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Media effects of experimental presentation of the ideal physique on eating disorder symptoms: A meta-analysis of laboratory studies ☆

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HIGHLIGHTS

- A meta-analysis of controlled studies of media exposure is performed.
- Small to moderate effects of media exposure on body image and eating disturbed symptoms were found.
- This study builds upon previous meta-analyses in its focus on controlled laboratory studies.

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ABSTRACT

Background: Older meta-analyses of the effects of the media's portrayal of the ideal physique have found small effects revealing that exposure to the ideal physique increases body image concerns. These meta-analyses also included correlational, quasi-experimental, and experimental studies, with limited examination of moderators and other relevant outcomes besides body image.
Methods: We conducted a systematic literature search and identified 33 experimental (i.e., pre and post data for both experimental and control groups) laboratory studies examining the effects of acute exposure to the media's portrayal of the ideal physique on eating disorder symptoms (i.e., body image, positive affect, negative affect, self-esteem, anger, anxiety and depression) and the mechanisms that moderate this effect.
Results: Fourteen separate meta-analyses revealed a range of small to moderate effect sizes for change in outcomes from pre to post for both experimental and control groups. Exposure to images of the ideal physique resulted in small effect sizes for increased depression and anger and decreased self-esteem and positive affect. Moderator analyses revealed moderate effect sizes for increased depression and body dissatisfaction among high-risk participants.
Conclusions: This meta-analysis makes it clear that media exposure of the ideal physique results in small changes in eating disorder symptoms, particularly with participants at high risk for developing an eating disorder. Further research is needed to examine the longitudinal effects of media exposure of eating disorder symptoms.

Contents

☆ The following authors were kind enough to provide information to compute effect sizes when the information was not available in the original article: Agliata and Tantleff-Dunn (2004); Fister and Smith (2004); Hargreaves and Tiggemann (2003, 2004); Tiggemann and Slater (2004); Patrick et al. (2004); and van den Berg and Thompson (2007). The following authors provided information regarding their studies that were published in non-English journals: Petersen (2005): German and Steenhuis et al. (2005): Dutch. The following authors provided unpublished data: Barta (2002); Becker and Frindell (2006); Dittmar and Howard (2004a, 2004b); Dittmar et al. (submitted for publication); Durkin, Paxton, and Sorbello (2007); Lew et al. (2007); and Harrison, Taylor, and Marske (2006). Leigh Cohn (Editor-in-Chief) was kind enough to provide potential references from Eating Disorders: The Journal of Treatment and Prevention; as well as post a request for unpublished data on the AED listserv. Thanks to Besty Becker and Ariel M. Aloe (Florida State University) for their expertise with coding and data analyses. Funded by NIH RO3 MH070389-01 (Hausenblas PI and Thompson Co-I).
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1. Introduction

Because of the increased prevalence of eating disorders and their chronic nature, theoretically examining their precipitating and perpetuating mechanisms are essential for establishing effective prevention and treatment programs (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Sociocultural models identify how the cultural values of the ideal physique negatively influence people's values, affect, and behaviors regarding their own physique, resulting in the acquisition and maintenance of body image and eating disturbances in vulnerable people. The mass media's portrayal of the culturally-ideal physique of a thin, lean, tall, and youthful physique for women and a lean and muscular physique for men is believed to be a main impetus behind increases in eating disorder symptoms (e.g., increased body dissatisfaction, anxiety, depression and negative mood); with repeated acute mass media exposure cultivating, activating, and reinforcing chronic body-image and eating disturbance for at-risk individuals (Levine & Harrison, 2004). The most significant source of data examining the media effects on eating disorder symptoms are laboratory experiments that expose participants to ideal physique images to determine their acute impact on body image and eating disorder symptoms, because these studies enable us to "model" and thus more carefully examine the causal nature and moderating mechanisms of media exposure.

Five published meta-analyses on the effects of the media on body image concerns exist (Blond, 2008; Grabe, Ward, & Hyde, 2008; Groesz, Levine, & Murnen, 2002; Holmstrom, 2004; Want, 2009). Groesz et al. (2002) meta-analysis of 25 quasi-experimental and experimental studies examining female body image found a moderate effect size ($d = -.31$), which supports the proposal that experimental exposure to thin media images leads to immediate post exposure increases in body dissatisfaction. In contrast, Holmstrom (2004) analyzed findings from 34 mixed experimental and correlational studies and found a small effect size ($r = .08$) suggesting minimal influence of media exposure on women's body image. In the most comprehensive review to date, Grabe et al. (2008) examined 77 experimental and correlational studies and found that media exposure for women resulted in increased body dissatisfaction ($d = -.28$), internalization of the thin ideal ($d = -.39$), and eating disordered behaviors/beliefs ($d = -.30$). Similarly, Want (2009) examined 47 experimental studies and found that media exposure resulted in decreased appearance satisfaction for women ($d = -.35$) and that pre-existing appearance concerns and the processing instructions participants were given moderated the size of the effect. Finally, Blond (2008) conducted a meta-analysis of 15 experimental studies and found that exposure to images of idealized male bodies had a small negative impact on men's body dissatisfaction ($d = .42$).

