Received: 10 November 2017 | Revised: 8 February 2018 | Accepted: 9 February 2018

DOI: 10.1002/erv.2585

REVIEW

WILEY

Body checking and body avoidance in eating disorders: Systematic review and meta-analysis

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Abstract

This review sought to systematically review and quantify the evidence related to body checking and body avoidance in eating disorders (EDs) to gauge the size of effects, as well as examine potential differences between clinical and nonclinical populations, and between different ED subtypes. PsycINFO, PsycARTICLES, PsycEXTRA, Cochrane Library, and MEDLINE databases were searched for academic literature published until October 2017. A grey literature search was also conducted. Fifty-two studies were identified for the systematic review, of which 34 were eligible for meta-analysis. Only female samples were included in the meta-analysis. ED cases experienced significantly higher body checking ($d = 1.26$, $p < .001$) and body avoidance ($d = 1.88$, $p < .001$) overall relative to healthy controls, but neither behaviour varied by ED subtype. In nonclinical samples, body checking ($r = .60$) and body avoidance ($r = .56$) were significantly correlated with ED pathology ($p < .001$). These findings support transdiagnostic theoretical models and approaches to ED treatment and early intervention programmes.

KEYWORDS

body avoidance, body checking, eating disorders, eating pathology

1 | INTRODUCTION

Cognitive-behavioural models conceptualise the overvaluation of weight and shape as the core psychopathology of eating disorders (EDs; Fairburn, Cooper, & Shafran, 2003; Fairburn & Harrison, 2003). This concept refers to an individual's judgement of their self-worth being based primarily on perceptions of weight and shape (Fairburn et al., 2003; Farrell, Shafran, & Lee, 2006). According to Fairburn et al.'s (2003) transdiagnostic model of EDs, body checking and body avoidance are overt behavioural manifestations of this overvaluation of weight and shape. Body checking refers to an individual's tendency to critically scrutinise and repeatedly check their weight and

Abbreviations: 13-FS, 13 Figure Scale; AN, anorexia nervosa; AN-BP, anorexia nervosa binging/purging subtype; AN-R, anorexia nervosa restricting subtype; BA, body avoidance; BC, body checking; BCAQ, Body Checking and Avoidance Questionnaire; BCCS, Body Checking Cognitions Scale; BCQ, Body Checking Questionnaire; BD, body dissatisfaction; BED, binge eating disorder; BIAQ, Body Image Avoidance Questionnaire; BICAS, Body-Image Compulsive Actions Scale; BIAS, Body-Image Avoidance Scale; BMI, body mass index; BN, bulimia nervosa; BRBS, Body-Related Behaviours Scale; BT-EDNOS, bulimic-type eating disorder not otherwise specified; CI, confidence interval; DSM, *Diagnostic and Statistical Manual of Mental Disorders*; EAT, Eating Attitudes Test; ED, eating disorder; EDE, Eating Disorder Examination Interview; EDE-Q, Eating Disorder Examination Questionnaire; EDI, Eating Disorder Inventory; EDNOS, eating disorder not otherwise specified; MBCQ, Male Body Checking Questionnaire; N/A, not applicable; OSFED, other specified feeding and eating disorder; PRISMA, Preferred Reporting for Systematic Reviews and Meta-Analyses

shape through behaviours such as ritualistic weighing, compulsive mirror checking, and using the fit of clothes to judge weight changes (Fairburn, Shafran, & Cooper, 1999). Conversely, body avoidance describes an individual's tendency to consciously evade situations that may facilitate evaluation of their appearance (e.g., clothes shopping) whilst also engaging in body-related avoidant behaviours such as covering mirrors, wearing oversized clothes, and refusing to be weighed (Rosen, Srebnik, Saltzberg, & Wendt, 1991). Beyond their association with the overvaluation of weight and shape, body checking and body avoidance also feature prominently in theoretical frameworks on the development and maintenance of EDs (Fairburn et al., 2003).

As an ED progresses, changes in weight and shape become the primary gauge of perceived self-control or failure over one's body (Reas & Grilo, 2004). Body checking and body avoidance are hypothesised to contribute to the maintenance of an ED by reinforcing distorted beliefs about changes in weight and shape (Fairburn et al., 2003; Shafran, Fairburn, Robinson, & Lask, 2004). Body checking is thought to amplify the perceived failure of control over weight, shape, and eating, which in turn reinforces disordered eating, encourages further checking, and strengthens pre-existing distorted beliefs about one's body (Fairburn et al., 1999; Reas, Grilo, Masheb, & Wilson, 2005). In contrast, body avoidance provides temporary relief from distress regarding changes in weight and shape (Reas & Grilo, 2004). As a result, the use of body avoidance is negatively reinforced, which further prevents the disconfirmation of distorted beliefs concerning one's body (Reas et al., 2005; Reas & Grilo, 2004).

Within clinical populations, cross-sectional research has consistently demonstrated that body checking occurs at significantly higher rates among individuals with EDs compared with healthy controls (e.g., Blechert, Ansorge, & Tuschen-Caffier, 2010; Calugi, Dalle Grave, Ghisi, & Sanavio, 2006; Mountford, Haase, & Waller, 2006; Øverås, Kapstad, Brunborg, Landrø, & Lask, 2015; Waller, Sines, Meyer, & Mountford, 2008) and more recent longitudinal evidence lends support to the causal relationship between body checking and core ED symptomatology (Calugi, El Ghoch, & Dalle Grave, 2017; Trottier, MacDonald, McFarlane, Carter, & Olmsted, 2015). Similarly, body avoidance has also been found to occur at significantly higher rates among individuals with EDs compared with healthy controls (e.g., Vocks, Grönemeyer, Schulte, Herpertz, & Suchan, 2010; Vocks, Legenbauer, Rüddel, & Troje, 2007) and contribute to the maintenance of EDs (Trottier, MacDonald, et al., 2015).

A growing body of research in nonclinical samples suggests that body checking and body avoidance also function as risk factors for the development of clinical EDs. For example, recent correlational research has documented significant positive associations between body checking and body avoidance and core symptoms of ED pathology, including the overvaluation of weight and shape (Hildebrandt, Walker, Alfano, Delinsky, & Bannon, 2010), body dissatisfaction (Vartanian & Grisham, 2012), drive for thinness (Alperin, Hornsey, Hayward, Diedrichs, & Barlow, 2014), and dietary restraint (De Berardis et al., 2007; Meyer, McPartlan, Rawlinson, Bunting, & Waller, 2011). Experimental evidence also points to a negative causal link between body checking and body avoidance and eating pathology (Bailey & Waller, 2017). For example, Shafran, Lee, Payne, and Fairburn (2007) demonstrated that compared with women who were asked to check their bodies noncritically in a mirror for 30 min, women who examined themselves critically ("high body checking condition") experienced greater increases in body dissatisfaction. Given that there is a high prevalence of nonclinical disordered eating in the general population (Latner, Mond, Vallance, Gleaves, & Buckett, 2012), this emerging body of research may hold valuable evidence to inform prevention strategies and early intervention programmes for EDs.

A question that has received less attention within the ED literature is whether body checking and body avoidance behaviours occur with differing frequency and severity across ED subtypes. From a clinical perspective, it is important to disentangle the impact of body checking and body avoidance behaviours across diagnostic ED groups to improve the effectiveness and specificity of ED treatment and early intervention programs. Additionally, findings regarding potential group differences between ED subtypes may have salient implications for transdiagnostic theoretical models of EDs, which suggest that because all ED subtypes share common characteristics and underlying psychopathology, they can be treated using similar psychological interventions (Fairburn et al., 2003). However, a common problem in assessing differences in body checking and avoidance between diagnostic groups is achieving adequate sample sizes across the various subtypes to enable meaningful comparisons (e.g., Brytek-Matera, 2009; Kraus, Lindenberg, Zeeck, Kosfelder, & Vocks, 2015; Mountford et al., 2006; Reas, Whisenhunt, Netemeyer, & Williamson, 2002; Vocks, Stahn, Loenser, & Legenbauer, 2009; Waller et al., 2008). The small number of studies that have been sufficiently powered to assess such differences have often produced ambiguous and contradictory findings, particularly in relation to body checking. For example, Calugi et al. (2006) reported significantly higher levels of body checking in individuals with bulimia nervosa (BN), compared with anorexia nervosa (AN),

but found no significant differences in body checking between the ED not otherwise specified (EDNOS) group, and BN or AN groups, respectively. In contrast, several other studies found that body checking did not significantly differ between AN, BN, or EDNOS groups (Amin, Strauss, & Waller, 2014; Blechert et al., 2010; Kachani, Brasiliano, Cordás, & Hochgraf, 2013). The pattern of findings in relation to body avoidance is somewhat clearer, with a number of studies suggesting that body avoidance does not differ between AN or BN groups (Blechert et al., 2010; Kachani, Barroso, Brasiliano, Hochgraf, & Cordás, 2014; Vocks et al., 2010) or between AN, BN, or EDNOS groups (Amin et al., 2014; Shafran & Robinson, 2004).

A viable alternative method of overcoming the current lack of studies assessing body checking and avoidance behaviours across ED subtypes is to use meta-analytic techniques, which combine effect sizes across available studies (Field, 2013). The pooling of data, particularly from small sample studies, which may not have reached statistical significance on their own, increases statistical precision and power, and therefore, the initial constraint of low power of analyses ceases to be a limiting factor (Field, 2013; Finckh & Tramèr, 2008). Additionally, the aggregating of data also enables the ability to assess for potential heterogeneity in effect sizes across studies (Borenstein, Hedges, Higgins, & Rothstein, 2009).

2 | THE CURRENT STUDY

Given that the majority of literature relating to body checking and body avoidance in EDs has been published in recent years, coupled with the above-mentioned gaps and inconsistencies in the literature, a synthesis of relevant studies is both timely and warranted. Therefore, the aims of this study were to

1. Assess the occurrence of body checking and body avoidance in EDs (irrespective of subtype), in contrast to healthy control groups.
2. Assess whether the size of differences between ED and healthy control groups on body checking and body avoidance differed depending on ED subtypes —that is, AN, BN, binge eating disorder (BED), and other specified feeding or eating disorder (OSFED, previously EDNOS in the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition [DSM-IV]; American Psychiatric Association [APA], 2000).
3. Assess the relationship of body checking and body avoidance to ED pathology in nonclinical samples. Nonclinical samples were defined as participants with no previous history of an ED.

