Body image flexibility and its correlates: A meta-analysis

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ABSTRACT

Body image flexibility refers to the ability to openly experience thoughts or feelings about the body without acting on them or trying to change them. Accumulating evidence has demonstrated that body image flexibility is connected to numerous adaptive processes, and that it is sensitive to change during psychological interventions. However, a quantitative synthesis of empirical research on body image flexibility is lacking. We conducted the first meta-analysis on body image flexibility and its correlates. Sixty-two studies were included. Random effects meta-analyses were conducted on 19 psychological correlates, divided into three clusters: eating and body image disturbances, positive body-related and general psychological constructs, and general psychopathology. Meta-analyses showed inverse correlations between body image flexibility and each construct within the eating and body image disturbances cluster ($rs = -.45$ to $-.67$), and the general psychopathology cluster ($rs = -.37$ to $-.58$). Body image flexibility was positively associated with each positive psychology construct ($rs = .23 – .58$). Men reported higher levels of body image flexibility than women ($d = 0.32$). Psychological interventions were more effective than control groups at enhancing body image flexibility in randomized controlled trials ($d = 0.42$). Findings confirm that body image flexibility is consistently connected to indices of mental health, and that it can be enhanced during psychological interventions.

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1. Introduction

Body image research has traditionally focused on negative body image; that is, preoccupation, concern and negative appraisals, thoughts, and feelings about one's body (Grogan, 2016). Within this tradition, positive or healthier expressions of body image have been cast as low levels of negative body image. More recently, however, researchers have argued for a greater focus on positive body image, on the grounds that positive and negative body image may be somewhat independent of each other rather than separate ends of the same continuum (Tylka & Wood-Barcalow, 2015a). So conceived, positive body image reflects a distinct construct that contains its own unique components related to respect, appreciation, and acceptance towards the body (Webb, Wood-Barcalow, & Tylka, 2015). The enthusiasm for positive body image stems from a growing evidence base suggesting that the various components

of positive body image, including body appreciation, functionality appreciation, and body acceptance, are consistently and independently associated with indices of positive mental health (Alleva et al., 2018; Tylka & Wood-Barcalow, 2015b, 2015b).

Body image flexibility, the ability for one to openly experience thoughts or feelings about the body without acting on them or trying to avoid or change them (Sandoz, Wilson, Merwin, & Kellum, 2013), is one positive body image component that has received growing research attention. It differs to the more conventional positive body image facets (e.g., body appreciation) in the sense that it has a strong grounding in the theory and principles that underpin the new third-wave behavioural therapies, including Acceptance and Commitment Therapy, Mindfulness-Based Cognitive Therapy, and Compassion-Focused Therapy (Hayes, 2004). According to these therapeutic approaches, the content or validity of inner mental experiences are not as important as an individual's relationship with, or awareness of, those experiences. Individuals who are unwilling to embrace or accept intrusive mental experiences, but instead try to avoid, control, or suppress them, are at greatest risk for impulsive and maladaptive behavioural repertoires, and further psychological distress (Hayes, 2004). In that regard, these

third-wave therapies emphasize strategies that reduce experiential avoidance (i.e., an unwillingness to experience certain internal experiences), and cultivate the skills related to acceptance, mindfulness, and psychological flexibility (i.e., consciously attending to the present moment without defese, while persisting in value-oriented behavior; Hayes, Villatte, Levin, & Hildebrandt, 2011).

Body image flexibility is a specific type of psychological flexibility relevant to the context of eating and body image. Individuals who possess this domain-specific flexibility are said to be able to non-judgementally experience intrusive thoughts and feelings about the body without ruminating on them and without impulsively acting on. For example, many disordered eating behaviours (e.g., restriction, purging etc.) serve the function of alleviating negative thoughts about, or feelings towards, one's body weight and shape (Stice, 2001). Individuals who exhibit characteristics of body image flexibility can instead recognize that such negative thoughts and feelings arise, can attend to them non-judgmentally, openly, and with an attitude of self-compassion, and can continue to pursue meaningful goals in other important domains without trying to suppress them via unhealthy coping strategies (Sandoz et al., 2013). It is thus not surprising that third-wave behavioural interventions for eating and body image disturbances devote a great deal of effort towards enhancing body image flexibility (Linardon, Fairburn, Fitzsimmons-Craft, Wilfley, & Brennan, 2017; Linardon, Gleeson, Yap, Murphy, & Brennan, 2018), as this variable is hypothesized to be one of the few important mechanisms of action. Nascent evidence suggests that these interventions can effectively enhance body image flexibility, and that changes in body image flexibility are associated with reductions in eating pathology (Bluett et al., 2016).

Empirical research on body image flexibility is growing. A recent systematic review of the body image flexibility literature by Rogers, Webb, and Jafari (2018) identified 44 articles, 36 of which were cross-sectional studies. The authors synthesized this literature, finding body image flexibility to be associated with numerous psychological constructs, including lower levels of body image concerns, eating disorder symptoms, and psychological distress, and higher levels of intuitive eating, wellbeing, and self-compassion. The authors also found preliminary evidence that body image flexibility was sensitive to change during third-wave behavioural interventions, but this evidence was weak given that research at the time was mostly based on case studies, case series, or non-randomized designs.

Although Rogers et al. (2018) provided important insights towards the extant literature on body image flexibility, their review was qualitative rather than quantitative in nature. A quantitative synthesis of the body image flexibility is necessary for more precisely characterizing the nature, magnitude, and direction of the relationships between body image flexibility and psychological constructs, and for clarifying any inconsistencies within this literature. Ultimately, this could better help guide theoretical models, future research questions, and relevant intervention targets. Moreover, identification of robust cross-sectional correlates established through meta-analytic techniques may also inform future prospective or experimental research by narrowing the list of *plausible* causes and consequences of body image flexibility that warrant further investigation through these designs. A meta-analysis would also allow one to explain heterogeneity in effect sizes, which is necessary for better understanding for whom the relationship between body image flexibility and a particular correlate is strongest or weakest. Crucially, since the publication Rogers et al.'s (2018) review, more than 20 additional studies of body image flexibility have been published, including some large-scale randomized controlled trials (e.g., Sundgot-Borgen et al., 2020), indicating that a meta-analytic synthesis of this literature is timely and pertinent.

It is possible that certain sample characteristics affect the relationships between body image flexibility and psychological constructs. *Gender* and *ethnicity* may be two candidate moderating variables. Unlike many non-Western cultures which tend to value and be more accepting of body diversity, Western cultures tend place a lot of pressure on men and women to exhibit a muscular and thin body type, respectively (Grogan, 2016). Women, however, face significantly more pressure than men to achieve the idealized body type, and consequently face more body image threats (e.g., social and mass media content glorying the thin ideal and stigmatizing larger bodies) and scrutiny from others in daily life (Fredrickson & Roberts, 1997; Thompson & Stice, 2001). In this way, women may find it more difficult to accept intrusive thoughts and feelings about their body image because it opposes societal messages that women should routinely monitor their body and desire to look a certain way if they are to be valued, considered attractive, and accepted. Women are also much more likely than men to engage in unhealthy weight control or appearance-fixing behaviours (Cash, Santos, & Williams, 2005), suggesting that they may be more susceptible to suppressing or altering the content of negative body-related thoughts and feelings.

Age may be another potential moderating variable. It has been suggested that our perceptions of, and attitudes towards, our body become more positive as we get older (Tiggemann, 2015). As we age, personal and familial responsibilities broaden, a shift in focus from appearance to health and functionality becomes more apparent, and the use of cognitive strategies to accept perceived body imperfections (e.g., reappraisal) can be more readily drawn upon (Arnett, 2000; Tiggemann, 2015). For these reasons, older individuals may be better able than younger individuals to behave in a manner that is consistent with their core values, even in the face of threating body image experiences.