In general, these reviews indicate the immediate negative impact of acute media exposure, however, study limitations exist. First, the studies reviewed included correlational, quasi-experimental (i.e., post assessments only for media and control conditions or pre–post assessment for media condition only), and experimental designs (pre–post exposure assessment for both a media and control condition). When experimental studies were included, the authors often failed to control for pre-assessment scores when computing the effect sizes. Combining the varying study designs renders it impossible to differentiate between changes in the outcomes over time as opposed to the effects of exposure, thus rendering the results difficult to interpret regarding the cause–effect of media exposure. Thus, in our meta-analysis, we focused exclusively on studies that tested whether the change in the outcomes following exposure were significantly greater in the experimental versus control conditions.

Second, we examined whether the media's negative effects of the earlier meta-analyses remained when limited to experimental studies (i.e., computing effect sizes controlling for pre-assessment scores). We also wanted to examine which characteristics of the studies were related to the effect sizes. Of significance, the five aforementioned reviews focused exclusively on either women or men, thus, excluding a comparison of gender differences. Additionally, we wanted to evaluate other putative moderating variables.

Thus, an updated meta-analysis examining experimental studies is warranted to advance our understanding of media effects in several important ways. The first aim of this review is to provide a statistical summary of the laboratory research examining the acute exposure to the media's portrayal of the ideal physique on eating disorder symptoms, along with body-image concerns, negative affect, and self-esteem. The second aim is to examine moderator effects, such as participant, media, delivery, and design features that might moderate intervention effects. The third aim is to discuss theoretical, methodological, and statistical limitations of the literature and explore promising directions for future research in light of the findings.

2. Method

2.1. Sample of studies

Our overarching goal was to examine the effects of controlled, experimental presentations of the media's portrayal of the ideal physique on eating disorder symptoms. Consequently, we used four procedures to attempt to retrieve all published and unpublished research. To minimize the effects of publication bias, we made a concerted effort to locate more obscure journals, to retrieve unpublished research, and to obtain the details of studies whose initial presentations made it impossible to

calculate "simple" effect sizes (Rosenthal, 1995). First, we conducted computer-based searches in PubMed, Dissertation Abstracts International, and PsycINFO, using the following keywords: body image, media, affect, eating disorder, eating pathology, sociocultural, body dissatisfaction, body satisfaction, bulimia nervosa, anorexia nervosa, and television. Second, we manually searched the reference sections of all identified articles, review articles, books, and book chapters. We also manually searched all issues of the following pertinent journals: Body Image; Eating Behaviors; Eating Disorders: The Journal of Treatment and Prevention; International Journal of Eating Disorders; Sex Roles; Journal of Social and Clinical Psychology; Journal of Eating and Weight Disorders; and European Eating Disorders Review. Third, we contacted active researchers in the field to retrieve either current or unpublished research (see article footnote). Finally, we requested unpublished reports through the Academy of Eating Disorders electronic mailing listserv. No language restrictions were applied.

2.2. Selection criteria

Inclusion criteria were liberal by design, in that a substantial goal of our meta-analysis was to test interactions of effect sizes with study features rather than holding these features constant. Inclusion criteria were that:

(a) The independent variable was supraliminal exposure (i.e., attentive processing whereby stimulus materials were consciously noticed; Healy & Proctor, 2003) of the ideal physique as presented in the mass media. Studies that presented attractive peers were excluded, as were studies (or conditions) that had media stimuli of attractive faces only (e.g., Richins, 1991, Study 3).
(b) The dependent variable was an eating disorder symptom outcome measure.
(c) The study design was experimental. Experimental designs had pre- and post-assessments for both a media and control condition. We excluded studies that were correlational, did not have a control group, or reported only post-exposure data because it is impossible to differentiate between spontaneous changes in the outcomes over time as opposed to the effects of exposure. It was necessary to control for initial levels of the outcome variable because otherwise the analyses are not providing a test of exposure change across conditions.
(d) There was sufficient information to compute an effect size. When sufficient data were not presented in the study, we contacted the author(s) in an attempt to obtain the data needed to compute an effect size. To clarify whether multiple reports from one research group came from independent samples, we compared the demographic data and descriptions of participants. We represented the effects from either different experiments or data sets as distinct provided that the samples were independent.
(e) We attempted to included both English and non-English articles to address language bias (i.e., studies with statistically significant results are more likely to be published in English; Hopewell, Clarke, & Mallett, 2005).
(f) We included both published and unpublished studies. When a study was available as both a dissertation and as a published article, we attempted to retrieve both formats because dissertations/theses tend to contain more information (e.g., detailed description of participants, descriptive statistics, and specific statistics and degrees of free for effects that are not statistically significant). Both formats are doubled asterisked in the reference section; however, data that were available in both formats counted as only one study for the purpose of our meta-analysis.
(g) The study had same-sex media images. For example, if men viewed female ideal images, we did not include this study (Hargreaves & Tiggemann, 2003).

