



The role of affective dysregulation in drug addiction

Ali Cheetham ^a, Nicholas B. Allen ^{a,b}, Murat Yücel ^{a,c}, Dan I. Lubman ^{a,d,*}

^a Orygen Youth Health Research Centre, Centre for Youth Mental Health, The University of Melbourne, Victoria, Australia

^b Department of Psychology, The University of Melbourne, Victoria, Australia

^c Melbourne Neuropsychiatry Centre, Department of Psychiatry, The University of Melbourne and Melbourne Health, Victoria, Australia

^d Turning Point Alcohol and Drug Centre, Eastern Health Clinical School, Monash University, Victoria, Australia

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ABSTRACT

Although affective and substance use disorders frequently co-occur, the role of affective dysregulation in addiction is often overlooked. This paper reviews the role of affective dysregulation in the initiation and maintenance of substance use disorders (SUDs), presenting evidence for a relationship between SUD and three biologically-based dimensions of affective temperament and behaviour: negative affect (NA), positive affect (PA), and effortful control (EC). High NA, low EC, and both high and low PA were each found to play a role in conferring risk and maintaining substance use behaviours, although the strength of their influence differed depending on stage of illness (i.e., early onset use through to addiction). Given these findings, we argue that future research should explicitly consider how changes within affective systems may underlie the development of SUDs. A better understanding of the role of affective dysregulation in addiction will aid in clarifying how risk is conferred, as well as how addictive behaviours are maintained, thereby informing the development of preventative strategies and novel treatments. Future studies should continue to examine the role of high NA in SUDs, and further examine the respective roles of high PA, low PA, and low EC, as well as identifying the affective characteristics that predispose high-risk individuals to later substance use problems.

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Contents

| | | |
|--------|---|-----|
| 1. | Introduction | 622 |
| 2. | What is affect? | 623 |
| 3. | Affective dimensions and substance abuse research | 623 |
| 3.1. | Negative affect | 623 |
| 3.1.1. | Risky use/addiction | 623 |
| 3.1.2. | Vulnerability | 624 |
| 3.1.3. | Critical analysis and summary of findings: NA | 624 |
| 3.2. | Positive affect | 625 |
| 3.2.1. | Risky use/addiction (high PA) | 625 |
| 3.2.2. | Vulnerability (high PA) | 625 |
| 3.2.3. | Risky use/addiction (low PA) | 626 |
| 3.2.4. | Vulnerability (low PA) | 626 |
| 3.2.5. | Critical analysis and summary of findings: PA | 626 |
| 3.3. | Effortful control | 627 |
| 3.3.1. | Risky use/addiction | 627 |
| 3.3.2. | Vulnerability | 628 |
| 3.3.3. | Critical analysis and summary of findings: EC | 628 |
| 4. | Limitations of existing research | 629 |
| 5. | Future directions | 630 |
| 5.1. | Measurement of affective processes and traits | 630 |
| 5.1.1. | Neuroimaging | 630 |
| 5.1.2. | Psychophysiology | 630 |

* Corresponding author. Turning Point Alcohol and Drug Centre, 54-62 Gertrude Street, Fitzroy, Vic 3065, Australia. Tel.: +61 3 8413 8413; fax: +61 3 9416 3420.
E-mail address: dan@turningpoint.org.au (D.I. Lubman).

| | | |
|--------|--------------------------------|-----|
| 5.1.3. | Experimental designs | 631 |
| 5.1.4. | Longitudinal studies | 631 |
| 6. | Conclusions | 631 |
| | References | 631 |

1. Introduction

Evidence from epidemiological and clinical studies has consistently shown a strong association between affective and substance use disorders (SUDs). Individuals with affective psychopathology, such as mood and anxiety disorders, have been shown to demonstrate high rates of comorbid SUDs (Merikangas, Dierker, & Szamari, 1998). Similarly, affective psychopathology has been observed among those with primary SUDs, with some studies suggesting that SUDs may play a causative role in the development of affective disorders (Schuckit, 2006; Volkow, 2004). SUDs have also been linked to a range of deficits in the experience and expression of emotion in the absence of affective psychopathology (Aguilar de Arcos et al., 2008; Gerra et al., 2003; Sell et al., 2000). In short, the comorbidity of SUDs with affective dysfunction has been well established and has important theoretical and therapeutic implications (Volkow, 2004).

