, biochemical verification (via urine analysis) indicated no use of any illicit substances or alcohol. The patient’s raw scores on the ASI and related outcome measures are presented in Table 1. On the primary outcome of AS, the patient demonstrated a reduction from pretreatment to midtreatment, which was maintained by posttreatment. At pretreatment, the patient reported an ASI score of 30, consistent with AS levels previously found among individuals with a diagnosis of posttraumatic stress disorder (31.6; Taylor, Koch, & McNally, 1992) and near the weighted mean ASI score (35.5) obtained from studies of panic disorder patients (Cox et al., 1999). At the midtreatment assessment, the patient reported an ASI score of 22, and at posttreatment, he reported an ASI score of 23. Despite being lower than his pretreatment ASI score, these scores were still consistent with mean levels observed among clinical samples of patients with generalized anxiety disorder diagnoses (Cox et al., 1999). Examination of the lower order ASI dimensions demonstrated that the patient’s improvement was specific to the physical concerns subscale. Speaking to this treatment’s ability to target a specific aspect of AS, patient’s posttreatment physical concerns subscale score was 7 points lower.
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than his pretreatment score. However, the patient’s mental incapacitation and social concerns subscale scores did not vary.

Evaluation of the patient’s ASI score 45 days following his last AST-H session demonstrated continued reduction in AS. At this assessment point, the patient reported an ASI score of 15. Speaking to the clinical significance of this reduction, Cox et al. (1999) reported a weighted mean ASI score of 18.3 for nonclinical samples, indicating that the patient was well within the nonclinical range for AS over a month posttreatment. Examination of the patient’s ASI subscale scores revealed that his physical and social concerns subscale scores demonstrated the greatest reductions from posttreatment. As before, his mental incapacitation score was not affected.

The patient also reported a reduction in heroin craving stemming from the experience of anxiety-related physical sensations. In particular, the patient reported that his cravings decreased in severity from 82 (out of a total score of 100) at pretreatment to 29 at midtreatment and 28 at posttreatment. The patient also demonstrated a consistent reduction in agoraphobic, social, and interoceptive fears across assessment points. Of note, all of the patient’s pretreatment APPQ subscale scores were at levels observed among patients with anxiety disorders, particularly panic disorder and social anxiety disorder (Rapee et al., 1994-1995). By the posttreatment assessment, however, the patient’s agoraphobia subscale score had reduced to a

Table 1
Outcome Measure Scores at Each Assessment Time Point

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<tr>
<th>Outcome Measure</th>
<th>Assessment Time Point</th>
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<tbody>
<tr>
<td></td>
<td>Pretreatment</td>
</tr>
<tr>
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<tr>
<td>ASI Physical Concerns</td>
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<td>ASI Mental Incapacitation</td>
<td>3</td>
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<tr>
<td>ASI Social Concerns</td>
<td>11</td>
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<tr>
<td>Heroin Cravings</td>
<td>82</td>
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<tr>
<td>Emotion Dysregulation</td>
<td>88</td>
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<tr>
<td>APPQ Agoraphobia</td>
<td>22</td>
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<tr>
<td>APPQ Social Phobia</td>
<td>10</td>
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<tr>
<td>APPQ Interoceptive</td>
<td>12</td>
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Note: ASI = Anxiety Sensitivity Index; Heroin Cravings = Score on the Reasons for Heroin Use Scale; Emotion Dysregulation = Total score on the Difficulties in Emotion Regulation Scale; APPQ = Albany Panic and Phobia Questionnaire.
nonclinical level (3.5). However, although his social phobia and interoceptive subscale scores had reduced from pretreatment and were in the subclinical range, they were still not consistent with nonclinical levels (5.3 and 1.1 for social phobia and interoceptive subscales, respectively; Rapee et al., 1994-1995).