A list of the excluded studies, and rationale for their exclusion, is available upon request from the first author.

2.3. Coding the studies

We developed a coding frame, which we pilot tested, revised, and applied to the primary studies. Coding was performed by the first, second, third, and seventh authors independently. Inter-coder agreement was 90%. Disagreements were resolved by discussion while further examining the studies (Orwin, 1994). We coded certain moderators two ways in an effort to ensure that we were not missing the effects of a moderator, because we did not operationalize it optimally. A priori lists of outcome measures to select when multiple measures were present in a study were developed to minimize the impact of coder bias on the selection process. All the coded characteristics were used as descriptions of the studies retrieved and as potential moderator variables (Rosenthal, 1995), in addition to the main moderators examined. A copy of the coding sheet is available from the first author.

2.3.1. Participant features

We coded the following participant features: age, gender, ethnicity, risk status, and socioeconomic status. In addition to coding the average age of participants at baseline, we also coded for age category of elementary school, middle school, high school, university, adults, or older adults. With regard to participant ethnicity, we coded both the percentage of participants who were White (a continuous variable), because this group is at high risk for eating disorders compared to non-Whites, and the dominant ethnic group represented in the sample (nominal variable). We also coded whether the study participants represented a universal or high risk group. Finally, we coded whether socioeconomic status of the participants was reported.

2.3.2. Media characteristics

For media characteristics we coded the type (i.e., television, magazines and movies), duration (i.e., how long participants viewed the stimuli), content of the media stimuli (e.g., overweight stimuli, average weight stimuli and neutral stimuli), frequency (i.e., how many stimuli viewed), and color (i.e., color, black/white, or not available) of the media stimuli. Finally, we coded whether content validity of the media stimuli was established.

2.3.3. Design and study features

We coded studies for publication year (as a measure of temporal trend), masked purpose, publication status, instruction set, and manipulation check. If two separate reports were used to code a single study (e.g., dissertation and published report in scientific journal), we coded the type of the more formally published report (i.e., journal article).

2.4. Retrieval of effect sizes

Efforts were made to calculate effect sizes for all measures of the constructs of interest for each eating disorder symptom. We operationalized eating disorder symptom to represent risk and maintenance factors for eating disorders (e.g., internationalization of ideal, mood, body image and self-esteem; Stice, 2002). Although all these symptoms have not received consistent support as predictors, causal risk factors, symptoms, and/or maintainers of eating disorders (Stice, 2002), we felt that it was important to examine their effect sizes because there is considerable evidence for their relevance to eating disorders and because they represent some of the ways in which mass media might influence the development of the spectrum of disordered eating. Thus, we calculated effect sizes representing change or group differences in measures that are either correlates or predictors of eating disturbances. A complete list of the effect size measures is available upon request from the first author.

2.5. Effect size calculations and analytic strategy

2.5.1. Effect size calculations

Using random effects modeling procedures, we calculated weighted mean effect sizes separately for experimental and control groups for ease of interpretation of overall effect sizes and performed corrections for sample-size bias to estimate d (Morris, 2008). We used Hedges and Olkin's (1985) procedures to correct for sample-size biases. Effect sizes were calculated as standardized mean-change measures (Becker, 1988), representing the magnitude of the difference between the pretest and the posttest for each outcome. If results were available for more specific subgroups (e.g., men, women, high and low internalization of the ideal, different age cohorts, and different ethnicities), effects were computed for the most specific groups for which data were available. To derive effect sizes for within-subject studies, one needs the correlation between posttest and pretest measures. Unfortunately, it is very rare to find reported values of r when the primary research studies do not investigate relations between measures, and indeed none of the studies in this synthesis reported r. Thus, we used a conservative value of r = .50. Positive effect sizes in this meta-analysis represented an increase in eating disorder symptoms.

