Affective Vulnerability in Substance Use Disorders

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Abstract

Substances of abuse are characterized by their rewarding effects and engagement of reward pathways in the brain. However, these substances also provide rapid relief of negative affect, and thus are highly negatively reinforcing. Accordingly, negative affectivity and other affective vulnerabilities (factors related to the experience of affect) are strongly linked to problematic substance use and substance use disorders. In this review, we provide a critical overview of the literature on affective vulnerabilities in substance use disorders. We discuss how both the experience of affect (e.g. negative affectivity, stress reactivity) and the interpretation of affect (e.g., distress intolerance, anxiety sensitivity) are pertinent to the development, maintenance and treatment of substance use disorders.

Keywords

substance use disorders; negative affect; distress intolerance; affective vulnerability; negative reinforcement

1. Introduction

Although a large body of research has established the roles of impulsivity and reward dysfunction in substance use disorders (SUDs) [1], affective dysfunction also plays a substantial role in the development and maintenance of these disorders [2]. Co-occurring mood, anxiety and traumatic-stress related disorders are highly prevalent among people with SUDs [3, 4], and are also prospectively associated with risk for the development of problematic substance use and SUDs [5]. Chronic substance use also can create new (or worsen existing) affective disturbances, further contributing to the maintenance of SUDs, as substances are increasingly used to relieve distress [2]. Accordingly, a growing body of research has attempted to better characterize the role of affect in the development and maintenance of SUDs.

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In this review, we provide an overview of affective vulnerabilities—factors related to the experience of affect—in SUDs. We focus specifically on variables related to the experience of and interpretation of affect. Although an increasing body of literature has examined emotion regulation in SUDs, here we will focus on the experience of affect rather than its effortful regulation (for reviews of emotion regulation deficits in SUDs see [6, 7]).

2. Negative Affectivity, Psychiatric Symptoms and Stress Reactivity

The role of negative affect in SUDs is complex and bidirectional. Substances of abuse have potent effects on affect during intoxication, withdrawal, and protracted withdrawal [2, 8]. For example, anxiety and depressive symptoms are highly elevated in people with alcohol use disorder during acute withdrawal, and require several weeks to return to baseline [9]. Accordingly, negative affect and psychiatric disorders can be a consequence of acute or chronic substance use. Indeed, acute substance intoxication and withdrawal can present as psychiatric syndromes, such as substance-induced mood, anxiety, or psychotic disorders[10].

Nonetheless, affective disturbance is more than simply a consequence of substance use. Although longitudinal risk factors for substance-related problems are understudied, evidence suggests that negative affect confers risk for the onset of substance misuse [11, 12]. The use of substances to cope with negative affect (i.e., self-medication) is also associated with incident SUDs [13, 14]. Many psychiatric disorders, particularly anxiety disorders, onset *prior to* the onset of SUDs [5, 15]. It is possible that this reflects a causal impact on risk for SUD development (i.e., presence of an anxiety disorder increases risk for later development of an SUD), or shared risk for both disorders. A longitudinal study that controlled for potential shared risk factors (e.g., exposure to childhood trauma) found that psychiatric disorders no longer predicted SUD incidence, providing some initial evidence for the common risk factor hypothesis [16].

In addition to the effects of negative affect and psychiatric symptoms in general, the affective response to stressors also plays a role in SUDs. Chronic substance use can sensitize stress response systems, contributing to heightened affective responding to stress [17, 18]. Consistent with this effect, people with SUDs have a heightened reactivity to stress (i.e., elevated subjective and physiological response to stressors) compared to people without SUDs [19, 20]. The degree of this reactivity also appears to vary based on level of use, with more severe use associated with greater reactivity [21]. Critically, individual differences in stress reactivity are associated with likelihood of relapse among people receiving treatment for both alcohol use disorder [20] and cocaine use disorder [22]. Thus, heightened reactivity to stress also is a poor prognostic factor for people diagnosed with SUDs who are in treatment.