In regard to his emotion dysregulation scores, the patient also exhibited a decrease. His emotion dysregulation score at pretreatment was 88, consistent with mean DERS scores obtained within a sample of individuals with a recent history of uncued panic attacks (88.38; Tull, 2006). His emotion dysregulation score decreased to 68 at midtreatment and remained steady at posttreatment. Again speaking to the clinical significance in this reduction, the patient’s posttreatment DERS score was well below those obtained among nonclinical samples of men (e.g., 80.66; Gratz & Roemer, 2004).

Given that the patient was also receiving substance abuse treatment in addition to AST-H, it is possible that any observed reduction on any outcome measure was because of the fact that he was in a structured treatment environment, as opposed to the AST-H. To examine this possibility, we examined data from other pilot work we are conducting at the same center examining the natural course of symptom reduction across a variety of domains for those receiving treatment as usual. ASI and DERS data were available for seven heroin-dependent patients both at the start of their treatment (within the first 10 days) and at the end of their 4th week; data on the RHUS and APPQ were not collected. Results demonstrated that these participants exhibited a slight increase in ASI scores, from 27.33 up to 30 at the end of their 4th week. Furthermore, these participants did not evidence any change in emotion dysregulation, maintaining a mean DERS score of 99 across both data collection points. These findings provide some support that the improvements noted for our case study are not characteristic of heroin users receiving standard substance use treatment with no specific focus on AS or other related constructs.

**Discussion**

Recent evidence of heightened AS in heroin use (Lejuez, Paulson, et al., 2006) suggests that AS may be a useful target of focused interventions for heroin users. This work sits on the backdrop of a larger AS–substance use literature that also indicates this cognitive factor is relevant to drug behavior and outcomes (Stewart & Kushner, 2001; Zvolensky, Bernstein, Yartz, McLeish, & Feldner, in press). That is, to the extent that high AS heroin-dependent
individuals use the substance to regulate anxiety-related bodily sensations perceived as threatening, they may also be at greater risk for treatment dropout and relapse following substance treatment (Lejuez, Zvolensky, et al., 2006). Consequently, brief, targeted interventions that can be completed as an adjunct to standard substance use treatment are needed to enhance the acceptance and tolerance of internal sensations among these individuals to facilitate willingness to have these sensations when they arise. In doing so, reliance on substances as a way of coping with uncomfortable internal sensations may be reduced, thus averting negative outcomes (e.g., treatment dropout and relapse to substance use). To this end, this article described the development of a brief behavioral intervention for heightened AS among heroin users, AST-H, and presented preliminary data on its utility with one male heroin user receiving residential substance use treatment.

AST-H was designed to increase the acceptance and tolerance of anxiety-related internal sensations perceived as threatening. Throughout the course of this treatment, the patient reported a decrease in (a) AS (primarily in the form of physical concerns), (b) heroin cravings stemming from the occurrence of anxiety-related bodily sensations, (c) emotion dysregulation, and (d) fear of situations that may bring about anxiety-related sensations. For many of these outcomes, the patient reached nonclinical levels. By the end of the treatment, the patient also reported a more accepting and tolerant stance toward the internal experiences he once feared and avoided. This patient also demonstrated willingness to have anxiety when it arises, experiencing less of a dependence on heroin to escape these sensations (as demonstrated by his reduction in heroin-craving score). Combined with data demonstrating that AS may not change simply as a result of the residential substance use treatment, our findings suggest the potential utility of this treatment in reducing AS among heroin users.

Moreover, it appears as though the skills training focused on facilitating emotional acceptance and nonevaluative awareness of anxiety-related sensations may have generalized to out-of-session situations, as demonstrated by the patient’s willingness to have and ability to effectively regulate (i.e., accept and tolerate) stress and anxiety between sessions, as well as his continued reduction in AS 45 days after his last session (15 of which occurred following his discharge from the residential treatment facility). In fact, at follow-up, the patient’s AS levels were well within the nonclinical range. This finding is even more encouraging considering that the follow-up assessment occurred when the patient was no longer in a structured treatment environment and may have been encountering numerous stressors associated
with early abstinence (e.g., finding a job, re-establishing relationships, coping with environmental triggers for substance use).