Typically, the relationship between media and outcome was reported as M and SD. If the M, SD, and sample size scores were not available, effect sizes were calculated using effect size estimates (e.g., F, t, r, or p values). If the results were described as significant and the sample size and type of statistical test used (e.g., F, t and r) were reported, we assumed that p = .05 (unless otherwise indicated) and recorded the F, t, or r value obtained from a statistical table (Ray & Shadish, 1996). We also estimated effect sizes when a report contained inexactly described p values—such as when the authors indicated that a given finding was not significant at .05—using the appropriate within- or between-subjects procedures. Thus, a reported nonsignificant finding was estimated to have a probability of .99, whereas a significant finding was estimated to have a probability at the level of the cutoff value used in the study (e.g., .05 or .01).

Along with the weighted average effect sizes, we computed the 95% confidence intervals. If the confidence interval does not include zero, then the mean effect size is statistically significant at the $p < .05$ level. We also graphed a forest plot (available upon request from the first author), which is a graph of each study as a point estimate bounded by its confidence intervals. The forest plot shows at a glance if the overall effect reported in the analysis is based on many studies or a few; on studies that are precise or imprecise; whether the treatment effects for all studies tend to line up in a row, or whether they vary substantially from one study to the next; and to examine outliers.

To determine heterogeneity of the effect sizes, we reviewed the actual dispersion on the forest plot and we calculated both the Q-statistic and I-squared. Q tests the hypothesis that the observed variance in effect sizes is no greater than that expected by sampling error alone. Under the null hypothesis that all studies derive from the same population, Q will follow a chi-square distribution for df = k, where k is the number of outcomes minus one. The p-value for Q, like all p-values, should not be interpreted by rote (Borenstein & Rothstein, 1999). That is, the absence of a significant p-value cannot be taken by itself as evidence of homogeneity as it could reflect a low power rather than actual consistency. Because of the technical and conceptual problems with the Q-statistic, we also calculated the I^2, which indicates the proportion of heterogeneity among studies that is beyond chance (Higgins & Thompson, 2002; Higgins, Thompson, Deeks, & Altman, 2003). That is, the Q-statistic indicates whether or not significant dispersion is present while the I^2 attempts to quantify the dispersion. For interpretation, the I^2 values of 25, 50, and 75 are considered low, moderate, and high, respectively (Higgins & Thompson, 2002). Thus, an I^2 in the low range suggests that the effect sizes are homogeneous relative to the precision of the individual studies (Higgins et al., 2003). For moderator analyses, we used Q_B, using mixed effects analysis, to explore the impact of categorical variables on the effect size); and we used meta-regression to explore the impact of continuous variables on the effect size. Mixed-effect models provide a more stringent test of moderators and help diminish the possibility of Type I errors, which can become inflated in the fixed-effects with moderators approach to meta-analysis (Overton, 1998). Data were analyzed using SPSS-18 and SAS 9.1 software.

2.5.2. Dependence

A fundamental assumption of most standard analyses used in meta-analysis is the independence of effects in the analysis. When multiple outcomes have been measured for the same individuals, or when the same outcome is measured at several time points for the same individuals, effect sizes computed for those multiple outcomes or time points will not be independent. A number of ways exist to deal with dependence (Becker, 2000). The primary approach used in our synthesis was to separate effects into groups that included primarily independent effects. Grouping the effects according to measure type eliminated most dependence because few studies used multiple measures of the same outcome type.

It was common for studies to include multiple assessments of an outcome variable (e.g., body image and positive mood). In these instances, each study was limited to one set of effect sizes per eating disorder symptoms category. Removal of effect sizes was conducted in studies with two or more measures of the same eating disorder symptom category. The removal order was first unstandardized questionnaires. In studies with two or more effect sizes remaining for an eating disorder symptom category, random removal was conducted until one effect remains per eating disorder symptoms category remained.

2.6. Publication/dissemination bias

Publication bias is the term for what occurs whenever the research that appears in the published literature is systematically unrepresentative of the population of completed results (Rothstein, Sutton, & Borenstein, 2005). To assess publication bias, we calculated Rosenthal's (1979) Fail Safe N or file drawer analysis procedures. The classic Rosenthal's N_{fs} indicates the number of missing studies (with M effect of 0) that would need to be added to the analysis before the combined effect would no longer be statistically significant (Rosenthal, 1979, 1995). The N_{fs} analyses were calculated for each statistically significant relation reported. According to Rosenthal's (1979) conservative guidelines, N_{fs} should exceed 5k (k = number of studies) + 10 to effectively overcome the file drawer problem.

3. Results

3.1. Description of studies

A total of 286 effect sizes (ES) from 33 studies were extracted for analysis in fourteen separate meta-analyses. Characteristics of the included studies, including effect sizes, can be located in Tables 1–7. The following meta-analyses examined the difference in standardized mean change (or gain) from pre media exposure to post media exposure. Separate meta-analyses were conducted for change scores in the media exposure groups and in the control exposure groups. A total of 7 eating disorder outcomes were analyzed: positive affect, negative affect, body dissatisfaction, anxiety, depression, anger, and self-esteem. Overall results for the estimate mean change ES are available in Table 8 for both media exposure and control groups. Results of the moderator analyses for the media exposure and control groups analyses are available in Table −9 and Table 10, respectively.