3 | METHOD

3.1 | Systematic review

3.1.1 | Search strategy

The systematic search was conducted in accordance with the Preferred Reporting for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009). A search for relevant academic literature was conducted utilising five international databases (PsycINFO, PsycARTICLES, PsycEXTRA, Cochrane Library, and MEDLINE Complete) for papers written in English and published in peer-reviewed journals until October 2017. The search strategy utilised the keywords of "body checking" OR "body avoidance" and cross-referenced these, using the conjunction AND with each of the following search terms: (a) "eating disorder*" (b) anorex* OR bulimi* OR "binge eating disorder" (c) "disordered eating" (d) "body dissatisfaction" and (e) weight OR shape. No field restrictions were applied. Please see Appendix S1 for the full search syntax. This component of the search was independently completed and confirmed by two reviewers (A. N. and T. D. P. or K. B.).

A supplementary search of the ProQuest Dissertations & Theses database and the conference programs of two major international ED conferences (Australian and New Zealand Academy for Eating Disorders; International Conference on Eating Disorders) was also carried out to identify relevant unpublished literature. The search of the ProQuest database used the same search terms and parameters as the academic database search, and the available proceedings of Australian and New Zealand Academy for Eating Disorders (2008–2016) and International Conference on Eating Disorders (2006–2016) conferences were hand searched for abstracts referring to body checking or body avoidance in clinical or nonclinical populations.

3.1.2 | Inclusion and exclusion criteria

The inclusion criteria for the review were that studies (a) examined and measured body checking and/or body avoidance and (b) utilised at least one variable that measured ED pathology, or separated groups by ED status/diagnosis. A study was excluded from the review if it measured body checking, body avoidance, and/or eating pathology using single item measures as this was regarded as an inadequate measure of the construct. Studies that measured body checking and/or body avoidance but did not report any relevant data pertaining to the aims of the current review were also excluded. All study designs were eligible with the exception of ecological momentary assessment designs, as the review focused on trait–level relationships rather

than relationships from moment to moment. However, experimental and prospective studies that did not measure body checking and/or body avoidance at baseline were excluded in order to enable data to be more readily compared with data from cross-sectional studies.

3.1.3 | Quality appraisal and assessment of risk of bias

As recommended in the Cochrane Handbook for Systematic Reviews (Higgins & Green, 2011), the quality and risk of bias of each study in the systematic review was evaluated using a framework by Downs and Black (1998). As this tool was created to assess clinical trials, criteria were adapted for the current study based on previous reviews in the ED literature (e.g., Rozenblat et al., 2017). A brief description of the items in their current application are presented in Appendix S2. Studies were evaluated independently by two coders (A. N. and K. B.), and any discrepancies were resolved by discussion and consensus with a senior author (I. K.).

3.2 | Meta-analysis

3.2.1 | Inclusion and exclusion criteria

To be eligible for inclusion in the meta-analysis, the study must have provided effect size estimates for rates of body checking, body avoidance, and/or disordered eating symptoms, or statistics suitable for their calculation (i.e., means, standard deviations, and/or correlations of interest). If insufficient information was reported, the corresponding author was contacted and asked to provide the relevant data. In order to avoid repeating the same analyses among studies of lower quality (i.e., due to the absence of a control frequency), studies that utilised an ED sample without a control group were excluded.

3.2.2 | Statistical analysis

Data were analysed using the R package *metafor* (Viechtbauer, 2010). For each analysis, a forest plot displays the overall summary effect—and subgroup effects where applicable—presented with 95% confidence intervals (95% CIs). A multilevel meta-analysis approach was used to account for clustering of effects within studies. For comparisons of EDs (both overall cases and ED subtypes) against healthy control groups, Cohen's d values were used as a measure of effect size, and the recommendations of Cohen (1988) were followed, where 0.2 is a small, 0.5 a medium, and 0.8 a large effect size. Positive d values were taken here to indicate that ED cases scored higher on body checking and/or body avoidance, whereas negative d values indicate healthy controls scored higher. In nonclinical samples, the correlation coefficient (r) was used as the effect size measure between body checking and body avoidance, and disordered eating symptoms. The recommendations of Cohen (1988) were followed, where 0.1 is a small, 0.3 is a medium, and 0.5 is a large effect size. For these analyses, r values were converted to Fisher's z transformed values to ensure accuracy of outputs. The values were then back-transformed into r values for all reporting to enable results to be provided in an interpretable format (i.e., r values ranging from −1 to +1).

Because we aimed to examine effects associated with ED cases overall as well as effects related to different ED subtypes, we first tested the meta-analysis result ignoring which ED subtype was being compared against healthy controls. We then tested whether ED subtype moderated the effect sizes. Forest plots thus provide the overall effect size and effect sizes for each subtype separately. Similarly, in nonclinical samples, correlational analyses were first conducted overall and then followed up with moderation analyses to test whether effect sizes differed depending on what form of ED behaviour was correlated against body checking or body avoidance. Because available data on specific ED behaviours were limited, we amalgamated these ED variables into three superordinate categories: total ED score, body image (which included weight and shape concerns and body dissatisfaction), and restraint (which included behavioural restraint and eating concerns).

Given that past research has illustrated that ED subtypes differ as a function of age and body mass index (BMI; e.g., Blechert et al., 2010; Shafran et al., 2004), additional follow-up meta-regressions analyses were conducted to determine whether effect sizes were moderated by mean age and mean BMI for ED groups in analyses examining ED cases versus healthy controls and for the overall sample in analyses in nonclinical samples. Several other variables were initially considered for their potential impact as moderators, including publication status (published vs. unpublished) and ED severity (inpatient vs. outpatient sample). However, these variables were not practical to model because they either had too few cases or their inclusion resulted in other primary variables dropping out of the meta-regression.

The random-effects method was utilised in all analyses, as it was assumed that the effects might vary between study samples (Borenstein et al., 2009). The heterogeneity of samples was assessed using Q and *I squared* (I^2) statistics, where the Q value provides a test of the null hypothesis that all studies in the analysis share a common effect size, and I^2 reflects the percentage of variation between studies that is due to sample mean heterogeneity (Borenstein et al., 2009). For I^2 values, we followed the recommendations of Higgins, Thompson, Deeks, and

Altman (2003), whereby 25% corresponds to a small I^2 value, 50% a moderate, and 75% a large I^2 value. The differences between ED cases and healthy controls were compared with the z-test, and the Q value was used to compare the effect sizes between ED subtypes (Borenstein et al., 2009). In the following analyses, $\alpha = .05$ was used unless stated otherwise.

4 | RESULTS

4.1 | Systematic review

The academic database search identified 1,599 articles, and 560 additional unpublished records (dissertations/theses: $n = 551$; conference abstracts: $n = 9$) were identified through other sources. A summary of the search strategy is shown in Figure 1. Following the removal of duplicates, 786 records were excluded based on title and a further 44 were excluded based on abstract. One hundred twenty-one full-text records were assessed for eligibility for the review. Based on the inclusion and exclusion criteria, 69 full-text articles were excluded. Of these, 28 studies were omitted as they did not examine body checking and/or body avoidance in a clinical ED population or a nonclinical population. A further 12 studies were excluded as they measured body checking and/or body avoidance using only one item; two treatment studies were omitted as they did not measure body checking and/or body avoidance at baseline; five studies utilised the same dataset; six studies were excluded as ED symptomatology was not measured; and 16 studies measured but did not report any relevant data pertaining to the aims of the current study. Therefore, a total of 52 articles met the selection criteria and were included in the systematic review (see Figure 1).

4.1.1 | Study characteristics

Tables 1–3 summarise the 52 studies that fulfilled the inclusion criteria for the systematic review. Overall, 15,564 people participated in the studies reviewed, including 11,818 females (4,906 from ED samples and 6,912 from nonclinical samples) and 3,746 males (102 from ED samples and 3,644 from nonclinical samples). The mean age of participants ranged from 14 to 78 years of

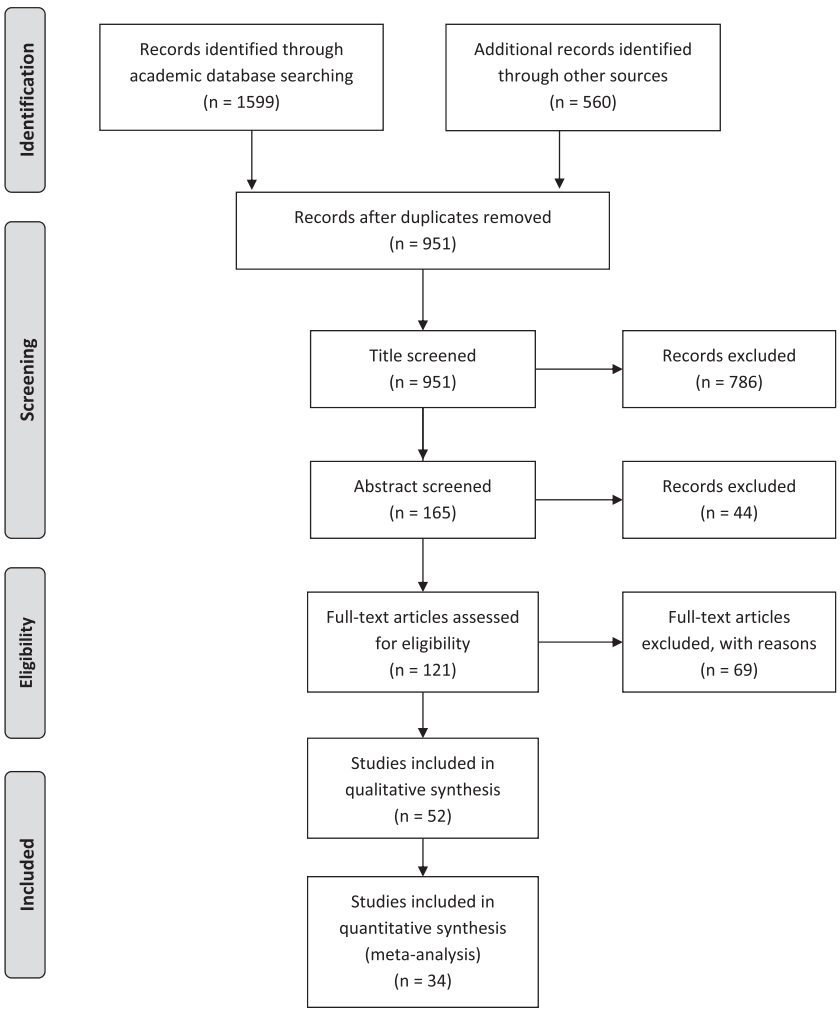

FIGURE 1 PRISMA flow chart of systematic review and meta-analysis selection process