3. Interpretation and Tolerance of Affect

In addition to negative affectivity itself, dispositional variables related to the *interpretation* or *tolerance* of affect are strongly linked to substance misuse. Variables such as distress intolerance (the perceived inability to manage negative affective and somatic states) and anxiety sensitivity (fear of anxiety-related symptoms and sensations) share a tendency to

interpret negative affect as harmful, intolerable, and/or interminable. These variables are heightened in people with problematic substance use and in those with SUDs [23–25]. Specifically, sensitivity/intolerance of distress is hypothesized to amplify the experience of distress, thereby increasing the motivation to escape or avoid. Substances of abuse provide strong, rapid relief that is highly proximal to the behavior (i.e., the effect occurs shortly following consumption), and thus are highly negatively reinforcing.

Consistent with this perspective, distress intolerance and anxiety sensitivity have been associated with coping motives (i.e., the use of substances to manage negative emotions) [26, 27]. This association may explain, at least in part, the association between distress intolerance and problematic substance use [28–30]. In other words, poor tolerance of distress may motivate the use of substances to relieve this distress, contributing to an escalation of substance use.

In addition to their association with increased risk for negative affect- or stress-driven use, distress intolerance and anxiety sensitivity also appear to influence the ability to tolerate early stages of abstinence in people with SUDs. These variables have been associated with early treatment dropout [31–33] and relapse [34, 35]. For people with heightened intolerance of distress, the ability to persist through the psychosocial and physical (e.g., withdrawal) stressors associated with early abstinence may be limited.

Distress intolerance and anxiety sensitivity are relevant to outcomes for the range of substances, including stimulants (e.g., cocaine; [32]) as well as analgesics/sedatives/ anxiolytics (e.g., opioids, benzodiazepines; [23, 36]). Nonetheless, intolerance of distress can vary across types of distress (e.g., pain, anxiety), and the type of distress may confer vulnerability for specific maladaptive behaviors. For example, intolerance of symptoms and sensations related to nicotine withdrawal have been specifically linked to poor smoking cessation outcomes [37], and poor tolerance of pain and anger have been specifically associated with opioid use disorder [38].

Emotion malleability beliefs (also referred to as implicit theories of emotion) refer to the assumptions about the malleability of emotions [39, 40]. The beliefs that individuals hold about whether emotions are malleable or fixed may hold important implications for how interpretations of negative affect relate directly and indirectly to SUDs. Theoretical work proposed that less malleable views of emotion could be tied to increased substance use and misuse because individuals who interpret their emotions as fixed then believe that they cannot change emotions themselves [41]. As a result, these individuals might be more inclined to look to external ways of alleviating negative emotions, such as through using alcohol and other substances of abuse [41]. There is preliminary empirical evidence to support this hypothesis. Specifically, more fixed views of anxiety (i.e., the belief that anxiety is *not* highly malleable) were associated with greater alcohol and drug misuse in a sample of students [42]. Anxiety malleability beliefs moderated the relationship between stressful life events and drug misuse, such that those with more fixed beliefs were more likely to use substances in response to stressful life events.

4. Treating Affective Vulnerability

Critically, affective vulnerabilities can be targeted with intervention, and treatments targeting affective vulnerabilities have shown significant promise for the treatment of SUDs. A number of studies have tested the efficacy of interventions targeting co-occurring psychiatric and substance use disorders, including studies that conceptualize these disorders as a single syndrome, rather than two separate disorders. These treatments have shown promise for the treatment of both disorders [43, 44]

Treatments targeting variables related to the response to affect – such as stress reactivity, distress intolerance and anxiety sensitivity - have also shown promise. Psychological therapies (e.g., mindfulness-based treatments) [45] and pharmacologic strategies (e.g., alpha adrenergic agonists or antagonists) [46] have been shown to reduce stress reactivity in people with SUDs. Distress intolerance and anxiety sensitivity are also modifiable with treatment; behavioral interventions have been shown to successfully reduce these vulnerabilities [47, 48], and to reduce substance use disorder symptoms [49]. Recent evidence also suggests that a brief psychoeducational intervention can induce more malleable beliefs [50–52]; testing this intervention in people with SUDs is an important future direction in this line of research.