Furthermore, in regard to AS levels, the treatment appeared to primarily target AS in the form of physical concerns, as this was the only dimension of AS to change during the course of the treatment. However, it is important to note that despite not changing during the course of the treatment, AS in the form of social concerns did decrease from the last session to the follow-up assessment. It is possible that this finding may be indicative of the patient’s increased activity in interpersonal situations that may have been previously avoided because of fears of experiencing physiological arousal associated with anxiety. Once the patient learned to accept and tolerate symptoms of anxiety, he may have been more willing to engage in social situations without fear of embarrassment or other negative consequences, thus resulting in a reduction of his AS in the form of social concerns. This pattern of findings may also be the result of the patient’s leaving the residential treatment center and entering a halfway house where there were many social demands (e.g., establishing new relationships, obtaining employment) that served as exposure in its own right. Of course, without more extensive examination of the possible factors that contributed to a reduction in the patient’s social concerns about AS, we cannot state with certainty what led to this finding. Future research is needed to examine how changes in one form of AS may lead to reductions in another.

Despite the encouraging nature of these findings, it is important to note that they were obtained with only one patient. Furthermore, it warrants mention that besides AS and emotion dysregulation, we do not know with certainty whether the magnitude of change in the patient’s heroin cravings and fear of situations associated with internal sensations can be attributed to simply being in residential substance use treatment. More extensive clinical trials are needed wherein the efficacy of this treatment is systematically evaluated in comparison to treatment as usual and other potential interventions. Furthermore, longer follow-up assessments would aid in determining whether this treatment has utility in producing sustainable changes in how high AS individuals evaluate their internal sensations, as well as preventing relapse to substance use. It would also be important for future studies to begin to assess potential mechanisms for continued improvement posttreatment, such as increased emotion regulation (e.g., acceptance- and tolerance-focused strategies) skill utilization.

Although this treatment was specifically designed to target high AS among heroin users, polysubstance use is common among heroin users. Therefore, it is unclear to what extent the use of other drugs might be relevant for measured
outcomes. Future investigations of this treatment would benefit from the more extensive examination and control of polysubstance use among high AS heroin users. Likewise, our initial examination of this treatment focused on high AS independent of an anxiety disorder diagnosis to limit interference as a result of avoidance and other anxiety disorder–related consequences. Thus, it will be important to extend future examinations of this treatment to those with a diagnosable anxiety disorder, especially those associated with high AS levels, such as panic disorder. The active ingredients of the AST-H would likely be similar but would require even greater attention to the treatment rationale and a plan for addressing potentially more chronic AS vulnerabilities, as well as the associated consequences of an anxiety disorder (e.g., extensive avoidance behaviors). Finally, this treatment was designed to aid high AS heroin users in accepting and being willing to experience anxiety, with the goal of reducing risk for treatment dropout and relapse to heroin use; however, the AST-H may also have utility prior to abstinence as it may assist patients in tolerating heroin-related withdrawal symptoms. Future studies are needed to examine this possibility. Although the application of behavioral treatments for comorbid conditions continues to be somewhat uncommon, a recent special series in Biological Psychiatry addressed the need for the development and investigation of such treatments (O’Brien et al., 2004). Furthermore, although we have just begun to implement AST-H, our experience with providing a depression-based adjunct treatment in a residential substance use treatment setting has been extremely well received. Specifically, in a recent study, all 22 patients with elevated depressive symptoms that we approached agreed to participate in a six-session adjunct depression group treatment, with only one dropping out of the treatment (Daughters et al., 2006). Although more work is needed to determine the feasibility of adjunct treatments for anxiety- and mood-related comorbidity among those with severe substance use problems, initial evidence is promising.

References


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