TABLE 1 Studies investigating body checking and/or body avoidance in an eating disorder sample (with a control group)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
1. Amin et al. (2014)[a]	Published	*N* = 261 (100% female) 99 ED (outpatient sample): 28 AN; 46 BN; 25 EDNOS (mean age = 30.4, *SD* = 9.44; mean BMI = 21.9, *SD* = 6.39) 162 HC (university sample) (mean age = 24.0, *SD* = not reported; mean BMI = 22.5, *SD* = not reported)	BRBS (BC & BA subscales) EDE-Q (total score)	Significant group differences on BC subscale: - ED > HC No significant differences between ED subtypes	Significant group differences on BA subscale: - ED > HC No significant differences between ED subtypes
2. Bamford, Attoe, Mountford, Morgan, and Sly (2014)[a]	Published	*N* = 160 (100% female) 100 ED (inpatient sample): 56 AN low weight (mean age = 26.0, *SD* = 9.38; mean BMI = 14.94, *SD* = 1.34); 44 AN weight restored (mean age = 24.75, *SD* = 8.99; mean BMI = 18.59, *SD* = 0.47) 60 HC (community sample) (mean age = 25.06, *SD* = 10.81; mean BMI = 22.02, *SD* = 2.75)	BCQ (total score) BIAQ (total score) EDE-Q (total score)	Significant group differences on BCQ: - AN low weight > HC - AN weight restored > HC No significant differences between AN groups	Significant group differences on BIAQ: - AN low weight > AN weight restored - AN low weight > HC - AN weight restored > HC
3. Blechert et al. (2010)[a]	Published	*N* = 58 (100% female) 37 ED (community sample): 19 AN (mean age = 23.5, *SD* = 4.66; mean BMI = 16.5, *SD* = 1.35); 18 BN (mean age = 26.9, *SD* = 8.35; mean BMI = 22.9, *SD* = 3.39) 21 HC (community sample) (mean age = 27.1, *SD* = 4.77; mean BMI = 20.3, *SD* = 2.12)	BCQ (total score) BIAQ (total score) EDE-Q (total score)	No significant differences between AN and BN	No significant differences between AN and BN
4. Blechert et al. (2009)	Published	*N* = 42 (100% female) 20 ED (community sample): all BN (mean age = 26.6, *SD* = 7.68; mean BMI = 22.6, *SD* = 3.40) 22 HC (community sample) (mean age = 26.5, *SD* = 4.65; mean BMI = 20.3, *SD* = 2.24)	BCQ (total score) BIAQ (total score) EDE-Q (total score)	Significant group differences on BCQ: - BN > HC	Significant group differences on BIAQ: - BN > HC
5. Calugi et al. (2006)[a]	Published	*N* = 573 (100% female) (overall mean age = 24.1, *SD* = 5.9) 151 ED (inpatient sample): 76 AN; 27 BN; 48 EDNOS (mean BMI = 16.8, *SD* = 3.1)	BCQ (total score) EAT-40 (total score)	Significant group differences on BCQ: - ED > HC - BN > AN	N/A

(Continues)

TABLE 1 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
		422 HC (university sample) (mean BMI = 20.4, *SD* = 2.2)		No significant differences between EDNOS and AN or BN groups	
6. Calugi et al. (2017)	Published	*N* = 248 (100% female) 66 ED (inpatient sample): all AN (mean age = 26.1, *SD* = 5.9; mean BMI = 14.7, *SD* = 2.1) 182 HC (community sample) (mean age = 24.9, *SD* = 5.6; BMI not reported)	BCQ (subscales and total score) EDE-Q (subscales and total score)	Significant group differences on BCQ: - AN > HC	N/A
7. Kachani et al. (2013)[a]	Published	*N* = 125 (100% female) 85 ED (outpatient sample): 44 AN; 41 BN (mean age and BMI not reported) 40 HC (patient sample from Gynaecology Clinic of the same hospital) (mean age and BMI not reported)	BCCS (total score) BCAQ (total score) EAT-40 (total score)	Significant group differences on BCCS: - ED > HC - AN > HC - BN > HC No significant differences between AN and BN	Did not differentiate between body checking and body avoidance items on the BCAQ
8. Kraus et al. (2015)	Published	*N* = 55 (100% female) 26 ED (outpatient sample): 7 AN; 11 BN; 8 EDNOS (mean age = 26.92, *SD* = 7.63; mean BMI = 20.06, *SD* = 3.22) 29 HC (university sample) (mean age = 24.00, *SD* = 3.90; mean BMI = 20.82, *SD* = 2.11)	BCQ (total score) EDE-Q (total score)	Significant group differences on BCQ: - ED > HC Differences between ED subtypes not examined	N/A
9. Legenbauer et al. (2017)[a]	Published	*N* = 422 (100% female) 310 ED (outpatient sample): 71 AN; 178 BN; 30 BED; 31 EDNOS (mean age = 26.83, *SD* = 7.99; mean BMI = 22.40, *SD* = 6.14) 112 HC (community sample) (mean age = 26.49, *SD* = 5.49; mean BMI = 21.91, *SD* = 0.95)	BCQ (total score) BIAQ (subscales and total score) EDE-Q (subscales) EDI-2 (drive for thinness and body dissatisfaction subscales)	Significant group differences on BCQ: - ED > HC - AN > BED - BN > BED - AN > EDNOS	Significant group differences on BIAQ: - ED > HC No significant differences between ED subtypes

(Continues)

TABLE 1 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
10. Lewer et al. (2016)[a]	Published	*N* = 59 (100% female) 31 ED (outpatient and community sample): all BED (mean age = 43.94, *SD* = 10.06; mean BMI = 35.83, *SD* = 4.30) 28 HC with obesity (outpatient and community sample) (mean age = 44.11, *SD* = 11.28; mean BMI = 37.29, *SD* = 4.26)	BCQ (total score) BIAQ (total score) EDE-Q (weight and shape concern subscales only) EDI-2 (subscales)	No significant group differences on BCQ between BED and HC	No significant group differences on BIAQ between BED and HC
11. Mountford et al. (2006)[a]	Published	*N* = 289 (100% female); 84 ED (inpatient sample): 12 AN; 29 BN; 43 EDNOS (mean age = 28.3, *SD* = 8.69; mean BMI = 22.1, *SD* = 6.72) 205 HC (university sample) (mean age = 22.4, *SD* = 8.69; mean BMI = 22.0, *SD* = 2.56)	BCQ (total score) EDE-Q (subscales)	Significant group differences on BCQ: - ED > HC Differences between ED subtypes not examined	N/A
12. Øverås et al. (2015)[a]	Published	*N* = 75 (100% female) 30 ED (inpatient sample): all AN-R mean age = 19.07, *SD* = 2.96; BMI = not reported 45 HC (school and university sample) (mean age = 18.31, *SD* = 3.14; BMI = not reported)	BCQ (total score) EDE-Q (total score)	Significant group differences on BCQ: - AN > HC	N/A
13. Reas et al. (2002)	Published	*N* = 165 (100% female) 16 ED (outpatient sample): 4 AN; 9 BN; 3 EDNOS 149 HC (university sample) (overall sample: mean age = 20.8, age range = 16–56; mean BMI = 22.1, range = 16.3–37.7)	BCQ (total score) EAT-26 (total score)	Significant group differences on BCQ: - ED > HC Differences between ED subtypes not examined	N/A
14. Rosen et al. (1991)[a]	Published	*N* = 45 (100% female) 20 ED (outpatient sample): all BN (mean age = 24.65, *SD* = 6.5; mean BMI = not reported) 25 HC (community sample)	BIAQ (total score) EDE-Q (weight and shape concern subscales only)	N/A	Significant group differences on BIAQ: - BN > HC

(Continues)

TABLE 1 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
		(mean age = 27.61, *SD* = 3.6; mean BMI = not reported)			
15. Shafran et al. (2004)	Published	*N* = 110 (100% female) 55 ED (inpatient sample): 14 AN (mean age = 24.8, *SD* = 6.9; mean BMI = 16.5, *SD* = 1.2); 12 BN (mean age = 25.2, *SD* = 4.0; mean BMI = 21.9, *SD* = 4.4); 29 EDNOS (mean age = 30.7, *SD* = 10.0; mean BMI = 21.1, *SD* = 3.5) 55 HC (community sample) (mean age = 28.5, *SD* = 8.5; mean BMI = 22.9, *SD* = 2.5)	BCAQ (total score) EDE-Q (total score)	Significant group differences on BCAQ: - ED > HC No significant differences between ED subtypes	Significant group differences on BCAQ: - ED > HC No significant differences between ED subtypes
16. Shafran and Robinson (2004)	Published	*N* = 84 (100% female) 42 ED (inpatient sample): 10 AN (mean age = 22.2, *SD* = 4.3; mean BMI = 16.7, *SD* = 0.8); 10 BN (mean age = 26.8, *SD* = 4.3; mean BMI = 24.2, *SD* = 6.2); 22 EDNOS (mean age = 32.3, *SD* = 11.6; mean BMI = 23.0, *SD* = 7.3) 42 HC (community sample) (mean age = 28.3, *SD* = 9.1; mean BMI = 23.6, *SD* = 4.1)	BCAQ (total score) EDE-Q (total score)	Significant group differences on BCAQ: - AN > HC - BN > HC - EDNOS > HC No significant differences between ED subtypes	Significant group differences on BCAQ: - AN > HC - BN > HC - EDNOS > HC No significant differences between ED subtypes
17. Vocks et al. (2010)[a]	Published	*N* = 55 (100% female) 28 ED (outpatient sample): 13 AN (mean age = 29.08, *SD* = 9.79, range = 18–49; mean BMI = 15.78, *SD* = 1.28, range = 12.92–17.38); 15 BN (mean age = 28.40, *SD* = 7.07, range = 20–42; mean BMI = 21.34, *SD* = 2.26, range = 17–68-24.44) 27 HC (community sample) (mean age = 26.74, *SD* = 7.60, range = 19–50; mean BMI = 22.06, *SD* = 2.06, range = 17.95–26.74)	BIAQ (total score) EDE-Q (total score) EDI-2 (subscales)	N/A	Significant group differences on BIAQ: - AN > HC - BN > HC No significant differences between AN and BN
18. Vocks et al. (2009)	Published	*N* = 169 (100% female) 62 ED (clinic waitlist (outpatient) sample): 16 AN; 21 BN; 25 EDNOS (mean age = 33.68, *SD* = 6.05; mean BMI = 19.30, *SD* = 2.68) 107 HC (university and community sample) (mean age = 32.80, *SD* = 13.22; mean BMI = 22.75, *SD* = 4.08)	BCQ (total score) EDI (BD, drive for thinness and bulimia subscales only) EDE-Q (total score)	Significant group differences on BCQ: - ED > HC Differences between ED subtypes not examined	N/A