These treatments may aim to work to either (1) reduce the affective symptom directly (e.g., decrease negative affect) or (2) to decouple the affective symptom from substance use. The latter strategy focuses on how to break the link between negative affect and using substances for relief. This strategy may be particularly important to prevent relapse when someone is experiences an exacerbation of negative affect or psychiatric symptoms, or in the context of an acute or unexpected stressor.

5. Discussion

Substances of abuse are potent reinforcers, in part because their effects are both strong and immediate. Not only are substances positively reinforcing, but they are also negatively reinforcing, providing rapid relief of aversive affective and somatic states. Indeed, theories of SUDs suggest that these are predominantly disorders of negative reinforcement in their later stages [2]. Heightened negative affect and the perception that negative affect is harmful or intolerable may increase motivation to escape or avoid distress through use of substances. As reviewed above, affective vulnerabilities play a role at every stage of the substance misuse continuum, from risk for onset of problems [11–13] to relapse risk [22, 34]. This suggests that negative reinforcement processes may be pertinent across the spectrum of SUD severity, and not only in the later stages characterized by chronic negative affect and substance withdrawal [2].

Although the theories about self-medication posit that substance use patterns should impact the targeted symptom (e.g., anxiolytic substances such as alcohol would be used by people with anxiety), the literature suggests that the associations between affective vulnerabilities and substance misuse is present across varied substance types. Nonetheless, the majority of the research on affective vulnerabilities has focused on alcohol and nicotine, and gaps

remain in understanding of whether these findings are consistent across substances of abuse or may impact substance choice.

Notably, affective vulnerabilities alone are not sufficient for conferring risk for SUDs. These same variables are also elevated in other psychiatric disorders not characterized by substance use (e.g., anxiety disorders, posttraumatic stress disorder [53]). It appears that SUDs differ from other disorders in the combination of high negative affectivity with other factors, such as greater disinhibition [54]. A growing literature has linked a specific type of impulsivity— acting rashly in the context of affect (urgency)—to problematic substance use [55]. Nonetheless, the link between substance misuse and affective vulnerabilities is not wholly attributable to the high comorbidity between these disorders. Dysfunction in affective vulnerabilities, such as heightened distress intolerance is independent of the impact of psychiatric comorbidity [23].

There remain many gaps in knowledge about the role of affective vulnerabilities in substance use disorders. One important future research direction is the use of longitudinal studies to understand (1) how these vulnerabilities develop, (2) how these vulnerabilities may confer risk for substance misuse, and (3) the impact of chronic substance use on these vulnerabilities. Further research is also needed to identify the behavioral/cognitive and biological mechanisms underlying the associations between affective vulnerabilities and substance misuse. Finally, these vulnerabilities may be particularly important for women with SUDs. Most notably, women with SUDs are more likely to use substance to cope with negative affect [56, 57] and to have co-occurring anxiety and depressive disorders [58, 59]. For some outcomes, affective vulnerabilities appear to be more strongly linked to negative substance outcomes for women [36, 60, 61]. The effects of both sex (i.e., biological difference between males and females) and gender (i.e., differences based on cultural factors) remain understudied and are an important future research direction.

Affective vulnerabilities play a role across the spectrum of harmful substance use. Negative affect and psychiatric symptoms are risk factors for the initiation and maintenance of problematic substance use, particularly among people for whom these symptoms are perceived to be harmful and intolerable, motivating behaviors that achieve rapid, proximal relief. Although findings have consistently demonstrated a key role for these variables, and treatments targeting these studies have shown initial promise for the treatment of SUDs, much remains to be understood about how these vulnerabilities develop, how they mechanistically relate to problem substance use, and how to optimally modify them with treatment.

Acknowledgements

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Highlights

- Negative affectivity is a risk factor for and consequence of substance misuse.

- Intolerance and sensitivity to affect are associated with coping motives for substance use.

- The modification of affective vulnerabilities can improve substance use treatment outcomes.