Body mass may also affect body image flexibility's relationship with psychological constructs. In contrast to a lower body mass, which is glorified and conflated with health and wellbeing in many Western cultures, a higher body mass is often stigmatized, punished, and equated with ill-health (Grogan, 2016). Consequently, many individuals living in a larger body may find it challenging to accept negative thoughts about their body or exhibit body compassion, and instead may criticize their body or suppress these internal experiences via maladaptive coping strategies (e.g., restrictive or binge eating).

We conducted the first meta-analytic review of body image flexibility, with the following aims. The first aim was to estimate the strength and the direction of the associations between body image flexibility and any psychological construct with which it has been paired. To obtain a snapshot of the existing literature on body image flexibility, we did not limit our focus to specific psychological correlates, but instead wanted to estimate relationships for all available body image flexibility correlates investigated in this field. The second aim was to explore whether certain sample characteristics, including age, body mass, and gender and ethnic distribution moderate any of these relationships. The third aim was to confirm whether any gender differences in body image flexibility exist. The final aim was to investigate whether body image flexibility is sensitive to change during RCTs of interventions that assessed body image flexibility as an outcome.

We first hypothesized that body image flexibility would be positively associated with other positive body-related and general psychology constructs, and inversely associated with measures of eating pathology, negative body image, and general psychological distress. Second, we hypothesized that men would report significantly higher levels of body image flexibility than women. Third, we hypothesized that body image flexibility would increase more during psychological interventions relative to control groups.

2. Method

2.1. Search strategy and study selection

Four online databases (Medline, PsycINFO, Web of Science, and ProQuest Database for Dissertations) were initially searched by the first author in May 2020, and subsequently updated in November 2020, by using the following key terms: "body image flexibility" OR "body image inflexibility" OR "Body Image-Acceptance and Action Questionnaire" OR "body image acceptance and action" OR "BI-AAQ[1]" OR "body image psychological inflexibility." Reference lists of included articles and relevant reviews were also hand searched.

We included any study that assessed body image flexibility, reported its relationship to gender or any other psychological construct, and provided sufficient data to calculate an effect size. We also included RCTs comparing any psychological intervention to a control condition and assessed body image flexibility as an outcome variable. No sample restrictions were applied, but case studies or case series were excluded (i.e., when data were not reported at an aggregate level). Published and unpublished data were included. Only English language studies were included. If multiple articles on the same sample were identified, the article with the largest sample was selected for inclusion. If a study did not include data for effect size calculation, the authors were contacted, and the study was excluded if they failed to provide the data. Authors from 14 studies were contacted requesting additional data. We were able to obtain these additional data from three authors (Kurz, Flynn, & Bordieri, 2016; Pellizzer, Waller, & Wade, 2018a; Pinto-Gouveia et al., 2017).

2.2. Data extraction

A coding template was developed to extract necessary data from included studies. The following data were extracted: study name, sample population, study design, intervention and control conditions, gender and racial distribution, mean age and BMI, body image flexibility measure, outcome variables, sample size, correlation value, and quality criteria. The first and second author independently extracted these data. Acceptable agreement was observed between the two coders (kappa > .82 across the characteristics).

2.3. Study quality

Two methods for assessing study quality were used. First, for those included studies that assessed cross-sectional correlates of body image flexibility, a modified version of the Newcastle-Ottowa Scale developed by Modesti et al. (2016) was used to assess study quality. Quality domains assessed were (1) sample size (one point for sample size justification and zero points for no justification), (2) response rate (one point for when comparability between survey respondents and non-respondents are established, zero points when non-respondents or their characteristics are not described), (3) ascertainment of exposure (two points for a validated measure, one point for non-validated measure but was described, or zero points for no description), (4) ascertainment of outcome (two points for interview-based measure, one point for self-report measure, or zero points for no description), and (5) appropriate statistical analyses (one point if the statistical analyses were appropriate, and confidence intervals and associated *p*-values are reported, or zero points if the statistical analyses are not appropriate, described, or incomplete). A quality score was assigned

to each study. The maximum score that could be obtained was seven.

Second, for RCT designs, study quality was assessed using four criteria from the Cochrane Risk of Bias tool (Higgins & Green, 2011): adequate generation of allocation sequence, concealment of allocation to conditions; blinding of outcome assessors or the use of self-report questionnaires; and dealing with incomplete outcome data (assessed as low risk when outcome data used to calculate effect size were based on intention-to-treat analyses). Each domain was rated with either a low risk (+), high risk (-), or unclear.

2.4. Statistical analyses

For the meta-analyses estimating the strength of the association between body image flexibility and continuous psychological constructs, Pearson correlation (r) was selected as the measure of effect size, with values of .10 considered small, .30 considered medium, and .50 considered large (Cohen, 1992). Meta-analyses were only performed on a particular correlate of body image flexibility if three or more studies reported this relationship. If a study used multiple measures to assess a particular construct, then the mean of the effect sizes from each measure within the study was calculated before the effect sizes were pooled (Borenstein, Hedges, Higgins, & Rothstein, 2009). All effect sizes were coded such that higher scores reflected higher levels of body image flexibility. Correlation coefficients were transformed prior to analyses using Fisher's Z_r transformation so that each effect size could be weighted by its inverse variance (Lipsey & Wilson, 2001). For ease of interpretation, these effect sizes were converted back into standard correlation coefficients when reporting results.

For the meta-analysis testing gender differences in body image flexibility, the standardized mean difference (SMD) was selected as the measure of effect size. The SMD was calculated by dividing the difference between the two group means by the pooled standard deviation. Positive SMD indicates that men had higher body image flexibility scores than women. Values of 0.20 are considered small, 0.50 considered medium, and 0.80 considered large (Cohen, 1992).

For the meta-analysis assessing whether body image flexibility is sensitive to change during psychological interventions, the SMD was also calculated by dividing the difference between the two group means (intervention and control condition) by the pooled standard deviation at post-test. There were some instances where RCTs compared more than one intervention group to a control group. When this occurred, we took a conservative approach by conducting additional sensitivity analyses in which the comparison with the smallest effect size was only included in the analysis.

Meta-analyses were performed using Comprehensive Meta-Analysis (Borenstein et al., 2009). Since considerable heterogeneity was expected, random effects models were used for all analyses. Heterogeneity was examined by calculating the I^2 statistic, which quantifies heterogeneity revealed by the $Q_{statistic}$ and reports how much overall variance (0–100 %) is attributed to between-study variance, with values of 25 %, 50 %, and 75 % representing low, moderate, and high heterogeneity, respectively (Higgins & Thompson, 2002). Univariate meta-regressions were also performed to examine whether there was a relationship between continuous study characteristics and effect sizes, as indicated by a regression slope and associated p-value. Per recommendations (Borenstein et al., 2009), meta-regressions were only performed when the study characteristics of at least 10 effect sizes were available. Given the large number of tests performed, the threshold for statistical significance was set at .002 (.05/23 tests; Field, 2013).

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[1] BI-AAQ is the acronym for the Body Image Acceptance and Action Questionnaire, the most widely used measure of body image flexibility. We included this acronym in the search string in case of studies reporting this term over the full measure name.

