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Review article

Self-reported interoceptive deficits in eating disorders: A meta-analysis of studies using the eating disorder inventory

Paul M. Jenkinson*, Lauren Taylor, Keith R. Laws

School of Life and Medical Sciences, University of Hertfordshire, UK

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ABSTRACT

Objective: An impairment of the ability to sense the physiological condition of the body – interoception – has long been proposed as central to the onset and maintenance of eating disorders. More recent attention to this topic has generally indicated the presence of interoceptive deficits in individuals with an eating disorder diagnosis; however, possible links with specific diagnosis, BMI, age, illness duration, depression, and alexithymia remain unclear from individual studies. This meta-analysis aimed to provide a necessary quantitative overview of self-reported interoceptive deficits in eating disorder populations, and the relationship between these deficits and the previously mentioned factors.

Methods: Using a random effects model, our meta-analysis assessed the magnitude of differences in interoceptive abilities as measured using the Eating Disorder Inventory in 41 samples comparing people with eating disorders (n = 4308) and healthy controls (n = 3459). Follow-up and moderator analysis was conducted, using group comparisons and meta-regressions.

Results: We report a large pooled effect size of 1.62 for eating disorders with some variation between diagnostic groups. Further moderator analysis showed that BMI, age and alexithymia were significant predictors of overall effect size.

Conclusion: This meta-analysis is the first to confirm that large interoceptive deficits occur in a variety of eating disorders and crucially, in those who have recovered. These deficits may be useful in identifying and distinguishing eating disorders. Future research needs to consider both objective and subjective measures of interoception across different types of eating disorders and may fruitfully examine interoception as a possible endophenotype and target for treatment.

1. Introduction

Eating disorders (EDs) are characterised by an ongoing disturbance of eating or eating-related behaviour, which leads to changes in the consumption or absorption of food, and significantly impaired physical health or psychosocial functioning [3]. EDs are a pervasive psychiatric disturbance, associated with severe negative consequences, including significant distress, depression, suicide, substance abuse and even death [5,74,75]. As such, EDs represent a major clinical challenge, and priority for research to identify their aetiology, and develop effective treatments. Unfortunately, the cause of EDs remains poorly understood, with several biological, social and psychological factors identified as important in the onset and maintenance of different EDs [22].

The task of identifying the causal mechanisms underlying EDs is complicated by the fact that a different combination of factors may contribute to various subtypes of ED. The current Diagnostic and Statistical Manual (DSM-5; APA 2013) identifies three primary ED diagnoses: Anorexia Nervosa (AN; characterised by restrictive eating, severe weight loss, and an intense fear of gaining weight), Bulimia Nervosa (BN; characterised by a preoccupation with body weight and shape, normal body weight, and episodes of binge eating with compensatory behaviours such as purging), and Binge Eating Disorder (BED; characterised by frequent binge eating with feelings of loss of control, but no use of compensatory behaviours). Two further categories (Other Specified Feeding or Eating Disorder (OSFED), and Unspecified Feeding or Eating Disorder (UFED)[1]), also exist to classify EDs that do not more accurately fit into AN, BN, or BED, such as atypical presentations of the above or other feeding and eating disorders.

Notably, early clinical descriptions of EDs highlighted “disturbances in accuracy of perception or cognitive interpretation of stimuli arising from the body” ([12], p. 189). These dual aspects have been examined under the modern-day concepts of interoception (i.e. the ability to sense

* Corresponding author at: School of Life and Medical Sciences, University of Hertfordshire, Hatfield, Hertfordshire AL10 9AB, UK.
E-mail address: p.jenkinson@herts.ac.uk (P.M. Jenkinson).

[1] The latter two categories replace the earlier category of Eating Disorders Not Otherwise Specified (EDNOS), which previously also incorporated the now-distinct category of BED.