Note that levels of the categorical moderators were included for analysis if they contained at least 10 ES's and the ES's were drawn from more than one study (Borenstein, Hedges, Higgins, & Rothstein, 2009). Only 3 of the meta-analysis included categorical moderators that met this criterion. The body dissatisfaction meta-analysis, which

Table 1
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for positive affect meta-analysis.

Author	Exp ES	Exp N	Cont ES	Cont N	Gender	Participant characteristics		
						Age group	Risk status	% White
Positive affect								
Barta (2002)	−1.42	21	−1.35	21	M	University	Universal	–
Barta (2002)	−1.42	21	−1.13	21	M	University	Universal	–
Bell, Lawton, and Dittmar (2007)	−0.37	21	−0.49	21	F	High school	Universal	95
Bell et al. (2007)	−0.37	21	−0.03	21	F	High school	Universal	100
Hausenblas et al. (2003)	−0.15	21	−0.09	21	F	University	High	100
Hausenblas et al. (2004)	−0.12	21	−0.37	21	F	University	Universal	–
Tiggemann and Slater (2004)	−0.1	40	0.21	41	F	University	Universal	
Tiggemann and Slater (2004)	−0.27	36	−0.57	37	F	University	Universal	95

Author	Med	Control content	Exp content	Dur	Freq	Masked purpose	Pub status	Random	Set	Measure
Positive affect										
Barta (2002)	Mag	Average	Muscular		12	Yes	Pub	Yes	No	PANAS-PA
Barta (2002)	Mag	No people	Muscular		12	Yes	Pub	Yes	No	PANAS-PA
Bell et al. (2007)	Music vid	Music	Thin		3	Yes	Pub	No	No	PANAS-PA
Bell et al. (2007)	Music vid	No media	Thin		3	Yes	Pub	No	No	PANAS-PA
Hausenblas et al. (2004)	Model pics	No people	Thin	26	8	Yes	Pub	No	No	PANAS-PA
Hausenblas et al. (2004)	Model pics	No people	Thin	26	8	Yes	Pub	No	No	PANAS-PA
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	Yes	VAS happy
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	No	VAS happy

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = Female; M = Male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Model pics = model pictures; Mag = magazine; Ordinary = ordinary people; Average = average people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub status = publication status; Pub = published study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; and PANAS-PA = positive affect scale from the Positive and Negative Affect Scale.

included the largest number of ES's, included the following categorical moderators for analysis: medium, control content, media content, media type, publication status, random assignment, instructional set, gender, risk status, and socioeconomic status. Control content and media type were also eligible for analysis in the anxiety outcome meta-analysis. Media type was also eligible for analysis in the depression outcome meta-analysis.

3.2. Meta-analyses for outcomes in experimental groups

The first set of meta-analyses examined the mean standardized change from pre to post in experimental groups exposed to idealized media (see Table 8 for summary of results). The analyses yielded several significant estimates of the mean standardized change in outcomes and the ES's ranged from small to moderately large. A moderately large ES

Table 2
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for negative affect meta-analysis.

Author	Exp ES	Exp N	Cont ES	Cont N	Gender	Participant characteristics		
						Age group	Risk status	% White
Negative affect								
Barta (2002)	−1.37	21	−1.25	21	M	University	Universal	–
Barta (2002)	−1.37	69	−2.08	71	M	University	Universal	–
Bell et al. (2007)	−0.1	21	−0.25	21	F	High school	Universal	95
Bell et al. (2007)	−0.1	25	−0.51	25	F	High school	Universal	95
Hargreaves and Tiggemann (2004)	−0.08	15	−0.23	15	F	High school	Universal	–
Hargreaves and Tiggemann (2004)	0.07	15	−0.22	15	F	High school	Universal	–
Hargreaves and Tiggemann (2004)	−0.23	18	−0.37	18	M	High school	Universal	–
Hargreaves and Tiggemann (2004)	−0.18	18	−0.39	18	M	High school	Universal	–
Hausenblas et al. (2004)	0.78	21	−0.19	21	F	University	High	100
Hausenblas et al. (2004)	0.55	21	−0.53	21	F	Elementary	Universal	100