(Continues)

TABLE 1 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
19. Waller et al. (2008)[a]	Published	*N* = 138 (100% female) 68 ED (outpatient sample): 9 AN; 22 BN; 37 EDNOS (mean age = 28.6, *SD* = 8.70; mean BMI = 22.3, *SD* = 6.53) 70 HC (university and community sample) (mean age = 23.2, *SD* = 4.18; mean BMI = 22.9, *SD* = 3.04)	BCQ (total score) EDE-Q (total score)	Significant group differences on BCQ: - ED > HC Differences between ED subtypes not examined	N/A

Note. AN = anorexia nervosa; AN-BP = anorexia nervosa binging/purging subtype; AN-R = anorexia nervosa restricting subtype; BA = body avoidance; BC = body checking; BCAQ = Body Checking and Avoidance Questionnaire; BCCS = Body Checking Cognitions Scale; BCQ = Body Checking Questionnaire; BD = body dissatisfaction; BED = binge eating disorder; BIAQ = Body Image Avoidance Questionnaire; BMI = body mass index; BN = bulimia nervosa; BRBS = Body-Related Behaviours Scale; EAT = Eating Attitudes Test; ED = eating disorder; EDE-Q = Eating Disorder Examination Questionnaire; EDI = Eating Disorder Inventory; EDNOS = eating disorder not otherwise specified; HC = healthy controls; M = mean; N/A = not applicable; OSFED = other specified feeding and eating disorder; SD = standard deviation.

[a]The study was included in the meta-analysis.

TABLE 2 Studies investigating body checking and/or body avoidance in an eating disorder sample (without a control group)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
20. Breithaupt et al. (2014)	Published	*N* = 9 (100% female); inpatient sample 9 AN (age range = 14–17, *M* = 16.0, *SD* = 1.0; BMI range = 11.50–16.40, *M* = 13.89, *SD* = 1.77)	BCQ (total score) EDE-Q (total score)	AN subtypes were amalgamated and analysed as a single sample; therefore, differences between subtypes were not examined	N/A
21. Brytek-Matera (2009)	Published	*N* = 61 (100% female) 7 AN-R; 19 AN-BP; 35 BN (age range = 16–31, *M* = 21.69, *SD* = 3.85; BMI not reported)	BIAQ (total score) EDI (BD subscale)	N/A	ED subtypes were amalgamated and analysed as a single sample; therefore, differences between ED subtypes were not examined
22. Dakanalis, Carrà, et al. (2015)	Published	*N* = 801 (70 males & 731 females); outpatient sample 345 BN (319 females; mean age = 27.1, *SD* = 7.9; mean BMI = 23.8, *SD* = 7.9); 189 BED (170 females; mean age = 39.5, *SD* = 11.9; mean BMI = 34.4, *SD* = 12.4); 267 BT-EDNOS (242 females; mean age = 26.7, *SD* = 9.1; mean BMI = 24.9, *SD* = 7.0)	BCQ (total score) EDE-Q (dietary restraint subscale)	No significant group differences on BCQ between ED subtypes	N/A
23. Kachani et al. (2014)	Published	*N* = 85 (100% female); outpatient sample 44 AN (age range = 18–55, *M* = 28.2, *SD* = 8.5; BMI range = 11.9–26.4, *M* = 18.3, *SD* = 2.9); 41 BN (age range = 18–45, *M* = 27.5, *SD* = 7.3; BMI range = 15.2–40.5, *M* = 24.9, *SD* = 5.6)	BCAQ (BC items) EDE-Q (total score)	Significant group differences on BC subscale: - BN > AN	N/A
24. MacDonald et al. (2014)	Published	*N* = 171 (6 males & 165 females); inpatient sample 25 EDNOS; 146 BN (age range = 17–57, *M* = 26.2, *SD* = 8.2; BMI = not reported overall)	BCQ (total score) BIAQ (total score) EDI (total score)	No significant group differences on BCQ between ED subtypes	No significant group differences on BIAQ between ED subtypes
25. Morgan et al. (2014)	Published	*N* = 55 (2 males & 53 females); inpatient sample 37 AN-R; 18 AN-BP (age range = 18–42, *M* = 28.4; BMI range = 17.0–20.3, *M* = 18.4)	BCQ (total score) BIAQ (total score) EDE-Q (subscales)	ED subtypes were amalgamated and analysed as a single sample; therefore, differences between ED subtypes were not examined	ED subtypes were amalgamated and analysed as a single sample; therefore, differences between ED subtypes were not examined

(Continues)

TABLE 2 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
26. Mountford et al. (2007)	Published	*N* = 84 (100% female); inpatient sample 19 AN (mean age = 24.7, *SD* = 4.15; mean BMI = 16.2, *SD* = 1.37); 29 BN (mean age = 29.8, *SD* = 10.2; mean BMI = 22.0, *SD* = 3.52); 6 BED (mean age = 38.3, *SD* = 7.53; mean BMI = 39.6, *SD* = 3.52); 30 OSFED (mean age = 25.0, *SD* = 4.81; mean BMI = 20.2, *SD* = 3.00)	BCQ (subscales) EDE-Q (subscales)	Although BC scores were reported separately, differences between ED subtypes were not examined	N/A
27. Mountford et al. (2015)	Published	*N* = 90 (2 males & 88 females); inpatient sample 90 AN (mean age = 26.4, *SD* = 9.2; mean BMI = 15.5, *SD* = 1.8)	BCQ (total score) EDE-Q (subscales)	AN subtypes were amalgamated and analysed as a single sample; therefore, differences between subtypes were not examined	N/A
28. Reas et al. (2006)	Published	*N* = 73 (22 males & 51 females); treatment-seeking sample 73 BED (mean age = 45.0, *SD* = 9.8; mean BMI = 38.5, SD = 6.1)	BCQ (total score) EDE-Q (subscales)	This study examined body checking within only one ED subtype; therefore, no comparisons could be made	N/A
29. Trottier, MacDonald, et al. (2015)	Published	*N* = 371 (100% female); outpatient sample 115 AN; 168 BN; 88 EDNOS (age range = 17–78, *M* = 26.8, *SD* = 4.2; BMI range = 13.2–44.9, *M* = 21.0, *SD* = 4.2)	BCQ (total score) BIAQ (subscales) EDI (BD subscale)	ED subtypes were amalgamated and analysed as a single sample; therefore, differences between ED subtypes were not examined	ED subtypes were amalgamated and analysed as a single sample; therefore, differences between ED subtypes were not examined
30. Vossbeck-Elsebusch et al. (2015)	Published	*N* = 78 (100% female); outpatient sample 31 BN; 47 EDNOS (age range = 17–56, *M* = 31.49, *SD* = 9.39; BMI range = 16.26–59.86, *M* = 30.71, *SD* = 11.97)	BIAQ (subscales) EDE-Q (subscales)	N/A	Although BIAQ scores were reported separately, differences between ED subtypes were not examined

Note. AN = anorexia nervosa; AN-BP = anorexia nervosa binging/purging subtype; AN-R = anorexia nervosa restricting subtype; BC = body checking; BCAQ = Body Checking and Avoidance Questionnaire; BCQ = Body Checking Questionnaire; BD = body dissatisfaction; BED = binge eating disorder; BIAQ = Body Image Avoidance Questionnaire; BMI = body mass index; BN = bulimia nervosa; BT-EDNOS = bulimic-type eating disorder not otherwise specified; EAT = Eating Attitudes Test; ED = eating disorder; EDE-Q = Eating Disorder Examination Questionnaire; EDI = Eating Disorder Inventory; EDNOS = eating disorder not otherwise specified; M = mean; N/A = not applicable; OSFED = other specified feeding and eating disorder; SD = standard deviation.

TABLE 3 Studies investigating body checking and/or body avoidance in a nonclinical population

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
31. Alperin et al. (2014)[a]	Published	N = 1176; community sample 635 males & 541 females (age range = 19–91, M = 28.41, SD = 8.84; BMI range = 13.21–60.47, M = 25.85, SD = 6.28)	BCQ (total score and subscales) EDI (drive for thinness subscale)	Significant positive correlations between the BCQ (total score and all subscales) and the drive for thinness subscale of the EDI	N/A
32. Bailey and Waller (2017)[a]	Published	N = 50; university students/staff 100% female (demographic data reported for 33 participants: age range= 19–72, M = 35.8, SD = 15.19; mean BMI = 24.8, SD = 4.93)	BCQ (total score) EDE-Q (total score and all subscales)	Significant positive correlations between the BCQ and all subscales of the EDE-Q	N/A
33. Carmona et al. (2015)[a]	Published	N = 1786; high school students 912 males & 874 females (age range = 12–16, M = 14.00, SD = 1.41; mean BMI = 21.43, SD = 3.67)	BIAQ (total score and all subscales) 13-FS (total score)	N/A	Significant positive correlations between the BIAQ (total score and all subscales) and body dissatisfaction (as measured by the 13-FS)
34. Chang (2014)[a]	Unpublished	N = 212; undergraduate students 100% female (mean age = 21.06, SD = 3.92; mean BMI = 24.22, SD = 4.49)	BCQ (total score) EDE-Q (all subscales) EDI-2 (body dissatisfaction, bulimia, and drive for thinness subscales)	Significant positive correlations between the BCQ, all subscales of the EDE-Q, and all three subscales of the EDI-2	N/A
35. Dakanalis, Favagrossa, et al. (2015)	Published	N = 551; university students 100% male (age range = 18–28, M = 20.82, SD = 4.43; BMI = not reported)	MBCQ (total score) EDI (bulimic behaviours and BD subscales)	Significant positive correlations between the MBCQ and both subscales of the EDI	N/A
36. De Berardis et al. (2007)[a]	Published	N = 254; university students 100% female (age range = 18–30, M = 22.5, SD = 1.9; BMI range = 17.3–31.1, M = 21.2, SD = 2.6)	BCQ (total score) EAT-26 (total score)	Significant positive correlations between the BCQ and the EAT-26	N/A
37. Engle (2009)[a]	Unpublished	N = 645; university students 100% female (age range = 17–51, M = 20.9, SD = 4.4; mean BMI = 24.1)	BICAS (checking subscale) BIAS	Significant positive correlation between the BICAS checking subscale and the EAT-26	Significant positive correlation between the BIAS and the EAT-26