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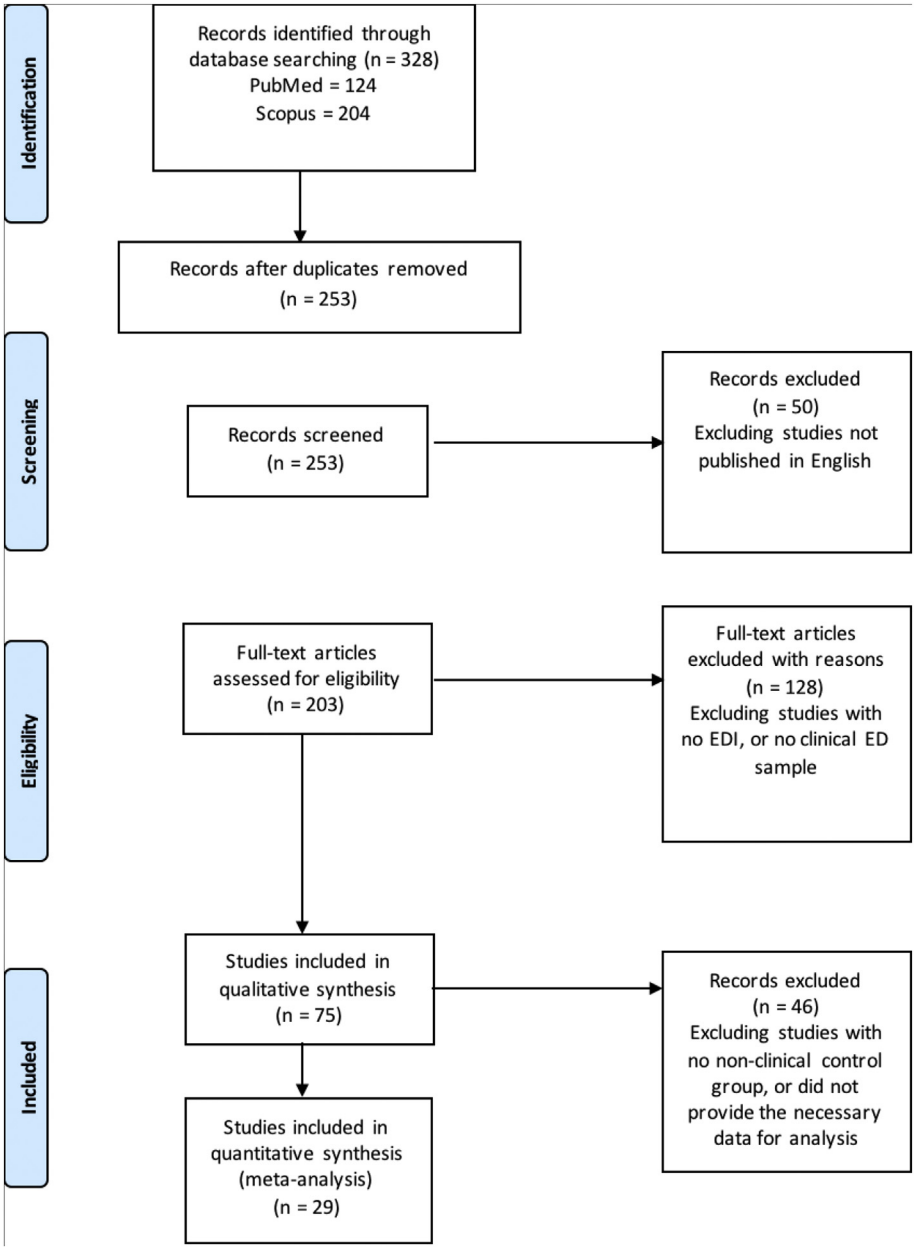

Fig. 1. Flow diagram demonstrating the identification and selection process of studies for the analysis.

the physiological condition of the body [19], and alexithymia (i.e. difficulty identifying and describing feelings/emotions; see [80]). Such difficulties in perceiving signals arising from the body and/or identifying and interpreting emotional states have since been established as a core psychopathological element of several ED [32,80].

Difficulties with somatic perception/awareness may contribute to EDs because individuals incorrectly interpret bodily signals referring to hunger and satiety cues [12]. A difficulty perceiving hunger cues may result in skipped meals, or the restriction of food intake until intense feelings of hunger occur. By contrast, difficulty in detecting normal levels of fullness could cause binging or overeating [32,50]. In addition, deficits in identifying emotional states may contribute to difficulties with emotional regulation; a multidimensional construct characterised by flexible modulation strategies, behavioral control, emotional awareness and distress tolerance [43,52]. ED patients may confuse their internal bodily signals with emotions, and have difficulties experiencing and differentiating different emotions, or modulating or attenuating their intensity [15,52]. Such maladaptive emotion regulation or *emotional dysregulation* is a key psychological problem in EDs, related to mood instability, impulsivity, recklessness, anger and self-destructiveness [52].

The majority of data concerning interoceptive deficits in EDs is based on self-reports obtained from the Eating Disorder Inventory (EDI; [42]), which primarily assesses the interpretative component of interoceptive deficits rather than somatic awareness. The EDI includes an "Interoceptive Awareness" subscale, comprising 10 questions reflecting "a lack of confidence in recognising and accurately identifying emotions and sensations of hunger or satiety" ([42], p. 18). Using the EDI and subsequent revisions (EDI-2, [40], EDI-2, [41]; EDI-VS, [58]), self-reported interoceptive deficits of this interpretative kind have been found consistently across patients with various EDs [32,52].

Importantly, although interoceptive deficits are widely reported as being a core psychopathological component of several EDs, it is not known whether the effect size is the same across the spectrum of EDs, or whether a particular diagnosis is associated with greater interoceptive deficits. In addition, several variables are known to interact and overlap