3. Results

3.1. Study characteristics

Fig. 1 presents a flowchart of the literature search. Fifty-nine articles (62 studies) met full inclusion criteria. Four unpublished studies were identified. For those studies assessing correlates of body image flexibility, most studies used a cross-sectional design (88 %). The remaining studies assessed body image flexibility pre- and post-intervention. All studies used the BI-AAQ (Sandoz et al., 2013), except for one study that used the Body Image Psychological Inflexibility Scale (Callaghan, Sandoz, Darrow, & Feeney, 2015). Seven studies sampled individuals with a clinically significant eating disorder, while the remaining sampled non-clinical student or community populations. The samples mostly comprised women (M = 75.39, SD = 27.16; median = 83 %, range = 0–100 %) and Caucasian individuals (M = 55.02, SD = 33.29; median = 70 %, range = 0–100 %). Quality ratings varied across these studies. The mean rating was 3.76 (SD = 0.83, minimum = 3.0 and maximum = 6.0). The two main reasons for the sub-optimal quality ratings were that few studies provided a justification for their target sample size (15 %) or compared survey completers to non-completers to ensure that no differences were observed (11 %). Half of the studies (52 %) conducted appropriate statistical analyses and reported complete data (i.e., p-values and associated confidence intervals). All studies used psychometric sound measures assessing body image flexibility and the relevant criterion variables. See Table 1 for more detail pertaining to these characteristics.

We located eight RCTs of interventions that assessed changes in body image flexibility (Table 2). The samples studied in these RCTs varied, and included university students, individuals with binge-eating disorder, individuals with a psychosomatic diagnosis, and school-aged children. The interventions also varied, although most were based on the principles and techniques of either the second- or third-wave behaviour therapies. A waiting list was the most common control group. Risk of bias was generally high, with five trials meeting the sequence generation criteria, zero meeting the allocation concealment criteria, eight using a self-report assessment of body image flexibility, and only two reporting data from intention-to-treat analyses.

3.2. Correlates of body image flexibility

Meta-analyses were performed on 19 different psychological correlates of body image flexibility. The results from these meta-analyses are presented in Table 3. For illustrative purposes, we divided these correlates into three broad clusters: (1) body mass, and eating and body image disturbances; (2) positive body-related and general psychological constructs; and (3) general psychopathology.

3.2.1. Body mass, and eating and body image disturbances

Results from the meta-analyses showed that body image flexibility was significantly and negatively associated with body image concerns (k = 27, r = -.67), eating pathology (k = 35, r = -.65), drive for thinness (k = 4, r = -.67), thin-ideal internalization (k = 4, r = -.45), and BMI (k = 28, r = -.26). Effect sizes range from small to large. There was high heterogeneity (I^2 = 75–96 %).

3.2.2. Positive body-related and general psychological constructs

Body image flexibility was significantly and positively associated with body appreciation (k = 16, r = .54), functionality appreciation (k = 8, r = .35), body acceptance by others (k = 7, r = .35), body pride (k = 5, r = .26), intuitive eating (k = 7, r = .58), mindfulness (k = 6, r = .23), psychological flexibility (k = 9, r = .48), self-compassion (k = 10, r = .41), self-esteem (k = 6, r = .44), and

wellbeing (k = 6, r = .38). Effect sizes ranged from small to large. Heterogeneity ranged from 41 to 91 %.

3.2.3. General psychopathology

Body image flexibility was significantly and negatively associated with depressive symptoms (k = 16, r = -.46), anxiety symptoms (k = 9, r = -.39), general psychological distress (k = 14, r = -.58), and perfectionism (k = 4, r = -.37). Effect sizes were moderate to large in strength. Heterogeneity ranged from 0 to 98 %.

3.3. Sensitivity analyses

In light of prior research demonstrating that lower quality studies can produce inflated effect sizes (Cuijpers, van Straten, Bohlmeijer, Hollon, & Andersson, 2010; Linardon, Kothe, & Fuller-Tyszkiewicz, 2019), we conducted a series of sensitivity analyses which involved re-computing the pooled effect sizes only for higher quality studies. Higher quality studies were defined as those that scored above the overall mean quality score. Results from these sensitivity analyses are presented in the Supplementary Materials. Briefly, the magnitude of effect sizes for the relationship between body image flexibility and each psychological construct was highly similar to the main analyses, and none of the relationships changed from statistically significant to statistically non-significant, providing evidence for the robustness of the effect sizes.

3.4. Gender differences

A statistically significant pooled effect size emerged for the comparison between men and women on body image flexibility (k = 15, N = 2,557 men and 4,070 women, d = 0.32 [0.21, 0.44], p < .001), indicating that men had higher levels of body image flexibility than women (see Fig. 2). There was significant heterogeneity (I^2 = 76 %).

3.5. Meta-regressions

Results from the meta-regressions predicting effect sizes from sample characteristics are presented in Table 4. Only one statistically significant (p < .001) moderation effect emerged, such that the effect size for the relationship between body image flexibility and body appreciation was stronger in samples with a higher percentage of women.

3.6. Changes in body image flexibility in randomized controlled trials

The pooled effect size for the 12 comparisons between intervention and control conditions on body image flexibility was a statistically significant d = 0.42 (95 % CI = 0.21, 0.65), indicating that the intervention conditions (N = 1012) produced higher levels of body image flexibility at post-test periods than control conditions (N = 618). There was high heterogeneity (I^2 = 73 %). When restricting the analyses to one effect per study (the smallest effect), the pooled effect size remained statistically significant (d = 0.32, 95 % CI = 0.09, 0.55). When also restricting the analyses to interventions that contained therapeutic strategies specifically designed to enhance body image flexibility (k = 9), the pooled effect size was larger than the overall effect (d = 0.52; 95 % CI = 0.25, 0.78).

4. Discussion

Body image flexibility is a component of positive body image grounded in the theory and principles of the third-wave behavioural therapies for eating and body image disturbances (Sandoz et al., 2013). Accumulating empirical research has begun to understand what role body image flexibility might have on mental

Table 1
Characteristics of Studies included in the Meta-Analysis.

Study	Design	Sample (*n*)	Female %	Caucasian %	Mean Age	Mean BMI	Psychological construct included in the meta-analysis	Quality (0−7)
Alleva, Tylka, and Kroon Van Diest (2017) – Study 1	Cross-section	Adult U.S citizens (253)	48 %	71 %	Women = 36.3 years Men = 33.2 years	Women = 26.8 Men = 26.7	Functional appreciation (FAS) Body appreciation (BAS-2) Thin-ideal internalization (SATAQ) Intuitive eating (IES-2) Dietary restraint (EDE-Q) Eating concerns (EDE-Q) Self-esteem (SISE) Anxiety symptoms (PROMIS) Depressive symptoms (PROMIS) BMI Body dissatisfaction (BSQ)	4
Basarkod, Sahdra, and Ciarrochi (2018)	Cross-section	Adult U.S citizens (752)	45 %	68 %	40.6 years	–	Thin-ideal internalization (SATAQ) Self-compassion (SCS-SF) Psychological distress (GHQ-12) Gender	4
Bhambhani, Flynn, Kellum, and Wilson (2019)	Cross-section	Adult U.S men of color who have sex with men (490) and white men who have sex with men (397)	0%	0% for men of color 100 % for white men	Men of color = 29.6 years White men = 32.0 years	–	Body fat dissatisfaction (MBAS) Muscularity dissatisfaction (MBAS)	4
Bluett et al. (2016)	Intervention	Female patients with an eating disorder attending residential treatment (113)	100 %	92 %	19.0 years	–	Eating pathology (EDI – total)	3
Butryn et al. (2013)	Intervention	Female patients with an eating disorder attending residential treatment (88)	100 %	88 %	25.8 years	–	Eating pathology (EDE-Q global) Drive for thinness (EDI) Body dissatisfaction (BDI) Bulimia (EDI) Psychological distress (OQ)	3
Callaghan et al. (2015) – Study 2	Cross-section	Undergraduate students (336)	76 %	20 %	19.3 years	–	Body appreciation (BAS) Psychological flexibility (AAQ) Body image disturbance (BIDS)	4
Cardoso, Oliveira, and Ferreira (2020)	Cross-section	Community-based adult women (273)	100 %	–	24.1 years	22.6	Eating pathology (EDE-Q global) BMI Intuitive eating (IES-2)	4
Duarte, Ferreira, Pinto-Gouveia, Trindade, and Martinho (2017)	Cross-section	Community-based adults (905)	55 %	–	Men = 24.7 Women = 22.3	Men = 23.7 Women = 21.6	Dietary restraint (IEQ)	4
Duarte, Gouveia, and Mendes (2016)	Cross-section	Community-based adults (1013)	73 %	–	28.3 years	–	Intuitive eating (IES-2)	4
Duarte et al. (2016)	Cross-section	Students and community-based women (853)	100 %	–	28.7 years	22.6	Binge eating (BES) BMI Depressive symptoms (DASS)	4