(Continues)

TABLE 3 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
			EAT-26		
38. Hildebrandt et al. (2010)[a]	Published	*N* = 342; university students 196 males & 146 females (mean age = 19.76, *SD* = 2.78; mean BMI (males) = 24.74, *SD* = 3.71; mean BMI (females) = 22.8, *SD* = 3.45)	MBCQ (total score) EDE-Q (all subscales)	Significant positive correlations between the MBCQ and all subscales of the EDE-Q	N/A
39. Jansen et al. (2016)[a]	Published	*N* = 22; university students 100% female (age range = 18–23, *M* = 19.8, *SD* = 1.5; BMI range = 18–29, *M* = 23.5, *SD* = 2.4)	BCQ (total score) BIAQ (subscales) EDE-Q (subscales)	No significant correlations between the BCQ (total score and all subscales) and the shape concern subscale of the EDE-Q	No significant correlations between the BIAQ (total score and all subscales) and the shape concern subscale of the EDE-Q
40. Latner et al. (2012)[a]	Published	*N* = 214; community sample 100% female (mean age = 26.30, *SD* = 8.98; mean BMI = 21.58, *SD* = 7.28)	BCQ (total score) BIAQ (total score) EDE-Q (subscales)	Significant positive correlations between the BCQ and all subscales of the EDE-Q	Significant positive correlations between the BIAQ and all subscales of the EDE-Q
41. Luethcke, McDaniel, and Becker (2011)[a]	Published	*N* = 168; university students 100% female (demographic data reported for 153 participants: age range = 17–21, *M* = 18.45, *SD* = 0.78; BMI = not reported)	BCQ (subscales) BIAQ (subscales) EDE-Q (subscales)	Significant positive correlations between all BCQ subscales, and both the shape concern and weight concern subscales of the EDE-Q	Significant positive correlations between all BIAQ subscales, and both the shape concern and weight concern subscales of the EDE-Q
42. Maïano, Morin, Monthuy-Blanc, and Garbarino (2009)[a]	Published	*N* = 106; high-school students 69 males & 37 females (age range = 11–18, *M* = 14.90, *SD* = 2.29; BMI = not reported)	BIAQ (total score and subscales) EAT-26 (total score)	N/A	Significant positive correlations between the BIAQ (total score and all subscales) and the EAT-26
43. McLean et al. (2011)	Published	*N* = 61; community sample 100% female (mean age = 45.4, *SD* = 8.4; mean BMI = 30.75, *SD* = 7.2)	BIAQ (social activities and clothing subscales only) EDE-Q (subscales)	N/A	Significant positive correlations between both BIAQ subscales, and the combined weight/shape concern subscale of the EDE-Q
44. Meyer et al. (2011)[a]	Published	*N* = 250; university students	BRBS (BC & BA subscales)	Significant positive correlations between the BC subscale and all four subscales of the EDE-Q	Significant positive correlations between the BA subscales and

(Continues)

TABLE 3 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
		88 males & 162 females (mean age (males) = 25.5, *SD* = 7.55; mean age (females) = 24.0, *SD* = 7.86; mean BMI (males) = 24.3; mean BMI (females) = 22.5)	EDE-Q (subscales)		all four subscales of the EDE-Q
45. Pellizzer et al. (2017)[a]	Published	*N* = 328; university students 100% female (mean age = 19.74, *SD* = 2.13; mean BMI = 23.00, *SD* = 4.77, range = 14.69–59.99)	BCQ (total score and subscales) BIAQ (total score and subscales) EDI (BD subscale) EDE-Q (total score)	Significant positive correlations between the BCQ subscales and EDE-Q, and the body dissatisfaction subscale of the EDI	Significant positive correlations between the BIAQ subscales, and the EDE-Q, and the body dissatisfaction subscale of the EDI
46. Rodgers et al. (2013)[a]	Published	*N* = 431; community sample 139 males & 292 females (age range = 19–35, *M* = 25.20, *SD* = 4.25; mean BMI (males) = 23.00, *SD* = 3.52; mean BMI (females) = 22.08, *SD* = 3.92)	BIAQ (subscales) EAT-26 (total score and subscales)	N/A	Significant positive correlations between all subscales of the BIAQ, and the EAT-26 (total score and all three subscales)
47. Trautmann et al. (2007)	Published	*N* = 540; university students 100% female (mean age = 19.72, *SD* = 2.36; mean BMI = 22.79, *SD* = not reported)	BIAQ (clothing subscale only) EDI (BD subscale)	N/A	Significant positive correlation between the clothing subscale of the BIAQ, and the BD subscale of the EDI
48. Vartanian and Grisham (2012)[a]	Published	*N* = 303; university students 167 males & 136 females (mean age (males) = 26.27, *SD* = 10.70; mean age (females) = 24.64, *SD* = 9.57; mean BMI (males) = 23.91, *SD* = 3.70; mean BMI (females) = 22.35, *SD* = 3.34)	BCQ (total score) EDI (BD subscale)	Significant positive correlation between the BCQ and the BD subscale of the EDI	N/A
49. Walker et al. (2009)	Published	*N* = 550; university students 100% male (age range = 16–30, *M* = 18.98, *SD* = 1.59; mean BMI = 24.7, *SD* = 4.4)	MBCQ (total score) EDE-Q (shape and weight concern subscales only)	Significant positive correlation between the MBCQ and the combined shape/weight concern subscale of the EDE-Q	N/A
50. White (2013)[a]	Unpublished	*N* = 904; university students	BCQ (total score)	Significant positive correlations between the total score of the EDE-Q and the	N/A

(Continues)

TABLE 3 (Continued)

Author(s)	Publication status	Sample	Measure(s)	Body checking results	Body avoidance results
		337 males & 567 females (mean age = 20.46, *SD* = 4.26); mean BMI = 24.19, *SD* = 5.21)	MBCQ (total score) BCCS (total score) EDE-Q (total score)	BCQ (females), MBCQ (males), and BCCS (both males & females)	
51. White and Warren (2013)	Published	*N* = 650; university students 100% female (age range = 18–32, *M* = 19.64, *SD* = 2.23; BMI range = 14.44–41.01, *M* = 22.41, *SD* = 4.13)	BCQ (subscales) EDE-Q (total score)	Significant positive correlations between all BCQ subscales and the total score of the EDE-Q	N/A
52. White et al. (2015)[a]	Published	*N* = 1013; university students 100% female (age range = 18–55, *M* = 20.61, *SD* = 4.80; BMI range = 14.50–41.01, *M* = 22.91, *SD* = 4.39)	BCQ (total score) EDE-Q (subscales)	Significant positive correlations between the BCQ and all four subscales of the EDE-Q	N/A

Note. 13-FS = 13 Figure Scale; BA = body avoidance; BC = body checking; BCAQ = Body Checking and Avoidance Questionnaire; BCCS = Body Checking Cognitions Scale; BCQ = Body Checking Questionnaire; BD = body dissatisfaction; BIAQ = Body Image Avoidance Questionnaire; BICAS = Body-Image Compulsive Actions Scale; BIAS = Body-Image Avoidance Scale; BMI = body massi index; BRBS = Body-Related Behaviours Scale; EAT = Eating Attitudes Test; EDE-Q = Eating Disorder Examination Questionnaire; EDI = Eating Disorder Inventory; M = mean; MBCQ = Male Body Checking Questionnaire; N/A = not applicable; SD = standard deviation.

[a]The study was included in the meta-analysis.

age and BMI varied across samples. The BMI of participants with an ED ranged from 11.50 to 40.13 kg/m^2, which is reflective of the various ED subtypes. The BMI of nonclinical samples demonstrated greater variability, ranging from 13.21 to 60.47 kg/m^2. The ethnicity of included participants was predominately Caucasian, and the majority of studies were retrieved from the United Kingdom ($n = 12$), the United States ($n = 12$), Germany ($n = 8$), and Italy ($n = 5$). Only a small number of studies provided details on other demographic and clinical characteristics such as illness duration and socio-economic status, which therefore precluded summarisation.

In regard to study samples, 30 studies (see Tables 1 and 2) examined body checking and/or body avoidance in an ED sample; however, only 19 of these studies utilised a control group. The remaining 22 studies examined body checking and/or body avoidance in a nonclinical population (Table 3). As indicated in Tables 1–3, overall, 25 studies assessed body checking only, whereas nine studies only assessed body avoidance. The remaining 18 studies examined both body checking and body avoidance. Research designs were predominantly cross-sectional ($n = 40$), with the remaining studies utilising experimental/quasi-experimental ($n = 7$) or longitudinal ($n = 5$) designs.

4.1.2 | Eating disorder diagnoses and measures

The DSM-IV (APA, 2000) was most commonly used to derive ED diagnoses. Only two studies (Calugi et al., 2006; Calugi et al., 2017) utilised the diagnostic questions of the Eating Disorder Examination interview (EDE 12.0D; Fairburn & Cooper, 1993). Within all relevant studies, diagnoses were made by trained clinicians. Overall, 3,208 people were diagnosed with ED. Of these, 908 were diagnosed with AN, 1,243 with BN, 728 with EDNOS/OSFED, and 329 with BED.

