



## Review

# Emotion processing deficits: A liability spectrum providing insight into comorbidity of mental disorders



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## ABSTRACT

Epidemiological studies have revealed that mental disorders are highly comorbid; almost half of the people with a mental disorder also meet the criteria of another disorder. The explanation of this high comorbidity has remained a scientific puzzle. We propose 'disrupted emotion processing' as a liability spectrum that underlies many different mental disorders. Emotion processing deficits have been reported in different disorders and result in difficulties in regulating emotions and at the perceptual level in attentional biases and impaired recognition of emotional expressions. This article provides a detailed overview of the literature on disrupted emotion processing in clinical groups on the behavioral and neurological level. In the discussion, the similarities and differences between these disorders are discussed in the context of common neuro-endocrine, genetic and environmental factors and ideas are put forward on how future research may advance. Most importantly, more interdisciplinary research is needed in which different techniques, tasks and clinical populations are combined to get a better understanding of disrupted emotion processing as a liability spectrum underlying various different mental disorders.

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## 1. Introduction

Epidemiological studies have revealed that up to 30% of the adult population in the United States has a mental disorder (e.g., [Kessler et al., 1994](#)). Interestingly, many people meet the criteria of more than a single mental disorder. In a large survey, it was found that 55% of the clinical population has a single disorder; 22% has two, and 23% has three or more disorders ([Kessler et al., 2005](#)). The cause of this high prevalence of comorbidity remains a scientific puzzle. Several explanations have been given. For example, comorbidity may represent different manifestations or two stages of the same underlying condition; there may be the same or correlated risk factors; or one condition predisposes to another disorder (for a review, see [Rutter, 1997](#)). It is also possible that it is an artifact of the diagnostic systems that are widely used, such as the *Diagnostic and Statistical Manual of Mental Disorders-5* (DSM-5, [American Psychiatric Association, 2013](#)). The DSM is constructed in such a way that symptoms cannot appear in the diagnostic criteria of more than one disorder. Moreover, it is possible that the divisions made in the DSM do not exist in nature and that the complexity and heterogeneity of mental disorders cannot be covered in a fixed, rigid diagnostic system ([Maj, 2005](#); [Panksepp, 2004a](#)).

Recently, a network approach to psychopathology has been proposed ([Borsboom et al., 2011](#); [Borsboom and Cramer, 2013](#); [Bringmann et al., 2013](#)), where it is argued that symptoms of a disorder can be the direct cause of the arising of other symptoms. For example, symptoms of a major depressive episode, such as sleep deprivation, may easily cause symptoms of generalized anxiety disorder, such as irritability and fatigue ([Borsboom et al., 2011](#)). In addition, several other approaches are possible, such as a range of different bivariate and multivariate comorbidity models ([Krueger and Markon, 2006](#)). Based on their meta-analysis, Krueger and Markon concluded that most evidence points into the direction of a liability-spectrum model of comorbidity. The assumption of this model is that comorbidity reflects the existence of a smaller number of liability constructs that underlie multiple disorders. Krueger and Markon propose a broad internalizing liability and a broad externalizing liability. The internalizing liability underlies disorders such as major depression, generalized anxiety disorder and specific phobias, whereas the externalizing liability underlies disorders such as addictions and antisocial behavior.

In the present article, while fully acknowledging the complexity of comorbidity, we follow the liability-spectrum model, but we propose a broader liability spectrum. We argue that a broader liability spectrum is necessary in order to explain the comorbidity of internalizing and externalizing disorders. The liability spectrum we propose is disrupted emotion processing, which underlies a wide range of mental disorders, including anxiety and mood disorders,

but also schizophrenia, autism spectrum disorders, borderline personality disorder and eating disorders. In this article we review the evidence for this proposal, and in addition, we review the evidence for neural correlates underlying disrupted emotion processing in different mental disorders.

We start this article by defining what emotion processing is and by addressing different theories that attempt to explain the nature of emotions. Then we briefly introduce the main neural correlates of emotion processing in healthy individuals. The main body of this article is a review of studies on emotion processing in several mental disorders, including anxiety disorders, mood disorders, schizophrenia, autism, borderline personality disorders, and eating disorders. We finish the article with a discussion about the implications of this literature review for the proposal that disrupted emotion processing is a plausible liability spectrum to explain the comorbidity of mental disorders.

### 1.1. What is emotion processing?

Emotion processing is a broad term that refers to a complex of affective, behavioral and cognitive mechanisms that underlie our emotions. Given the impact of our emotions on a wide range of mental processes (e.g., memory, decision making) and manifest behaviors (e.g., helping behavior, drug use), being able to recognize and regulate our emotions is of crucial importance and an essential feature of mental health. It is notable that different emotion regulation strategies have been shown to impact the subjective, physiological, and behavioral components of negative emotion in distinct ways. For example, cognitive reappraisal and suppression have been shown to decrease the behavioral expression of negative emotion, but only reappraisal decreases subjective distress ([Gross, 1998](#)). Moreover, emotion regulation strategies have varying effects on the temporal course of emotions. Rumination has been shown to prolong episodes of sadness, whereas distraction appears to shorten them ([Nolen-Hoeksema and Morrow, 1993](#)). Finally, habitual use of certain emotion regulation strategies is meaningfully associated with interpersonal functioning and well-being ([Gross and John, 2003](#)), suggesting that some emotion regulation strategies may be “healthier” than others ([John and Gross, 2004](#)). What emotions are and how they arise has been a matter of ongoing debate (e.g., [Ekman and Cordaro, 2011](#); [Panksepp and Watt, 2011](#)).

Theories on emotions can be roughly categorized into two main approaches. The discrete emotion approach posits that there are empirically distinguishable basic emotions, such as happiness, sadness, fear, anger, disgust, and surprise. These emotions are biologically inherited and cannot be broken down in smaller components (e.g., [Ekman, 1992](#)). The dimensional approach proposes

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