Table 1 (*Continued*)

Study	Design	Sample (*n*)	Female %	Caucasian %	Mean Age	Mean BMI	Psychological construct included in the meta-analysis	Quality (0−7)
Dutta et al. (2018)	Cross-section	Two distinct samples of medical students (n = 92 for sample 1; n = 103 for sample 2)	39 % 52 %	–	18.2 years (sample 1) 22.4 years (sample 2)	–	Gender	3
Ferreira, Duarte, Pinto-Gouveia, and Lopes (2018)	Cross-section	Community-based adults (401)	52 %	–	18.1 years	–	Perfectionism (PSPS-BI)	4
Ferreira, Pinto-Gouveia, and Duarte (2011)	Cross-section	Community-based adults (679)	84 %	–	19.5 years		BMI Self-compassion (SCS subscales) Body dissatisfaction (FRS & EDI) Drive for thinness (EDI) Bulimia (EDI) Depressive symptoms (DASS) Anxiety symptoms (DASS) Gender	4
Givehki et al. (2020)	Cross-section	Patients with somatic illness (357)	58 %	–	23.4 years	–	Psychological flexibility (AAQ-II) Mindfulness (FMI) Depressive symptoms (DASS) Anxiety symptoms (DASS) BMI	6
He, Cai, Chen, Lu, and Fan (2020)	Cross-section	Undergraduate Chinese students (1068)	53 %	0%	20.1 years	21.3	Psychological flexibility (AAQ-II) Body dissatisfaction (EDI-BD) Psychological distress (K-10) Gender	4
Hill, Masuda, and Latzman (2013)	Cross-section	Community-based adult women (258)	100 %	60 %	28.6 years	26.1	Eating pathology (EAT-26) Body dissatisfaction (BSQ) BMI	3
Kelly, Vimalakanthan, and Miller (2014)	Cross-section	Community-based adult women (153)	100 %	48 %	20.2 years	23.1	BMI Self-compassion (SCS) Self-esteem (RSE) Eating pathology (EDE-Q global) Weight concerns (EDE-Q) Shape concerns (EDE-Q) Eating concerns (EDE-Q) Dietary restraint (EDE-Q)	3
Koushiou, Nikolaou, Mavraki, and Karekla (2020) – Study 1	Cross-section	High school and undergraduate female students (85)	100 %	–	17.9 years	22.1	Weight concerns (WCS) Depressive symptoms (Y1-F) Self-esteem (RSE) Psychological flexibility (AAQ-II)	3
Koushiou et al. (2020) – Study 2	Cross-section	High school and undergraduate female students (240)	83 %	–	21.5 years	22.8	Eating pathology (EDE-Q global) Self-compassion (SCS) Depressive symptoms (DASS) Anxiety symptoms (DASS) Weight concerns (WCS) Psychological flexibility (AAQ-II)	3
Lee, Smith, Twohig, Lensegrav-Benson, and Quakenbush-Roberts (2017)	Cross-section	Females with an eating disorder attending residential treatment (132)	100 %	91 %	19.1 years	–	Eating pathology (EDI-Total) Drive for thinness (EDI) Bulimia (EDI) Body dissatisfaction (EDI) Mindfulness (FFMQ subscales) Depressive symptoms (BDI-II) Anxiety symptoms (BAI)	3

Table 1 (*Continued*)

Study	Design	Sample (*n*)	Female %	Caucasian %	Mean Age	Mean BMI	Psychological construct included in the meta-analysis	Quality (0−7)
Linardon, Messer, Lee, and Fuller-Tyszkiewicz (2019) and Linardon, Kothe et al. (2019)	Cross-section	Women with binge-eating disorder (179)	100 %	81 %	29.2 years	24.1	Binge eating (EDE-Q)	5
		Women without binge eating symptoms (179)	100 %	80 %	29.4 years	25.8	Eating pathology (EDE-Q global) Weight concerns (EDE-Q) Shape concerns (EDE-Q) Eating concerns (EDE-Q) Dietary restraint (EDE-Q) Psychological distress (DASS) Psychosocial impairment (CIA)	
Linardon et al. (2020)	Cross-section	Community-based adults (1,014)	62 %	82 %	Women = 26.6 years Men = 28.5 years	–	Binge eating (EDE-Q) Overvaluation weight/shape (EDE-Q) Eating concerns (EDE-Q) Dietary restraint (EDE-Q) Psychological distress (DASS total) Psychosocial impairment (CIA) Self-compassion (SCS) Self-criticism (SCS)	5
Lucena-Santos, Carvalho, Oliveira, and Pinto-Gouveia (2017)	Cross-section	General population of adult women (294)	100 %	–	40.8 years	32.3	Drive for thinness (EDI) Binge eating (BES)	3
Manaf, Saravanan, and Zuhrah (2016)	Cross-section	Female undergraduate students (206)	100 %	–	19.5 years	–	Eating pathology (EAT) Depressive symptoms (PHQ)	3
Mandavia et al. (2015)	Intervention	Community-based adults (254)	85 %	–	20.7 years	–	Eating pathology (EAT)	3
Manwaring, Hilbert, Walden, Bishop, and Johnson (2018)	Cross-section	Patients with an eating disorder attending treatment program (211)	94 %	–	20.6 years	17.3	Eating pathology (EDI total) Depressive symptoms (BDI-II) Anxiety symptoms (STAI) Mindfulness (KIMS subscales) Mental health problems (PROMIS)	3
Masuda, Hill, Tully, and Garcia (2015)	Cross-section	Men attending college (237)	0%	37 %	20.9 years	23.7	Eating pathology (EAT subscale) BMI	4
Masuda, Latner, Barlie, and Sargent (2018)	Cross-section	Undergraduate women (360)	100 %	18 %	20.1 years	24.3	BMI	3
Meneses, Torres, Miller, and Barbosa (2019)	Cross-section	Community-based older adults (202)	59 %	–	70.7 years	26.9	Body appreciation (BAS-2)	5
Moore, Masuda, Hill, and Goodnight (2014)	Cross-section	Female undergraduate students (573)	100 %	–	21.1 years	22.9	Eating pathology (EAT subscale) Psychological flexibility (AAQ-II) Mindfulness (MASS) BMI	3
Pellizzer, Tiggemann, Waller, and Wade (2018)	Cross-section	Female undergraduate students (328)	100 %	74 %	19.7 years	23.0	Eating pathology (EDE-Q global) Psychosocial impairment (CIA) BMI Depressive symptoms (DASS) Anxiety symptoms Body dissatisfaction (EDI) Perfectionism (MPS)	4
Pellizzer, Waller, and Wade (2018b)	Intervention	Individuals with eating disorders (78)	92 %	88 %	27.1 years	26.7	Eating pathology (EDE-Q global) Psychological distress (DASS)	3
Pena (2017)	Cross-section	College-aged women and men (245)	63 %	–	–	–	Gender	4