In regard to the questionnaire measures utilised, the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) was the most widely used measure of ED pathology, followed by the Eating Disorder Inventory-2 (Garner, 1991), and the Eating Attitude Test (EAT-26; Garner, Olmsted, Bohr, & Garfinkel, 1982). As shown in Tables 1–3, the majority of studies utilised the Body Checking Questionnaire (Reas et al., 2002) to measure body checking and the Body Image Avoidance Questionnaire (Rosen et al., 1991) to measure body avoidance. However, two studies used the Body-Related Behaviours Scale (Meyer et al., 2011); two studies utilised the Body Checking Cognitions Scale (Mountford et al., 2006); four studies used the Body Checking and Avoidance Questionnaire (BCAQ; Shafran et al., 2004); and four studies utilised the Male Body Checking Questionnaire (Hildebrandt et al., 2010).

4.1.3 | Eating disorder sample (with a control group)

Nineteen studies examined body checking and/or body avoidance in an ED sample utilising a control group. As indicated in Table 1, eight of these studies assessed body checking, whereas two studies assessed body avoidance. The remaining nine studies examined both body checking and body avoidance. A total of 1,330 people were diagnosed with an ED, and there were 1,800 healthy controls. Of those with an ED, 519 were diagnosed with AN, 479 with BN, 271 with EDNOS/OSFED, and 61 with BED.

Body checking

As shown in Table 1, 16 studies found significantly higher body checking scores in EDs overall compared with healthy controls. Only one study (Lewer, Nasrawi, Schroeder, & Vocks, 2016) found no significant differences between the two groups.

In regard to ED subtypes, Legenbauer et al. (2017) reported significantly higher levels of body checking among individuals with AN relative to both BED and EDNOS, and among individuals with BN relative to BED. Another study (Calugi et al., 2006) reported significantly higher levels of body checking among BN relative to AN; however, no significant differences were found between EDNOS, and BN or AN groups, respectively. In line with the latter finding, five studies (Amin et al., 2014; Blechert et al., 2010; Kachani et al., 2013; Shafran et al., 2004; Shafran & Robinson, 2004) found no significant differences in body checking scores across AN, BN, or EDNOS groups. A further five studies (Carmona, Tornero-Quiñones, & Sierra-Robles, 2015; Kraus et al., 2015; Mountford et al., 2006; Reas et al., 2002; Vocks et al., 2009; Waller et al., 2008) contrasted body checking in EDs versus a healthy control group; however, the various ED subtypes were amalgamated and analysed as a single sample. As a result, potential group differences between ED subtypes were not examined.

Body avoidance

As shown in Table 1, nine studies found significantly higher body avoidance scores in EDs overall compared with healthy control groups. Only one study (Lewer et al., 2016) found no significant differences between the two groups. In regard to ED subtypes, five studies (Amin et al., 2014; Blechert et al., 2010; Legenbauer et al., 2017; Shafran et al., 2004; Vocks et al., 2010) found no

significant differences in body avoidance scores across AN, BN, BED, and/or EDNOS groups.

4.1.4 | Eating disorder sample (without a control group)

Eleven studies (see Table 2) examined body checking and/or body avoidance in an ED sample without a control group. Of these, six studies assessed body checking, whereas only two studies assessed body avoidance. The remaining three studies examined both body checking and body avoidance. A total of 1,878 people were diagnosed with an ED, specifically, 389 with AN, 764 with BN, 457 with EDNOS/OSFED, and 268 with BED.

Body checking

One study (Kachani et al., 2014) reported significant differences between ED subtypes, with BN scoring higher on body checking scores, relative to AN. Conversely, two studies (Dakanalis et al., 2015; MacDonald, McFarlane, & Olmsted, 2014) found no significant differences in body checking across BN, EDNOS, or BED groups. In a total of five studies (Breithaupt, Payne, & Rose, 2014; Morgan, Lazarova, Schelhase, & Saeidi, 2014; Mountford et al., 2015; Mountford, Haase, & Waller, 2007; Trottier, MacDonald, et al., 2015), ED subtypes were combined and analysed as a single sample, and thus, potential differences were not examined. The final study (Reas, White, & Grilo, 2006) only examined one ED subtype, so no comparisons were made.

Body avoidance

One study (MacDonald et al., 2014) compared body avoidance across ED subtypes; however, no significant differences were found. Consistent with the pattern observed in the literature, in three studies (Brytek-Matera, 2009; Morgan et al., 2014; Trottier, MacDonald, et al., 2015), ED subtypes were amalgamated and analysed as a single sample. In the remaining study (Vossbeck-Elsebusch et al., 2015), although body avoidance scores were reported separately for each ED subtype, analytic comparisons were not conducted.

4.1.5 | Nonclinical population

Twenty-two studies examined body checking and/or body avoidance in a nonclinical population, with the majority of participants drawn from university samples. As indicated in Table 3, 11 studies assessed body checking, and five studies assessed body avoidance. The remaining six studies examined both body checking and body avoidance.

Body checking

As shown in Table 3, 12 studies reported significant positive correlations between body checking and eating pathology as measured by the EDE-Q subscales of eating concern, restraint, shape concern, and weight concern. Conversely, one study (Jansen et al., 2016) found no significant association between body checking and the EDE-Q. Two studies (respectively) reported a significant positive correlation between body checking and drive for thinness (Alperin et al., 2014; Chang, 2014), bulimic behaviours (Chang, 2014; Dakanalis et al., 2015), and the total score of the EAT-26 (De Berardis et al., 2007; Engle, 2009). Three studies reported a positive association between body checking and body dissatisfaction (Chang, 2014; Pellizzer, Tiggemann, Waller, & Wade, 2017; Vartanian & Grisham, 2012).

Body avoidance

As shown in Table 3, six studies reported significant positive correlations between body avoidance and the EDE-Q subscales of eating concern, restraint, shape concern, and weight concern. Conversely, one study (Jansen et al., 2016) found no significant association between body avoidance and the EDE-Q. Two studies reported significant positive correlations between body avoidance and body dissatisfaction (Carmona et al., 2015; Pellizzer et al., 2017), and two studies reported a significant positive correlation between body avoidance and the total score of the EAT-26 (Engle, 2009; Rodgers, Melioli, Laconi, Bui, & Chabrol, 2013).

4.1.6 | Quality appraisal and assessment of risk of bias

The appraisal and assessment of quality and risk of bias found that, by and large, studies adopted valid and reliable methods, with clear reporting of results. The main issues, and potential sources of bias in this systematic review, pertained to nonrepresentative samples, poor control for potential confounding variables, failure to report exact probability values, and insufficient power to detect small effect sizes (see Appendix S2 for the results of the quality appraisal). Nonetheless, the studies present promising initial findings and constitute a good foundation for continued analyses in the field.

4.2 | Meta-analysis

As seen in Figure 1, 34 studies were eligible for the meta-analysis. In total, 31 corresponding authors were contacted and asked to provide additional data (see Appendix S3 and S4 for extracted data), most commonly in relation to data for each separate ED subtype. When

contacting the authors, it became apparent that several papers were derived from the same dataset: (a) Blechert, Nickert, Caffier, and Tuschen-Caffier (2009) and Blechert et al. (2010); and (b) White and Warren (2013) and White, Claudat, Jones, Barchard, and Warren (2015). In order to ensure that participants were not artificially over-represented, only the paper that contained the most comprehensive data was selected from each dataset, and therefore, two papers (Blechert et al., 2009; White & Warren, 2013) were excluded. It is important to note that these studies differ from those excluded during the systematic review selection process, as it was only upon correspondence that it became known that the same data had in fact been utilised. Furthermore, the majority of included papers utilised samples consisting entirely of females. Given that disordered eating behaviours and weight and shape concerns are more prevalent among females (Croll, Neumark-Sztainer, Story, & Ireland, 2002) and are expressed differently among males (Weltzin et al., 2005), a decision was made to exclude the two papers that consisted of all male samples (Dakanalis, Favagrossa, et al., 2015; Walker, Anderson, & Hildebrandt, 2009) and to use only the female data from studies with mixed gender samples. Thus, all results reported hereafter refer to female samples. Two studies (Shafran et al., 2004; Shafran & Robinson, 2004) were also excluded as they utilised the BCAQ (Shafran & Robinson, 2004), which did not differentiate between body checking and body avoidance items.

4.2.1 | Eating disorders versus healthy control groups: Body checking

This analysis was based on the 10 studies (see Figure 2a) that compared body checking in females with EDs (separated into subtypes) versus healthy female control groups. Within the 10 studies, AN was examined in nine, BN in seven, BED in three, and EDNOS/OSFED in five. The overall summary effect was significant ($d = 1.26$, 95% CI [1.06, 1.47], Z = 12.09, $p < .001$), suggesting that EDs overall (regardless of subtype) experience significantly higher body checking, with a large effect size, relative to healthy control groups. There was considerable heterogeneity between studies, as evidenced by a significant Q value ($Q = 94.05$, $p < .001$) and a moderate I^2 value ($I^2 = 62.85$). Follow-up meta-regression analysis revealed that effect sizes did not significantly differ between the ED subtype groups (EDNOS vs. BN: $b = 2.95$, 95% CI [−3.07, 8.96], $z = 0.96$, $p = .34$; EDNOS vs. BED: $b = 3.36$, 95% CI [−6.49, 13.21], $z = 0.67$, $p = .50$; EDNOS vs. AN: $b = 2.98$, 95% CI [−3.20, 9.15], $z = 0.94$, $p = .35$), or by the mean age ($b = -.10$, 95% CI [−0.44, 0.24], $z = -0.56$, $p = .58$) or BMI of the ED group ($b = 0.04$, 95% CI [−0.21, 0.30], $z = 0.32$, $p = .75$). With these potential moderators