Author	Med	Control content	Exp content	Dur	Freq	Masked purpose	Pub status	Random	Set	Measure
Negative Affect										
Barta (2002)	Mag	Average	Muscular		12	Yes	Pub	Yes	No	PANAS-NA
Barta (2002)	Mag	No people	Muscular		12	Yes	Pub	Yes	No	PANAS-NA
Bell et al. (2007)	Music vid	Music	Thin		3	Yes	Pub	No	No	PANAS-NA
Bell et al. (2007)	Music vid	No media	Thin		3	Yes	Pub	No	No	PANAS-NA
Hargreaves and Tiggemann (2004)	TV	Average	Thin		18	Yes	Pub	Yes	Yes	VAS-NA (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Thin		18	Yes	Pub	Yes	Yes	VAS-NA (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Muscular		18	Yes	Pub	Yes	Yes	VAS-NA (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Muscular		18	Yes	Pub	Yes	Yes	VAS-NA (composite)
Hausenblas et al. (2004)	Model pics	No people	Thin	26	8	Yes	Pub	No	No	PANAS-NA
Hausenblas et al. (2004)	Model pics	No people	Thin	26	8	Yes	Pub	No	No	PANAS-NA

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = female; M = male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Model pics = model pictures; Mag = magazine; Ordinary = ordinary people; Average = average people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub status = publication status; Pub = published study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; NA = negative affect; and PANAS-NA = negative affect scale from the Positive and Negative Affect Scale.

Table 3
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for body dissatisfaction meta-analysis.

Outcome	Exp ES	Exp N	Cont ES	Cont N	Participant characteristics			
					Gender	Age group	Risk status	% White
Body dissatisfaction								
Agliata and Tantleff-Dunn (2004)	0.43	8	0.12	8	M	University	Universal	66
Baird and Grieve (2006)	1.14	31	−0.27	31	M	University	Universal	84.4
Barta (2002)	−0.08	30	0.06	30	M	University	Universal	–
Barta (2002)	−0.08	30	0.24	27	M	University	Universal	–
Becker and Frindell (2006)	0.15	15	−0.1	15	F	University	Universal	69
Bell et al. (2007)	0.34	30	0.04	1	F	High school	Universal	95
Bell et al. (2007)	0.34	30	−0.02	1	F	High school	Universal	95
Birkeland et al. (2005)	−0.16	15	−0.33	15	F	University	Universal	67
Borowiak (2003)	1.09	30	−0.05	30	F	University	High	96.7
Borowiak (2003)	0	30	−0.98	30	F	University	Universal	96.7
Cattarin, Thompson, Thomas, and Williams (2000)	0.23	30	−0.72	30	F	University	Universal	77.8
Cattarin et al. (2000)	0.14	30	−0.49	30	F	University	Universal	77.8
Cattarin et al. (2000)	0.17	31	−0.32	31	F	University	Universal	77.8
DeBraganza (2004)	0.27	31	−0.74	31	F	University	Universal	–
DeBraganza (2004)	0.02	31	–	–	F	University	Universal	–
Durkin and Paxton (2002)	−0.15	31	−0.02	33	F	Middle	Universal	–
Durkin and Paxton (2002)	−0.28	31	−0.09	33	F	High school	Universal	–
Durkin et al. (2007)	−0.43	30	−0.09	27	F	High school	Universal	–
Fallon and Hausenblas (2005)	0.57	35	−0.44	34	F	University	High	100
Fallon and Hausenblas (2005)	0.79	35	0.14	34	F	University	High	100
Fleming and Martin Ginis (2004)	−0.07	30	0.09	1	F	University	Universal	
Fleming and Martin Ginis (2004)	−0.24	30	0.05	1	F	University	Universal	
Grogan, Williams, and Conner (1996)	−0.26	30	−0.03	30	F	University	Universal	–
Grogan et al. (1996)	−0.25	30	0	30	M	University	Universal	–
Hargreaves and Tiggemann (2003)	0.14	30	−0.13	27	F	High school	Universal	–
Hargreaves and Tiggemann (2004)	0	15	−0.2	15	F	High school	Universal	–
Hargreaves and Tiggemann (2004)	0.05	15	−0.1	15	F	High school	Universal	–
Hargreaves and Tiggemann (2004)	−0.47	15	−0.29	15	M	High school	Universal	–
Hargreaves and Tiggemann (2004)	−0.13	11	−0.17	10	M	High school	Universal	–
Hausenblas et al. (2003)	0.21	20	−1.01	20	M	University	High	88.9
Hausenblas et al. (2003)	0.01	31	−0.24	33	M	University	Universal	88.9
Heinberg and Thompson (1995)	0.15	31	−0.21	31	F	University	High	100
Heinberg and Thompson (1995)	−0.12	31	−0.1	31	F	University	Universal	100
Humphreys and Paxton (2004)	0.22	85	−0.09	86	M	Middle	Universal	–
King, Menzel, and Baird (1997)	−0.12	110	0.03	110	F	–	Universal	–
King et al. (1997)	0.36	26	0.06	25	F	–	High	–
King et al. (1997)	−0.06	25	−0.05	25	F	–	High	–
Legenbauer, Ruhl, and Vocks (2008)	−0.13	35	0	34	F	University	Universal	–
Legenbauer et al. (2008)	−0.28	62	0.25	61	F	University	High	–
Lorenzen, Grieve, and Thomas (2004)	−0.16	80	0.05	80	M	University	Universal	78.8
Monro and Huon (2005)	−0.22	30	−0.21	30	F	University	Universal	–
Monro and Huon (2005)	−0.01	30	−0.46	30	F	University	Universal	–
Monro and Huon (2005)	0.58	30	0	30	F	University	High	–
Monro and Huon (2005)	0.38	30	−0.27	30	F	University	High	–
Ogden and Mundray (1996)	−0.42	30	0.46	30	F	University	Universal	–
Ogden and Mundray (1996)	−0.21	30	0.04	30	M	University	Universal	–
Oliveira (2000)	−0.25	30	−0.31	30	3	Elementary	Universal	49
Robertson (2001)	−0.11	62	−0.03	61	F	University	Universal	100
Robertson (2001)	−0.1	76	0.01	78	M	University	Universal	100
Rocchio (1995)	−0.15	76	0.32	78	F	University	Universal	82.1
Strong (2005)	−0.27	31	−0.08	31	M	University	Universal	66.4
Tiggemann and Slater (2004)	0.13	27	−0.22	22	F	University	Universal	–
Tiggemann and Slater (2004)	0.5	30	−0.05	30	F	University	Universal	–
van den Berg and Thompson (2007)	−0.22	35	0.44	34	F	University	Universal	58
van den Berg and Thompson (2007)	−0.22	35	−0.03	34	F	University	Universal	58
Wasserman (2006)	0.02	19	−0.13	19	F	University	Universal	65
Wasserman (2006)	0.15	23	−0.12	22	M	University	Universal	65