Table 1 (*Continued*)

Study	Design	Sample (*n*)	Female %	Caucasian %	Mean Age	Mean BMI	Psychological construct included in the meta-analysis	Quality (0−7)
Perey and Koenigstorfer (2020)	Cross-section	Community-based adult women (250)	100 %	85 %	42.6 years	26.9	Self-compassion (SCS) Eating pathology (EDE-Q global) Body appreciation (BAS-2) BMI	4
Pinto-Gouveia et al. (2017)	Intervention	Women who are overweight/obese with binge-eating disorder (36)	100 %	–	42.7 years	34.5	Eating pathology (EDE-Q global) Binge eating (BES) Depressive symptoms (BDI) Self-compassion (SCS) Mindfulness (FFMQ subscales)	3
Prowse, Bore, and Dyer (2013)	Cross-section	Undergraduate students (411)	75 %	–	22.5 years	–	Eating pathology (EDE-Q global) Weight concerns (EDE-Q) Shape concerns (EDE-Q) Eating concerns (EDE-Q) Dietary restraint (EDE-Q) Mindfulness (KIMS subscales) Gender	3
Ramsey (2018)	Cross-section	Community-based women (391)	100 %	85 %	49.9 years	28.2	BMI Body appreciation (BAS-2)	3
Sandoz et al. (2013)	Cross-section	Study 1: Undergraduate students (182)	70 %	68 %	19.6 years	–	**Study 1** BMI Psychological flexibility (AAQ) Body dissatisfaction (BSQ) Bulimic symptoms (BULIT-R) Dieting (EAT-26)	3
		Study 2: Undergraduate students (288)	60 %	77 %	19.5 years		**Study 2** Psychological flexibility (AAQ) Body dissatisfaction (BSQ) Bulimic symptoms (BULIT-R) Dieting (EAT-26)	
Schoenefeld and Webb (2013)	Cross-section	Female undergraduate students (322)	100 %	67 %	19.4 years	23.5	Self-compassion (SCS) Intuitive eating (IES) Self-esteem (RSE) BMI	4
Soulliard and Vander Wal (2019)	Cross-section	Sexual orientation minority adults (223)	53 %	80 %	32.4 years	–	Body appreciation (BAS-2) Functionality appreciation (FAS) Body dissatisfaction (EPSI – BD) Binge eating (EPSI – BD) Purging (EPSI – BD) Dietary restraint (EPSI – BD) Intuitive eating (IES-2) Psychological distress (PROMIS) Gender	3

Table 1 (*Continued*)

Study	Design	Sample (*n*)	Female %	Caucasian %	Mean Age	Mean BMI	Psychological construct included in the meta-analysis	Quality (0−7)
Swami, Weis, Barron, and Furnham (2017)	Cross-section	Community-based U.S adults (314)	48 %	88 %	32.5 years	25.8	Body appreciation (BAS-2) Body pride (BASES-AP) Body acceptance by others (BAOS) Gender	3
Swami, Weis, Barron, and Furnham (2018)	Cross-section	Community-based UK adults (1148)	62 %	88 %	34.8 years	25.9	Body appreciation (BAS-2) Body pride (BASES-AP) Body acceptance by others (BAOS) Wellbeing (MHC-SF subscales) BMI Gender	3
Swami, Laughton, Grover, and Furnham (2019) – Study 2	Cross-section	Community-based British adults (377)	50 %	92 %	37.0 years	25.3	Body appreciation (BAS-2) Body acceptance by others (BAOS) Functionality appreciation (FAS) BMI	3
Swami, Furnham, Horne, and Stieger (2020)	Cross-section	Community-based adults (501)	50 %	87 %	36.4 years	24.5	Body appreciation (BAS-2) Body pride (BASES-AP) Body acceptance by others (BAOS) Functionality appreciation (FAS) Gender	4
Tang, Cooper, Wang, Song, and He (2020) [a]	Cross-section	Undergraduate Chinese students (989)	50 %	0%	20.1 years	Women = 20.6 Men = 21.5	Dietary restraint (TFEQ)	4
Trindade, Ferreira, and Pinto-Gouveia (2018)	Cross-section	Undergraduate and graduate students (737)	100 %	0%	21.7 years	21.7	BMI Body Image discrepancy (FRS) Wellbeing/Quality of life (WHOQOL psychological subscale)	4
Wade et al. (2019) – Study 1	Intervention	Undergraduate students with elevated perfectionism (51)	78 %	–	25.1 years	–	Perfectionism (MFPP subscales) Psychological distress (DASS depression & anxiety subscales combined)	6
Wade et al. (2019) – Study 2	Intervention	Undergraduate students with elevated perfectionism (55)	85 %	–	26.7 years	–	Perfectionism (MFPP subscales) Psychological distress (DASS total)	6
Webb (2015)	Cross-section	White college-bound females (84)	100 %	100	17.9 years	22.7	BMI Body appreciation (BAS) Body image concerns (CBSR, PIDR, CIDR, TFPR, C-PID, C-CID, C-TFP)	5

Table 1 (*Continued*)

Study	Design	Sample (*n*)	Female %	Caucasian %	Mean Age	Mean BMI	Psychological construct included in the meta-analysis	Quality (0–7)
Webb et al. (2014)	Cross-section	Black older adolescent females (247)	100 %	0	17.8 years	25.4	BMI Body appreciation (BAS) Body image concerns (CBSR, PIDR, EIBSR, TEFPBSR, CPID, CEGID, CTEFPD) Self-compassion (SCS)	5
Webb and Hardin (2016)	Cross-section	College women (333)	100 %	63 %	19.4 years	23.4	Intuitive eating (IES-2) BMI	4
Wendell, Masuda, and Le (2012) – Study 1	Cross-section	Undergraduate students (208)	79 %	36 %	18.8 years	–	Eating pathology (EDE-Q global) Gender	4
Wendell et al. (2012) – Study 2	Cross-section	Undergraduate students (178)	63	40%	19.4 years	–	Eating pathology (EDE-Q global) Gender	4
Wu, Niu, Ni, Shao, and Luo (2019)	Cross-section	Female adolescents from a public middle school in China (646)	100 %	0%	14.4 years	–	BMI Body image concerns (SIQ) Eating pathology (EAT total score)	4
Walloch (2015)	Cross-section	Adult gay men (24)	0%	37 %	28.5 years	–	Bulimia (EAT subscale) Dieting (EAT subscale) Body dissatisfaction (MBAS total) Weight/shape concerns (EDE-Q subscales, BSQ)	4
Westercamp (2012)	Cross-section	Undergraduate and graduate students (248)	52 %	51 %	22.2 years	23.7	Thin ideal internalization (SATAQ) Self-esteem (RSE) Eating concern (EDE-Q subscale) Dietary restraint (EDE-Q subscale) Eating pathology (EDE-Q global) Depressive symptoms (BDI)	3