Despite these findings, models of addiction have not generally provided a comprehensive account of the role of affect in SUDs. Recent research has focussed more upon the neurobiological substrates underlying addiction than on its affective components, emphasising how the dysregulation of brain reward and stress systems bias addicted individuals towards continued substance use. Now widely accepted, this perspective has emphasised the importance of the circuitry that mediates the behavioural response to natural rewarding stimuli, the action of drugs of abuse within this system, and the resulting adaptations that occur within the brain in an attempt to maintain homeostasis (Altman et al., 1996; Koob & Le Moal, 1997). In doing so, it has helped explain the compulsive-like nature of addiction and the involuntary nature of cravings. However, although these findings are not incompatible with an affect-centred theory of SUD (Li & Sinha, 2008), most research within this field has not explicitly considered how affective processing may mediate addictive behaviours.

Theoretically, affect and SUD can be linked in a number of ways. Most relevant to this review is the crucial role that affective processes play in influencing motivated behaviours. The experience of affect facilitates action: it directs attention, prepares the individual for rapid physical responses, and guides behaviour to meet a particular need (Gross, 1998; Thompson, 1994). Affect is thus implicated in a range of concepts relevant to substance use, including positive and negative reinforcement, behavioural motivation, and the regulation of cognition and mood (Quirk, 2001). In a related vein, there is research suggesting that affect plays an important role in reasoning and decision-making (Bechara & Damasio, 2002; Damasio, 2001). As well as rational 'cold' cognition, human behaviour is driven by emotion-motivated reasoning: reasoning biased to select outcomes that minimise negative and maximise positive affective states (Westen,

Blagov, Harenski, Kilts, & Hamann, 2006). Moreover, although the focus of this article is not on neurobiology, it is also relevant to note that the neural circuitry implicated in affective reactivity and regulation is closely related to the circuitry proposed to underlie addictive behaviours (Koob, 2003; 2006; Li & Sinha, 2008; Phan, 2002). Thus, many of the processes associated with substance abuse and addiction appear congruent with those underlying more naturally occurring affective experiences.

Given this apparent relationship, it is important that we understand the ways in which affect and substance use interrelate. As will be discussed in the following sections, this issue has been approached from a number of theoretical perspectives, including examination of how various forms of emotional distress can prompt substance use (e.g. Baker, Piper, McCarthy, Majeskie, & Fiore, 2004; Kassel et al., 2007; Robinson & Berridge, 2003), how substances can be powerful inducers of positive affective states (e.g. Volkow et al., 2005), how affect is related to dysfunctional decision-making processes and risky behaviours (e.g. Bechara & Damasio, 2002; Cyders & Smith, 2008), as well as how expectancy of affective change can motivate use (e.g. Cox & Klinger, 1988). While varied, these theories share common ground in that they posit a central role for affective processes in the motivation to use and abuse substances.

The primary goals of this paper are (i) to conceptualise SUDs as disorders of affect, and (ii) propose new ways of researching these constructs, beyond self-report. To this end, a selective review of the SUD literature was undertaken. Studies were identified through searches of relevant databases (e.g. Pubmed, PsycInfo, Web of Science) using combinations of the terms *affect**, *affect regulation*, *emotion*, *drug*, *substance*, and *alcohol**. The reference lists of selected articles were also scanned to identify additional relevant publications. Given the breadth of this review, and the large body of research within some areas, a systematic review of the literature was not undertaken. However, for areas in which little research has been conducted (e.g., the relevance of low positive affect to SUD risk), attempts were made to identify all articles with relevance to the topic. For more extensively researched areas (e.g., the relationship between SUD and negative affect), crucial articles representing well-validated findings were prioritised for inclusion, along with review articles, in order to provide a selection of articles that were representative of the larger body of findings.

The studies selected for review examine the relationship between SUDs and dysregulation within three dimensions of affective temperament and behaviour: negative affect (NA), positive affect (PA) and effortful control (EC). It is proposed that each of these affective dimensions strongly influence patterns of substance use, but do so at differing stages of illness (i.e., from early onset experimental use through to addiction and relapse: see Fig. 1). Research is reviewed

| <i>Proposed relationships between affective dimensions and stages of substance use</i> | | | |
|--|-------------|-----------|-----------------------|
| | Early Onset | Risky Use | Addiction and Relapse |
| NA | ↑ | ↑ | ↑ ↑ ^a |
| PA | ↑ | ↑ | ↓ ↓ |
| EC | ↓ | ↓ | ↓ |

^a Double arrows indicate stronger relationships.

Fig. 1. Proposed relationships between affective dimensions and stages of substance use.

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