Author	Med	Control content	Exp content	Dur	Freq	Masked purpose	Pub status	Random	Set	Measure
Body dissatisfaction										
Agliata and Tantleff-Dunn (2004)	TV	Ordinary	Muscular		16	Yes	Pub	Yes	No	VAS-MD
Baird and Grieve (2006)	Mag	No people	Muscular	30	8	Yes	Pub	Yes	No	Body assessment
Barta (2002)	Mag	Average	Muscular		12	Yes	Pub	Yes	No	BPSS
Barta (2002)	Mag	No people	Muscular		12	Yes	Pub	Yes	No	BPSS
Becker and Frindell (2006)	Mag	OverWght	Thin		15	Yes	UnPub	Yes	No	BIIQ discrepancy
Bell et al. (2007)	Music vid	Music	Thin		3	Yes	Pub	No	No	BISS-a
Bell et al. (2007)	Music vid	No media	Thin		3	Yes	Pub	No	No	BISS-a
Birkeland et al. (2005)	Mag	Average	Thin			Yes	Pub	Yes	No	VAS-PAS
Borowiak (2003)	TV	Ordinary	Thin			Yes	UnPub	Yes	No	EDI-BD
Borowiak (2003)	TV	Ordinary	Thin			Yes	UnPub	Yes	No	EDI-BD
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS-PAD

(continued on next page)

Table 3 (*continued*)