Note. EDE-Q = Eating Disorder Examination Questionnaire; BDI = Beck Depression Inventory; RSE = Rosenberg Self-Esteem Scale; EAT = Eating Attitudes Test; SATAQ = Sociocultural Attitudes Towards Appearance Questionnaire; MBAS = Male Body Attitudes Scale; SIQ = Self-Image Questionnaire; IES = Intuitive Eating Scale; SCS = Self-Compassion Scale; BAS = Body Appreciation Scale; CBSR = Current Body Size Rating; PIDR = Personal Ideal Body Size Rating; EIBSR = Ethnic Group Ideal Body Size Rating; TEFPBSR = Typical Ethnic Female Peer Size Rating; CPID = Current Personal Ideal Discrepancy; CEGID = Current Ethnic Group Ideal Discrepancy; CTEFPD = Current Typical Ethnic Female Peer Discrepancy; BSQ = Body Shape Questionnaire; CIDR = Cultural Ideal Body Size Rating; TFPR = Typical Female Body Size Rating; C-CID = Current Minus Cultural Ideal Body Size Discrepancy; C-TFP = Current Minus Typical Female Peer Body Size Discrepancy; DASS = Depression Anxiety Stress Scale; MFPP = Frost Multidimensional Perfectionism Scale; FRS = Figure Rating Scale; FAS = Functionality Appreciation Scale; SISE = Single Item Self-Esteem; PROMIS = Patient-Reported Outcomes Measurement Information System; BAOS = Body Acceptance of Others Scale; EDI = Eating Disorder Inventory; GHQ-12 = General Health Questionnaire; BASES-AP = Body and Appearance Self-Conscious Emotions Scale; BES = Binge Eating Scale; IEQ = Inflexible Eating Questionnaire; BIDS = Body Image Disturbance Scale; OQ = Outcome Questionnaire; AAQ-II = Acceptance and Action Questionnaire; MASS = Mindful Attention Awareness Scale; CIA = Clinical Impairment Assessment; BULIT-R = Bulimia Test Revised; PSPS-BI = Perfectionistic Self-Presentation Scale – Body Image; K-10 = Kessler Psychological Distress Scale; KIMS = Kentucky Inventory of Mindfulness Skills; FFMQ = The Five Facet Mindfulness Questionnaire; WCS = Weight Concern Scale; TFEQ = Three Factor Eating Questionnaire; PHQ = Patient Health Questionnaire.

[a] Note that the sample used in Tang et al. (2020) is the same as the sample used in He, Cai et al. (2020) and He, Sun et al. (2020). Tang et al. (2020) investigated some correlates that were not reported in He, Cai et al. (2020) and He, Sun et al. (2020). Meta-analyses were conducted on these correlates but not on those that were also assessed in He, Cai et al. (2020) and He, Sun et al. (2020).
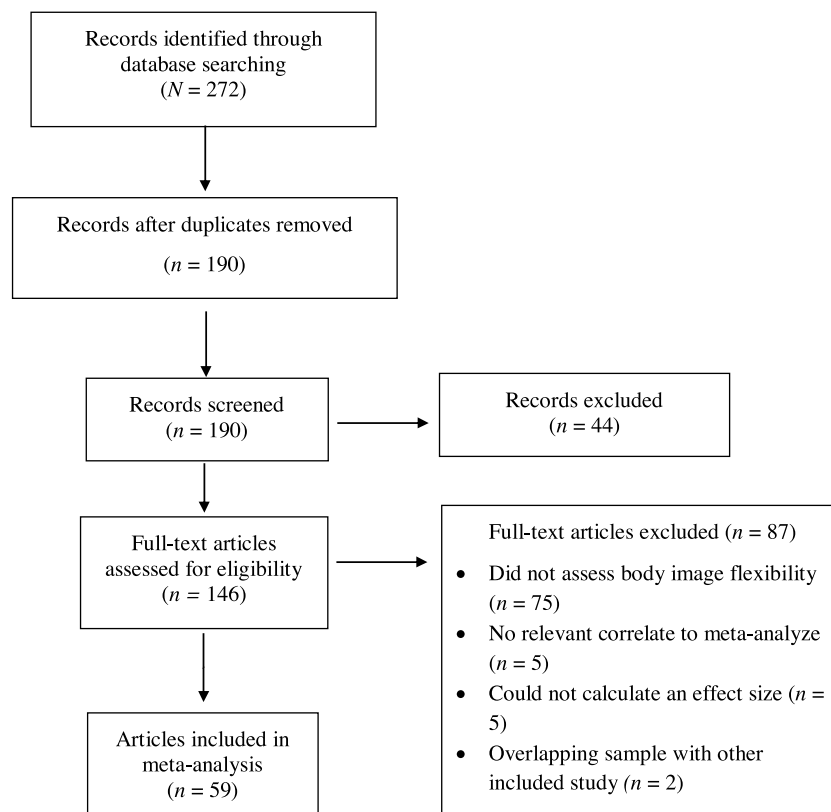
Records identified through
database searching
(*N* = 272)

↓

Records after duplicates removed
(*n* = 190)

↓

Records screened   →   Records excluded
(*n* = 190)   (*n* = 44)

↓

Full-text articles   →   Full-text articles excluded (*n* = 87)
assessed for eligibility
(*n* = 146)   • Did not assess body image flexibility
                                     (*n* = 75)
                                   • No relevant correlate to meta-analyze
                                     (*n* = 5)
                                   • Could not calculate an effect size (*n* =
                                     5)
↓   • Overlapping sample with other
                                     included study (*n* = 2)

Articles included in
meta-analysis
(*n* = 59)

Fig. 1. Flow-chart of literature search.

Table 2
Characteristics of Included Randomized Controlled Trials.

Study	Sample	Intervention group	Control Group	Risk of Bias
Duarte, Pinto-Gouveia, and Stubbs (2017)	Individuals with binge-eating disorder.	CARE – a 4 week blended compassion, mindfulness, and acceptance-based intervention designed to address binge eating (n = 17 randomized)	Waiting list (n = 16 randomized)	?? SR -
Givehki et al. (2018)	Individuals diagnosed with a psychosomatic disorder based on DSM-5.	Acceptance and commitment therapy – 10 weekly 90 min sessions designed to improve body image and mindfulness skills (n = 25 randomized)	1. Treatment as usual (n = 25 randomized) 2. Active control (n = 25 randomized)	+? SR -
Pennesi and Wade (2018)	University women with elevated weight concerns.	1. One week online imagery rescripting intervention (n = 38 randomized) 2. One week online dissonance-based intervention (n = 39 randomized)	1. Mind wandering control group (n = 38)	+? SR -
Pinto-Gouveia et al. (2017)	Individuals with binge-eating disorder.	BEfree – 12 group sessions of a blended psychoeducation, mindfulness and compassion-focused intervention (n = 34 randomized)	Waiting list (n = 25 randomized)	?? SR -
Rodgers et al. (2018)	Adolescents and emerging adult students	BodyMojo – an app-based mindfulness, self-compassion and acceptance-based intervention (n = 129 randomized)	Waiting list (n = 130 randomized)	+? SR -
Sundgot-Borgen et al. (2020)	Male and female school students	Health Body Image – workshops aimed at cultivating positive body image processes (n = 1499 randomized)	Waiting list (n = 947 randomized)	+? SR -
Wade et al. (2019) – Study 1	University students with self-reported problems with perfectionism	ICBT-P – an 8 module, internet-based cognitive-behavioral intervention designed to address perfectionistic tendencies (n = 28 randomized)	Waiting list (n = 23 randomized)	+? SR +
Zhou, Pennesi, and Wade (2020)	University women with elevated weight concerns.	1. Online body-based imagery rescripting intervention (n = 35 randomized) 2. Online general imagery rescripting intervention (n = 31 randomized)	Mind wandering control group (n = 30)	?? SR +

Note. In the risk of bias column a "-" sign (low risk), a "?" (unclear), or a - sign (high risk) is given for the four items of risk of bias: allocation sequence; concealment of allocation to conditions; blinding of assessors; and intention-to treat analyses. For Blinding of assessor we reported "SR" when only self-report outcome measures were used.

Table 3
Meta-Analyses on the Relationship between Body Image Flexibility and Psychological Constructs.