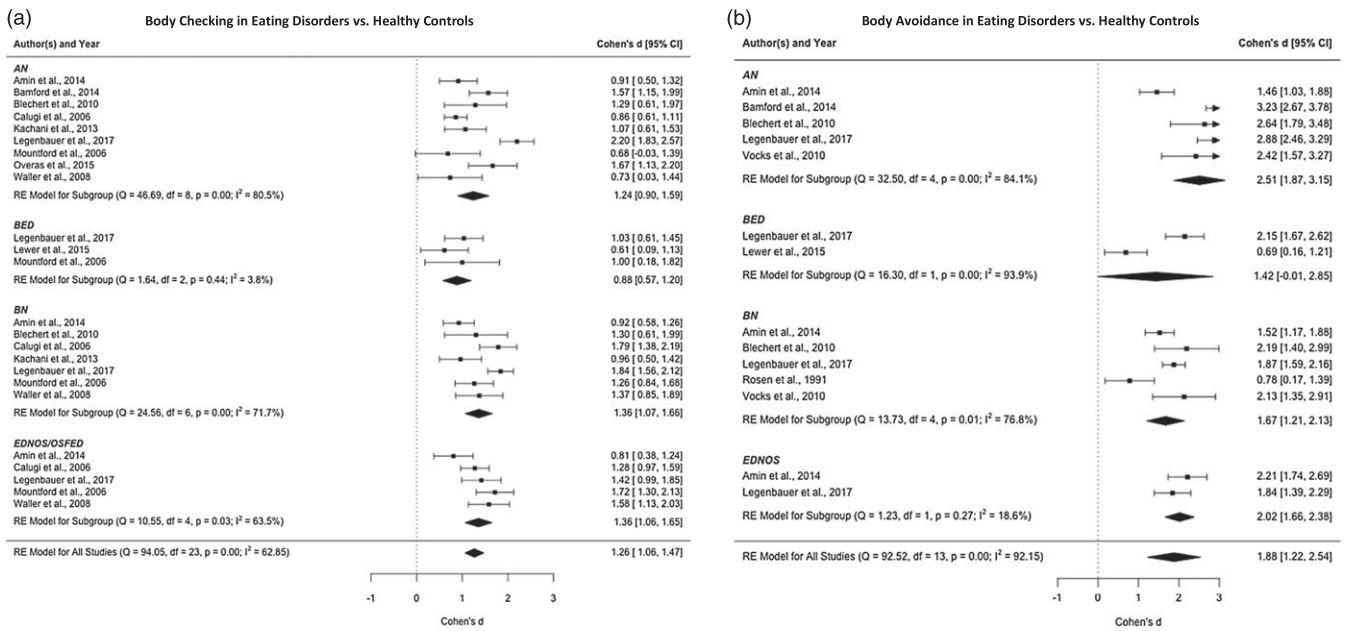

FIGURE 2 Forest plots of (a) body checking in eating disorders versus healthy controls and (b) body avoidance in eating disorders versus healthy controls, including effect sizes (Cohen's d) and confidence intervals (CIs) for effect sizes for group comparisons. The overall effect sizes for the random-effects meta-analyses for eating disorder subtypes and eating disorders overall are represented by black diamonds.
AN = anorexia nervosa; BED = binge eating disorder; BN = bulimia nervosa; EDNOS = eating disorder not otherwise specified; OSFED = other specified feeding or eating disorder

included, the effect size for body checking remained heterogeneous across studies; $Q = 39.27$, $p < .001$.

4.2.2 | Eating disorders versus healthy control groups: Body avoidance

This analysis was based on eight studies (see Figure 2b) that compared body avoidance in females with EDs (separated into subtypes) versus healthy female control groups. One study (Kachani et al., 2013) that utilised the BCAQ (Shafran & Robinson, 2004) was excluded. Within the eight studies, AN was examined in five, BN in five, BED in two, and EDNOS in two. The overall summary effect was significant ($d = 1.88$, 95% CI [1.22, 2.54], $Z = 5.60$, $p < .001$), suggesting that EDs overall (regardless of subtype) experience significantly higher body avoidance, with a large effect size, relative to healthy control groups. There was considerable heterogeneity between studies, as evidenced by a significant Q value ($Q = 92.52$, $p < .001$), and a large I^2 value ($I^2 = 92.15$), indicating that the original studies differed from each other. Follow-up meta-regression analysis revealed that effect sizes significantly differed between several of the ED subtype groups (EDNOS vs. BN: $b = 7.70$, 95% CI [1.29, 14.11], $z = 2.36$, $p = .02$; EDNOS vs. AN: $b = 7.82$, 95% CI [1.61, 14.03], $z = 2.47$, $p = .01$; but nonsignificant for EDNOS vs. BED: $b = 9.52$, 95% CI [−0.66, 19.71], $z = 1.83$, $p = .07$; EDNOS vs. AN: $b = 2.98$, 95% CI [−3.20, 9.15], $z = 0.94$, $p = .35$). Effect sizes did not differ as a function of mean age ($b = -0.16$, 95% CI [−0.40, 0.08], $z = -1.33$, $p = .18$) or BMI of the ED group ($b = -0.05$, 95% CI [−0.22, 0.13], $z = -0.55$, $p = .59$). With these potential moderators included, the effect size for body avoidance remained heterogeneous across studies; $Q = 63.76$, $p < .001$.

4.2.3 | Eating disorder pathology in nonclinical samples: Body checking

This analysis was based on 14 studies (see Figure 3a) that assessed the relationship between body checking and ED pathology in female nonclinical samples. As previously mentioned, insufficient data on specific ED behaviours (e.g., eating concern, shape concern, and body dissatisfaction) necessitated grouping the individual categories into three superordinate categories: total ED score, body image, and restraint. As illustrated in Figure 3a, body checking was significantly and positively correlated with

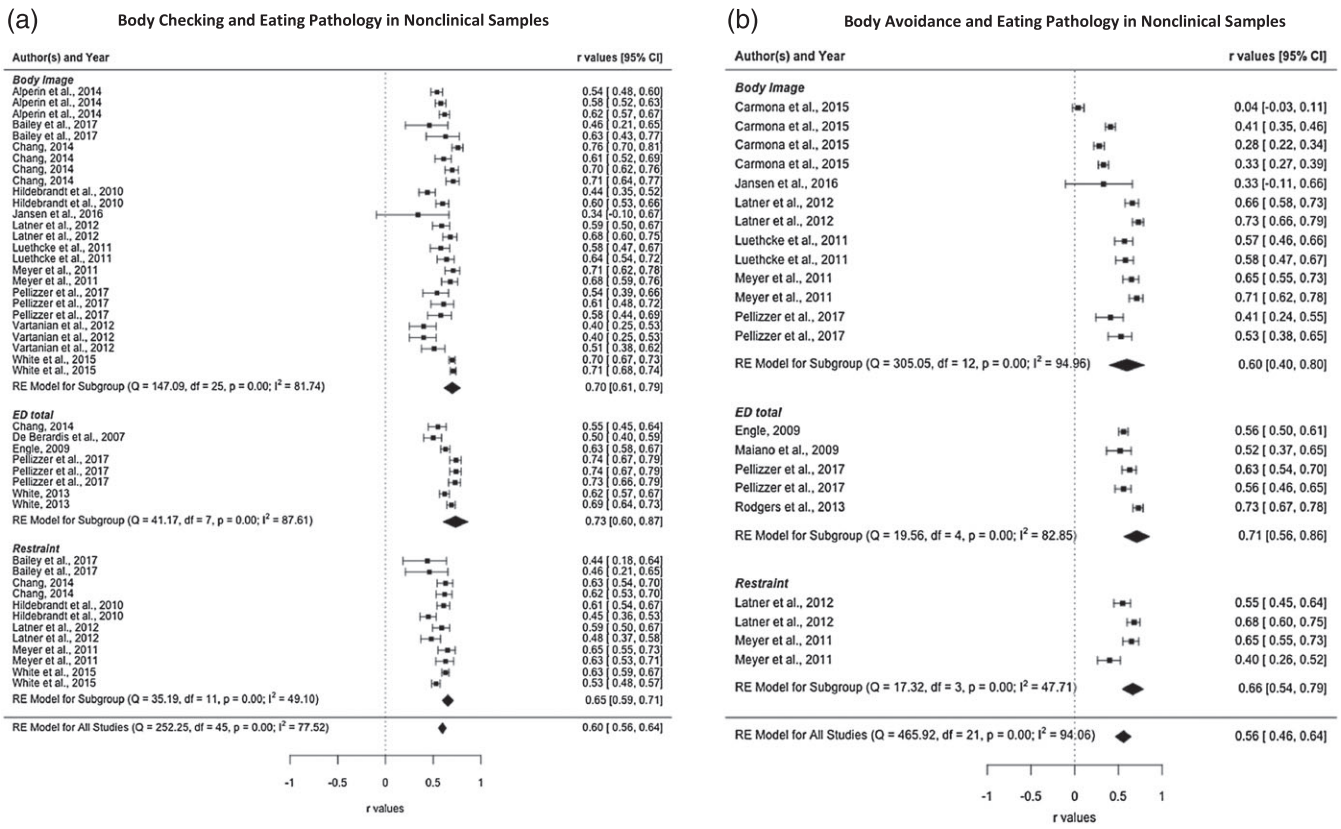

FIGURE 3 Forest plots of (a) body checking and eating disorder pathology in nonclinical samples and (b) body avoidance and eating disorder pathology in nonclinical samples, including effect sizes (r) and confidence intervals (CIs) for effect sizes. The overall effect sizes for the random-effects meta-analyses for eating pathology behaviours and eating pathology overall are represented by black diamonds. ED = eating disorders

ED pathology overall, with a large effect size, $r = .60$, 95% CI [0.56, 0.64], $p < .001$. A significant Q value ($Q = 252.25$, $p < .001$) and moderate-large I^2 value ($I^2 = 77.52$) indicated the studies differed notably from each other. Follow-up meta-regression analysis revealed that effect sizes did not significantly differ as a function of operationalisation of ED symptomatology (ED total score vs. restraint score: $b = -0.06$, 95% CI [−0.21, 0.08], $z = -0.84$, $p = .40$; ED total score vs. body image score: $b = -0.01$, 95% CI [−0.18, 0.15], $z = -0.13$, $p = .90$), mean age ($b = -.01$, 95% CI [−0.02, 0.00], $z = -1.40$, $p = .16$) or BMI of the sample ($b = 0.00$, 95% CI [−0.05, 0.04], $z = -0.04$, $p = .96$). With these potential moderators included, the effect size for body checking remained heterogeneous across studies; $Q = 196.35$, $p < .001$.

