



Emotion generation and regulation in anorexia nervosa: A systematic review and meta-analysis of self-report data



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HIGHLIGHTS

- A comprehensive review and meta-analysis of emotional processing in AN.
- People with AN report less emotional awareness/clarity but more emotionality than HCs.
- People with AN employ maladaptive emotion regulation strategies more than HCs.
- People with AN employ adaptive emotion regulation strategies less than HCs.
- Findings inform cognitive-affective AN models and therapeutic interventions.

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ABSTRACT

This systematic review sought to examine the generation and regulation of emotion in people with Anorexia Nervosa (AN). Key databases (Medline, Embase, PsychINFO and Web of Science) were searched for peer-reviewed articles published by March 2015 yielding 131 studies relevant to emotion generation and emotion regulation (ER) processes as defined by Gross (1998). Meta-analyses determined pooled group differences between AN and healthy control (HC) groups.

More maladaptive schemata were reported by people with AN than HCs, with largest pooled effects for defectiveness/shame ($d = 2.81$), subjugation ($d = 1.59$) and social isolation ($d = 1.66$). Poorer awareness of and clarity over emotion generated and some elevated emotionality (disgust and shame) were reported. A greater use of 'maladaptive' ER strategies was reported by people with AN than HCs, alongside less use of 'adaptive' strategies. Pooled differences of particularly large effect were observed for: experiential avoidance ($d = 1.00$), negative problem-solving style ($d = 1.06$), external/social comparison ($d = 1.25$), submissiveness ($d = 1.16$), attention concentration (worry/rumination; $d = 1.44$) and emotion suppression ($d = 1.15$), particularly to avoid conflict ($d = 1.54$). These data support the notion that emotion regulation difficulties are a factor in AN and support use of associated cognitive-affective models. The implications of these findings for further understanding AN, and developing models and related psychological interventions are discussed.

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1. Introduction

Emotions are responses to external or internal stimuli resulting in physiological, behavioural and cognitive changes. They are learnt or instinctive reactions with identifiable triggers, distinguishing them from *mood* and *affect* which represent broad states persisting over time (Scherer, 1984; Watson, 2000). Emotions therefore inform about immediate environments, and their appropriate processing and management enable navigation of situations. Indeed, they are evolutionarily understood to have developed for this purpose: to organise and direct human cognitions and behaviour for survival and appetitive outcomes (Cosmides & Tooby, 2000). Emotions thus act as a super-ordinate system; the conductor of an orchestra comprised of cognitive, behavioural, physiological and social functions.

1.1. Emotion generation, regulation & psychopathology

Disruptions to emotional processing are considered problematic and indeed dysfunctional emotional processing is proposed to underpin many psychological disorders (Berenbaum, Raghaven, Le, Vernon, & Gomez, 2003). Although the issue of how to conceptualise and define components of emotional processing remains a difficult undertaking (Rottenberg & Gross, 2003), Gross's (1998) process model of emotion regulation provides a widely used and helpful overarching conceptual framework for organising emotion regulatory processes (Webb, Miles, & Sheeran, 2012). Gross and Jazaieri (2014) argue that it is "both possible and important" to clarify how emotion generation, emotion regulation (ER) and different forms of psychopathology are connected (p. 388).

Gross (1998) uses a linear modal model to define the emotion generation process. This posits that situations induce an attentional focus, which is appraised, and emotion subsequently generated. ER is the conscious or unconscious influencing of this emotion generation process, i.e. over which emotions we have, when we have them and how we experience and express those (Bargh & Willimas, 2007; Gross

& Jazaieri, 2014). According to Gross (1998), emotion may be regulated at five junctures. Strategies can be *antecedent-focussed*, coming into play before emotional responses are fully activated and mobilised. These include: (1) Situation selection (e.g. approaching or avoiding people or situations); (2) situation modification (e.g. modifying an environment); (3) attentional deployment (e.g. intense preoccupation to alter emotional experience); and (4) cognitive change (re-evaluation of a situation and its meaning, i.e. cognitive reappraisal). ER can also be *response-focused* involving (5) response modulation. This concerns the things we do once an emotional response has already been triggered, such as emotion suppression or acceptance (Gross, 2002).

Healthy or helpful emotional experience is a balance; it requires acknowledging and expressing emotions to enable processing, but can also necessitate inhibition of emotion to optimise situational outcomes (Pennebaker, Zech, & Rimè, 2001). Adaptiveness of emotional control is likely to vary depending upon the method selected (Bridges, Denham, & Ganiban, 2004) and situation specific factors (Rottenberg & Gross, 2003). For example, it is argued that response-focussed strategies (controlling expression) are less adaptive than some antecedent-focussed strategies inherent in controlling input and experience (e.g. cognitive reappraisal; Chambers, Gullone, & Allen, 2009). Perhaps unsurprisingly, use of 'adaptive' strategies negatively associates with psychopathology; whilst use of maladaptive strategies positively correlates with psychopathology (for reviews see Aldao, Nolen-Hoeksema, & Schweizer, 2010; Aldao, 2013).

1.2. Emotion generation, regulation & anorexia nervosa

Anorexia nervosa (AN) is a disorder characterised by a relentless pursuit of thinness and over-valuation of emaciation, driven by an extreme dread of food, eating and normal body weight (Koskina, Campbell, & Schmidt, 2013; Walsh, 2013). People with AN often present as outwardly bland, with little overt emotional expression; this is noted even in the very earliest description of the disorder. In 1873, Charles

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