Construct	k	n	r (95% CI)	I^2
Body Mass, and Eating and Body Image Disturbances				
Body image concerns	27	9261	−.67 (−.73, −.61)	96 %
Eating pathology	35	9401	−.60 (−.65, −.54)	94 %
Drive for thinness	4	1193	−.67 (−.74, −.59)	75 %
Thin ideal internalisation	4	1263	−.45 (−.59, −.28)	89 %
Body mass index	28	10956	−.26 (−.31, −.20)	88 %
Positive Body-Related and General Psychological Constructs				
Body appreciation	16	4326	.54 (.46, .61)	91 %
Functionality appreciation	8	2368	.35 (.26, .43)	80 %
Body acceptance by others	7	2340	.35 (23, .46)	89 %
Body pride	5	1963	.26 (.11, .41)	91 %
Intuitive eating	7	2417	.58 (.53, .63)	70 %
Mindfulness	6	1722	.23 (.09, .37)	88 %
Psychological flexibility	9	3200	.48 (.41, .54)	79 %
Self-compassion	10	3480	.41 (.32, .49)	87 %
Self-esteem	6	1061	.44 (.37, .50)	41 %
Wellbeing/satisfaction with life	6	3310	.38 (.29, .46)	88 %
General Psychopathology				
Depressive symptoms	16	4838	−.46 (−.51, −.41)	74 %
Anxiety symptoms	9	2396	−.39 (−.42, −.35)	0%
Psychological distress	14	4758	−.58 (−.68, −.45)	98 %
Perfectionism	4	618	−.37 (−.59, −.09)	89 %

All effect sizes are statistically significant at $p < .001$, except trait-level mindfulness ($p = .002$), body pride ($p = .001$), and perfectionism ($p = .010$). Note that k = number of effect sizes and n = total sample size per analysis.

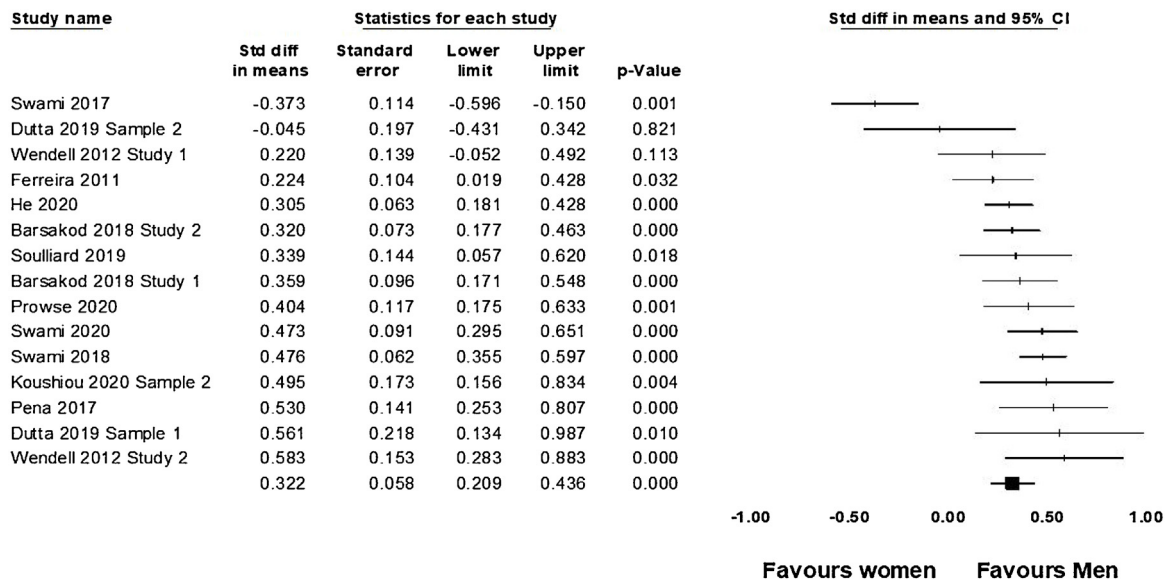| Study name	Statistics for each study					Std diff in means and 95% CI
	Std diff in means	Standard error	Lower limit	Upper limit	p-Value	
Swami 2017	-0.373	0.114	-0.596	-0.150	0.001	
Dutta 2019 Sample 2	-0.045	0.197	-0.431	0.342	0.821	
Wendell 2012 Study 1	0.220	0.139	-0.052	0.492	0.113	
Ferreira 2011	0.224	0.104	0.019	0.428	0.032	
He 2020	0.305	0.063	0.181	0.428	0.000	
Barsakod 2018 Study 2	0.320	0.073	0.177	0.463	0.000	
Soulliard 2019	0.339	0.144	0.057	0.620	0.018	
Barsakod 2018 Study 1	0.359	0.096	0.171	0.548	0.000	
Prowse 2020	0.404	0.117	0.175	0.633	0.001	
Swami 2020	0.473	0.091	0.295	0.651	0.000	
Swami 2018	0.476	0.062	0.355	0.597	0.000	
Koushiou 2020 Sample 2	0.495	0.173	0.156	0.834	0.004	
Pena 2017	0.530	0.141	0.253	0.807	0.000	
Dutta 2019 Sample 1	0.561	0.218	0.134	0.987	0.010	
Wendell 2012 Study 2	0.583	0.153	0.283	0.883	0.000	
	0.322	0.058	0.209	0.436	0.000	

Favours women   Favours Men

Fig. 2. Meta-Analysis of Gender Differences in Body Image Flexibility.

health generally, and on eating pathology and body image disturbances more specifically. We present the first meta-analytic review of the body image flexibility literature.

Consistent with our hypotheses, we observed strong pooled effect sizes (rs = −.45 to −.67) for the relationships between body image flexibility and indices of eating and body image disturbances. This suggests that individuals who are better able to embrace rather than suppress negative body-related experiences are less likely to report concerns about their body, buy into and strive for societal appearance ideals, and exhibit dysfunctional attitudes and behaviours towards eating. These statistical associations align with theoretical proposals that body image flexibility may serve some protective function against eating and body image disturbances, possibly through adaptive affect regulation mechanisms (Webb, Butler-Ajibade, & Robinson, 2014). Perhaps those who are able to attend to experiences that threaten their body image with an attitude of acceptance, kindness, and compassion are less likely to

feel the urge to act on these experiences via maladaptive coping strategies, such as dietary restriction, binge eating, or compensatory behaviours. Instead, these individuals may recognize that threats to body image are a common experience encountered by most people, but that it does not have to affect their overall outlook or mood, perceptions of the self, or motivation to continue to behave in a value-consistent manner. This interpretation may also in part explain why we observed moderate to large inverse correlations between body image flexibility and general mental health problems (e.g., distress, depression, and anxiety symptoms).

Significant meta-analytic correlations (rs = .23–.58) were also observed for the relationships between body image flexibility and numerous positive body-related and general psychology constructs. These findings suggest that those who possess the characteristics of body image flexibility are also more likely to exhibit healthy attitudes and behaviours both within (e.g., intuitive eating, body appreciation) and outside (e.g., life satisfaction,

Table 4
Univariate Meta-Regressions Predicting Effect Sizes from Covariates.