4.2.4 | Eating disorder pathology in nonclinical samples: Body avoidance

This analysis was based on the nine studies (see Figure 3b) that assessed the relationship between body avoidance and ED pathology in female nonclinical samples. As with the previous analysis, insufficient data on specific ED behaviours necessitated grouping the individual categories into the three superordinate categories of total ED score, body image, and restraint. Given that two studies (McLean, Paxton, & Wertheim, 2011; Trautmann, Worthy, & Lokken, 2007) used alternative scoring methods for the Body Image Avoidance Questionnaire, the data were not comparable and these studies were excluded. As illustrated in Figure 3b, body avoidance was significantly and positively correlated with ED pathology overall, with a large effect size, $r = 0.56$, 95% CI [0.46, 0.64], $p < .001$. The significant Q value ($Q = 465.92$, $p < .001$) and large *I squared* value ($I^2 = 91.40$) indicated that the studies differed notably from each other. Follow-up meta-regression analysis revealed that effect sizes significantly differed as a function of operationalisation of ED symptomatology (ED total score vs. restraint score: $b = 0.28$, 95% CI [0.15, 0.41], $z = 4.39$, $p < .001$; ED total score vs. body image score: $b = 0.16$, 95% CI [0.05, 0.27], $z = 2.91$, $p = .003$) and mean age ($b = 0.05$, 95% CI [0.04, 0.06], $z = 9.84$, $p < .001$), but not by BMI of the sample ($b = -.03$, 95% CI [−0.09, 0.02], $z = -1.14$, $p = .26$). However, even with these moderators included, the effect size for body checking remained heterogeneous across studies; $Q = 99.53$, $p < .001$.

5 | DISCUSSION

This is the first systematic review and meta-analysis of the literature related to body checking and body avoidance in EDs. Although suggested to be important contributors to the development and maintenance of EDs (Fairburn et al., 2003), to date, these behaviours have not previously been studied by means of a meta-analytical approach. This study therefore set out to collate, summarise, and provide an objective appraisal of the literature, before extending the knowledge base by using meta-analytic methods to pool data from existing studies. The results showed that overall, ED cases experienced significantly higher body checking and body avoidance relative to healthy controls, with large effect sizes. In regard to ED subtypes, the analyses provided no evidence that body checking or body avoidance varied by diagnostic category. The findings also revealed that body checking and body avoidance were significantly and positively correlated with core ED pathology in nonclinical samples.

5.1 | Clinical eating disorder population versus healthy controls

Meta-analytic summary effects showed that ED cases overall experienced significantly higher body checking and body avoidance relative to healthy controls. Although the heterogeneity of observed effects prompts cautious interpretation, this finding corroborates increasing evidence (see Kachani et al., 2013) that although body checking and body avoidance are common in the general population, these behaviours occur at significantly higher rates among individuals with EDs. These results are consistent with theoretical accounts of EDs (e.g., Fairburn et al., 2003) that identify body checking and body avoidance to be the behavioural expressions of the overevaluation of weight and shape, which is considered the core psychopathology of EDs (Fairburn et al., 2003). The current findings are also in line with research suggesting that body-related information gained from body checking and body avoidance is processed differently in individuals with EDs compared with the general population (Walker & Murray, 2014). For instance, similar to the way in which selective attention to internal cues is believed to maintain panic disorder, selective attention towards disliked body parts is believed to maintain disordered weight and shape concern in EDs (Shafran, Farrell, Lee, & Fairburn, 2009). In illustration of this, individuals with EDs almost always selectively attend to their most disliked body parts when viewing themselves, in contrast to controls (Shafran et al., 2004), which increases negative body-related emotions and the use of body avoidance strategies (Tuschen-Caffier, Vögele, Bracht, & Hilbert, 2003; Vocks, Kosfelder, Wucherer, & Wächter, 2008). Subsequently, the overvaluation of weight and shape is intensified (Shafran et al., 2004).

5.2 | Eating disorder subtypes versus healthy controls

Given the inconsistent findings in the literature related to body checking and body avoidance across diagnostic categories of EDs, we aimed to evaluate whether the size of differences between clinical ED groups and healthy control groups on body checking and avoidance was moderated by ED subtype (i.e., AN, BN, BED, and EDNOS/OSFED). Results revealed no evidence to suggest that effect sizes varied across ED diagnostic categories. As the first study to use meta-analytic methods to compare body checking and body avoidance across ED subtypes, this novel finding has important implications. Most importantly, it lends support to the transdiagnostic model of EDs (Fairburn et al., 2003), which is based on the premise that all ED subtypes share common characteristics and underlying psychopathology and, therefore, can be treated using similar psychological interventions. Our results suggest that instead of administering separate interventions targeting body checking or body avoidance to each ED subtype (e.g., Morgan et al., 2014), which can be both time and resource intensive, transdiagnostic treatment interventions and early intervention programmes can be developed to target these behaviours across all subtypes.

It is also important to consider that the nonsignificant finding across ED categories may be related to other, as yet unexplored factors within the field, such as lower level distinctions within subtypes. For instance, the DSM-5 (APA, 2013) separates AN into two further subtypes—AN-restricting (AN-R) and AN-binge/purge (AN-BP). Although there is a high degree of crossover between these subtypes (Peat, Mitchell, Hoek, & Wonderlich, 2009), research has shown that individuals with AN-BP demonstrate greater diagnostic similarities with BN than those with AN-R (Eddy et al., 2002). It is therefore possible that there may be distinguishing differences in body checking and body avoidance if AN and BN were instead examined according to the restricting versus binge/purge division (Eddy et al., 2008). Because only one (Waller et al., 2008) of the 10 studies that assessed AN in this meta-analysis distinguished between AN-R and AN-BP, we were unable to make such comparisons.

5.3 | Nonclinical samples

Within nonclinical samples, meta-analytic summary effects showed that both body checking and body avoidance were significantly and positively correlated with ED symptomatology, with large effect sizes. Because of the lack of subscale data reported for specific ED behaviours in some included studies (e.g., De Berardis et al., 2007; Pellizzer et al., 2017), we amalgamated available variables into three categories of ED symptomatology (total ED score, body image, and restraint). Moderation analyses indicated that effect sizes did not differ depending on which of these three variables body checking or body avoidance were correlated against. However, there is a clear need for future studies to continue to explore and clarify the relationships between specific ED behaviours (e.g., body dissatisfaction, and drive for thinness) and body checking and body avoidance in nonclinical populations.

Despite the small number of studies in this area, the meta-analytic results add further support to the developing body of research on the relationship between body checking and body avoidance, and core ED symptoms in nonclinical samples. Importantly, body image concerns are known risk factors in the development and maintenance of EDs (Allen, Byrne, Oddy, Schmidt, & Crosby, 2014). For instance, eating, shape, and weight concern in early adolescence has been shown to significantly predict later-onset EDs, relative to control groups, over and above childhood exposures such as childhood obesity (Allen et al., 2014). Therefore, given that body checking and body avoidance are common in the general population (Reas et al., 2002), coupled with the current findings that these behaviours are significantly and positively associated with core ED symptoms, early intervention and prevention programmes that are able to successfully reduce body checking and body avoidance may help to prevent the onset of clinical EDs in those at risk. This may involve the use of behavioural experiments and response prevention to reduce body checking or body avoidance (Bailey & Waller, 2017), or exposure-based methods to reduce the use of checking or avoidance in response to feelings of anxiety. Psychoeducation and cognitive-behavioural therapies could also play a role in addressing beliefs and cognitions underlying the development of body checking and body avoidance behaviours (Bailey & Waller, 2017).

5.4 | Limitations and strengths

The current study had several limitations that must be acknowledged. Perhaps most importantly, considerable heterogeneity of observed effects were detected within meta-analytic analyses, even after the inclusion of age and BMI as potential moderators. Given that the high level of heterogeneity of effect sizes across analyses could not be explained by the modelled variables, it will be important for future studies to explore the potential moderating effect of other relevant variables, such as sample type and publication status, which could not be modelled in this study due to small samples or missing data. A further limitation was the exclusion of male samples in the

meta-analysis to provide a more homogenous sample. It would be beneficial for future research to examine body checking and body avoidance behaviours among males to explore potential gender differences, and to inform ED prevention and treatment strategies among males.

Notwithstanding these limitations, the current review had a number of strengths. Most noticeably, a large number of studies were included, which allowed distinct analyses to be undertaken. The use of meta-analytic methods to pool effect sizes also enabled the current review to adequately disentangle, for the first time, whether body checking and body avoidance differ across ED subtypes. Furthermore, the inclusion of unpublished content limited the potential impact of publication bias that may have been present if only peer-reviewed publications had been included (Borenstein et al., 2009). Finally, our critical examination of the included studies using a quality appraisal and assessment of bias rating system allowed us to make specific recommendations to assist the methodology of future studies.

6 | FUTURE DIRECTIONS AND CONCLUSIONS

Our quality appraisal of risk of bias within the included studies revealed that the most common unmet criteria across all studies related to nonrepresentative samples, the asynchronous recruitment of cases and controls, and failure to control for potential confounding variables. Consequently, future studies should aim to more carefully control sample features and recruitment, such as the inclusion of male participants; information regarding the source population (i.e., name and type of hospital); the use of larger samples spanning the spectrum of EDs; and increased efforts to reduce the heavy reliance on convenient cohorts (i.e., treatment-seeking participants). Additionally, in order to promote the contemporaneous recruitment of participants, cases and controls should be recruited over the same time period.

Although the literature on body checking and body avoidance in EDs is rapidly expanding, this review identified research gaps in several key areas. For example, we were unable to test whether distinguishing AN and BN according to restricting versus binge/purge divisions resulted in any differences in body checking or avoidance between ED subtypes. Given that there are both diagnostic similarities and distinctions between AN-R, AN-BP, and BN (Eddy et al., 2008), there is a clear need for future studies to distinguish between AN subtypes to facilitate more nuanced comparisons. Furthermore, the relationships between several core ED pathologies (i.e., bulimic symptoms and body dissatisfaction) and body checking and body avoidance have yet to be adequately examined in nonclinical samples.

This meta-analysis extends the knowledge of body checking and body avoidance in EDs and provides several novel findings. Meta-analytic summary effects showed that ED cases experienced significantly higher body checking and body avoidance relative to healthy controls but that body checking and body avoidance did not vary by ED subtype. This finding has salient implications for transdiagnostic theoretical models and treatment approaches. Furthermore, body checking and body avoidance were significantly and positively correlated with core ED symptoms in nonclinical samples, which could have the potential to inform early intervention and prevention programmes.

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

How to cite this article: Nikodijevic A, Buck K, Fuller-Tyszkiewicz M, de Paoli T, Krug I. Body checking and body avoidance in eating disorders: Systematic review and meta-analysis. *Eur Eat Disorders Rev*. 2018;26:159–185. https://doi.org/10.1002/erv.2585