Construct	Covariate	k	b (SE)	95 % CI	p
Body image concerns	Women	27	−0.00 (.00)	−0.00, 0.00	.932
	Caucasian	22	−0.00 (.00)	−0.01, 0.00	.385
	Age	27	−0.02 (.01)	−0.03, -0.01	.025
	BMI	12	−0.05 (.05)	−0.15, 0.04	.294
Eating pathology	Women	35	−0.00 (.00)	−0.00, 0.00	.117
	Caucasian	22	−0.00 (.00)	−0.01, 0.00	.353
	Age	35	0.00 (.01)	−0.01, 0.01	.878
	BMI	22	0.01 (.01)	−0.02, 0.04	.591
Body mass index	Women	28	−0.00 (.00)	−0.01, -0.00	.030
	Caucasian	23	0.00 (.00)	−0.00, 0.01	.066
	Age	28	0.00 (.00)	−0.00, 0.01	.096
Body appreciation	Women	16	0.00 (.00)	0.00, 0.01	**<.001**
	Caucasian	15	−0.00 (.00)	−0.01, 0.00	.125
	Age	16	−0.01 (.00)	−0.02, -0.00	.004
	BMI	14	−0.07 (.05)	−0.16, 0.02	.154
Self-compassion	Women	10	0.00 (.00)	−0.00, 0.00	.422
	Age	10	0.00 (.01)	−0.01, 0.01	.370
Depressive symptoms	Women	16	0.00 (.00)	−0.00, 0.00	.525
	Age	16	−0.01 (.01)	−0.02, 0.00	.128
Psychological distress	Women	14	−0.00 (.01)	−0.01, 0.01	.929
	Caucasian	10	−0.00 (.00)	−0.01, 0.01	.236
	Age	13	0.01 (.02)	−0.02, 0.04	.574
Gender	Age	14	−0.00 (.01)	−0.01, 0.12	.692

self-esteem) of the domain of eating and body image. Since many of these body-related and general positive psychology constructs have been temporally and causally linked with mental health and wellbeing improvements (Atkinson & Wade, 2012; Du, King, & Chi, 2017; Keng, Smoski, Robins, Ekblad, & Brantley, 2012), these findings are consistent with the notion that cultivating body image flexibility may lead to concurrent increases in these constructs, or vice versa. This idea is supported by recent research showing that mindfulness and compassion-focused interventions that effectively reduced eating disorder and general psychopathology also led to concurrent increases in body image flexibility (Pinto-Gouveia et al., 2017).

No consistent moderating variables were identified. However, these null results should not be taken as conclusive evidence that these sample characteristics are not relevant to these relationships. Meta-regression only enabled us to detect if a variable was or was not associated with effect sizes *across* studies. A better method to test whether those demographic characteristics moderate these relationships is to pool data from multiple studies and conduct an individual participant-level meta-analysis. The increasing availability of datasets through open science practices may make this feasible in future reviews in this area.

As expected, women reported significantly lower levels of body image flexibility than men. The pooled effect size was remarkably similar to the magnitude of gender differences in body appreciation (d = 0.27) reported in a recent meta-analysis (He, Sun, Zickgraf, Lin, & Fan, 2020). Importantly, as the sex invariance of the BI-AAQ has been established (Linardon, Messer, Lisboa, Newton, & Fuller-Tyszkiewicz, 2020), women and men's mean scores on this measure can be compared, and any gender differences are not due to instrument artefacts.

These findings may be interpreted within the context of the sociocultural pressures faced by men and women. Although both men and women experience pressure to look and present a certain way, the pressure experienced by women in contemporary society is typically more pronounced (Grogan, 2016). Consequently, women encounter internal and external experiences that threaten their body image at a much more frequent rate than

men (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Perhaps being saturated with experiences that send the message that women need to regularly monitor their appearance and look a certain way makes it more difficult for them to approach their thoughts and feelings about their body with an attitude of non-judgemental acceptance, or at least sustain this attitude over long periods. This might also explain why women are much more likely to engage in appearance altering behaviours (e.g., dieting and various weight-control behaviours), and body image avoidant coping strategies (e.g., social withdrawal, thought suppression; Cash et al., 2005; Jones, 2001; Striegel-Moore et al., 2009; Tiggemann, 2015), which are incompatible with the characteristics of body image flexibility.

A key aim of this meta-analysis was to investigate whether body image flexibility was sensitive to change during psychological interventions. From eight RCTs, we observed a moderate between-groups effect size, indicating that body image flexibility can be learnt through psychological interventions. Expectedly, the effect size was stronger among studies that contained one or more strategies designed to cultivate body image flexibility (i.e., those based on third-wave behaviour principles). However, it is important to point out that many of the included RCTs contained small sample sizes, received a high risk of bias rating, and did not deliver a credible control condition that controls for non-specific processes. Thus, before any definitive conclusions can be made regarding whether body image flexibility can be enhanced during psychological interventions, more higher quality, adequately powered RCTs are needed. Moreover, as body image flexibility is a hypothesized change mechanism (Sandoz et al., 2013), future RCTs need to ensure that session-by-session changes in body image flexibility are recorded so that one can test whether increases in body image flexibility prospectively predict immediate reductions in eating and body image disturbances.

It is important to point out that all but one included study used the BI-AAQ to measure body image flexibility. Each item of the BI-AAQ is negatively worded (e.g., "*I shut down when I feel bad about my weight or shape*"), raising concerns about this measure's content and face validity with respect to body image flexibility and to positive

body image constructs more broadly. Thus, it has been suggested that the BI-AAQ measures the *absence* of a maladaptive relationship with the experience of body image threats, rather than the *presence* of acceptance, flexibility, and compassion in the face of such body threats (Webb et al., 2015). As positive body image is multi-faceted and does not represent the opposite end of the continuum from negative body image (Tylka & Wood-Barcalow, 2015a), development of a measure that contains positively valanced item content that taps into the presence of body image flexibility attributes would significantly advance our understanding of this construct. The limitations of the BI-AAQ may explain why this measure shared much more overlapping variance with other measures of eating and body image disturbances (and, as such, may represent a proxy or by-product of these various psychopathology constructs) than with other positive body image constructs. If body image flexibility does indeed represent a potential therapeutic change mechanism, intervention target, or determinant of treatment outcomes, then future interventional research is needed to control for the various eating and body image disturbances that overlap with BI-AAQ scores, or use a new measure of body image flexibility that overcomes the limitations of the BI-AAQ.

This meta-analysis has limitations to consider. First, the vast majority of studies included in this meta-analysis contained non-clinical student or community samples made up of mostly women of Caucasian descent. Therefore, the strength of the associations reported in this study may be limited in their generalizability. It is important for future research to actively recruit participants of different genders, ethnicities, weight classes, and symptom severities so that we can confirm whether body image flexibility operates similarly across these groups. Second, given the state of the literature, effect sizes were based on cross-sectional data, which precludes any inferences of temporal precedence. Now that we have a strong evidence base of cross-sectional associations between body image flexibility and mental health variables, researchers studying body image flexibility should opt for naturalistic longitudinal or ecological momentary assessment designs to explore the dynamic relationships between these variables over time (e.g., Tan et al., 2019). Third, all studies used self-report questionnaires to assess the constructs included in this meta-analysis. While convenient and efficient, self-report questionnaires can be subject to retrospective recall biases, with research showing that individuals tend to overestimate their eating and body image concerns with this method of assessment (Berg, Peterson, Frazier, & Crow, 2011).

In sum, we presented the first quantitative synthesis of the body image literature. We found strong evidence that body image flexibility is connected to various adaptive psychological processes, including lower levels of eating, body image, and mental health disturbances, and higher levels of positive body-related and general psychology constructs. Men exhibit higher levels of body image flexibility than women, and nascent findings from RCTs indicate that body image flexibility could potentially be learnt through psychological interventions. A shift in focus should now be made towards uncovering temporal or possible causal relationships between body image flexibility and key psychological constructs.

Author contributors

We confirm that the manuscript has been approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We also confirm that the work has not been published previously or is not under consideration for publication elsewhere.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.bodyim.2021.02.005.

Declaration of Competing Interest

The authors report no declarations of interest.

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