Author	Med	Control content	Exp content	Dur	Freq	Masked purpose	Pub status	Random	Set	Measure
Body dissatisfaction										
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS-PAD
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	No	VAS-PAD
DeBraganza (2004)	Mag	Average	Thin	15	9	Yes	UnPub	Yes	No	NAS-BD
DeBraganza (2004)	Mag	Average	Thin		9	Yes	UnPub	Yes	No	VAS-BD
Durkin and Paxton (2002)	Mag	No People	Thin		10	Yes	Pub	Yes	No	VAS-BS
Durkin and Paxton (2002)	Mag	No People	Thin		10	Yes	Pub	Yes	No	VAS-BS
Durkin et al. (2007)	Mag	No People	Thin		10	Yes	UnPub	Yes	No	BAQ
Fallon and Hausenblas (2005)	Mag	No People	Thin	10	9	Yes	Pub	Yes	No	VAS-BD
Fallon and Hausenblas (2005)	Mag	No people	Thin	10	9	Yes	Pub	Yes	No	VAS-BD
Fleming and Martin Ginis (2004)	Ex vid	Average	Thin			No		Yes	No	SPE
Fleming and Martin Ginis (2004)	Ex vid	Average	Thin			No		Yes	No	SPE
Grogan et al. (1996)	Mag	No people	Thin		16	Yes	Pub	Yes	Yes	BIS-BE
Grogan et al. (1996)	Mag	No people	Muscular		16	Yes	Pub	Yes	Yes	BIS-BE
Hargreaves and Tiggemann (2003)	TV	Ordinary	Thin		20	Yes	Pub	Yes	No	VAS-AWD (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Thin		18	Yes	Pub	Yes	Yes	VAS-BD (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Thin		18	Yes	Pub	Yes	Yes	VAS-BD (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Muscular		18	Yes	Pub	Yes	Yes	VAS-BD (composite)
Hargreaves and Tiggemann (2004)	TV	Average	Muscular		18	Yes	Pub	Yes	Yes	VAS-BD (composite)
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS-BD
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS-BS
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS-BD
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS-BD
Humphreys and Paxton (2004)	Mag	No people	Muscular	13	10	Yes	Pub	Yes	No	Desire toned body
King et al. (1997)	Mag	OverWght	Thin			Yes	UnPub	No	No	VSE
King et al. (1997)	Mag	OverWght	Thin			Yes	UnPub	No	No	VSE
King et al. (1997)	Mag	OverWght	Thin			Yes	UnPub	No	No	BSE
Legenbauer et al. (2008)	Movie	No People	Thin	300	14		Pub	No	Yes	CDRS—Ideal
Legenbauer et al. (2008)	Movie	No people	Thin	300	14		Pub	No	Yes	CDRS—Ideal
Lorenzen et al. (2004)	Mag	Average	Muscular		6	Yes	Pub	Yes	No	BAS
Monro and Huon (2005)	Mag	No people	Thin	20	24	Yes	Pub	No	No	VAS-AA
Monro and Huon (2005)	Mag	No people	Thin	20	24	Yes	Pub	No	No	VAS-AA
Monro and Huon (2005)	Mag	No people	Thin	20	24	Yes	Pub	No	No	VAS-AA
Monro and Huon (2005)	Mag	No people	Thin	20	24	Yes	Pub	No	No	VAS-AA
Ogden and Mundray (1996)	Mag	OverWght	Thin		5	Yes	Pub		No	BS-Silhouettes
Ogden and Mundray (1996)	Mag	OverWght	Muscular		5	Yes	Pub		No	BS-Silhouettes
Oliveira (2000)	Mag	Ordinary	Both	10	60	Yes	UnPub	Yes	No	CFRS
Robertson (2001)	Mag	Average	Thin		10		UnPub	Yes	No	BES
Robertson (2001)	Mag	Average	Muscular		10		UnPub	Yes	No	BES
Rocchio (1996)	Mag	No people	Thin	10	30	Yes	UnPub	No	No	BASS
Strong (2005)	Mag	Average	Muscular		28	Yes	UnPub	Yes	No	BPS-MS
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	Yes	VAS-BD (composite)
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	No	VAS-BD (composite)
van den Berg and Thompson (2007)	Mag	OverWght	Thin	10	11	Yes	Pub	Yes	No	VAS-OS
van den Berg and Thompson (2007)	Mag	No media	Thin	10	11	Yes	Pub	Yes	No	VAS-OS
Wasserman (2006)	Mag	Average	Thin	45	10	No	UnPub	Yes	No	BASS
Wasserman (2006)	Mag	Average	Muscular	45	10	Yes	UnPub	Yes	No	BASS

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = female; M = male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Model pics = model pictures; Mag = magazine; Ordinary = ordinary people; Average = average people; OverWgt = overweight people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub status = publication status; Pub = published study; UnPub = unpublished study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; BASS = Body Area Satisfaction Scale; BD = body dissatisfaction; CFRS = Children's Figure Rating Scale; EDI-BD = Body Dissatisfaction subscale of the Eating Disorder Inventory; AA = appearance anxiety; BIS-BE = Body Esteem subscale of the Body Image Scale; PAD = physical appearance dissatisfaction; NAS-BD = ; BPS-BD = ; SPE = self presentational efficacy; BISS-a = adapted version of the Body Image States Scale; VSE = visual size estimation; BS = body satisfaction; BPSS = Body Parts Satisfaction Scale; BAQ = Body Attitudes Questionnaire; AWD = appearance and weight dissatisfaction; BIIQ = Body Image Ideals Questionnaire; MD = muscle dissatisfaction; BAS = Body Assessment Scale; OS = overall satisfaction; CDRS = Contour Drawing Rating Scale; and BES = Body Esteem Scale.

estimate was obtained for change in positive affect from pre to post (d = −.49), indicating a substantial reduction in positive affect following the viewing of idealized media images. Significant, small negative ES's were also obtained for self-esteem (d = −.21) and anxiety (d = −.12) and a large negative ES for negative affect (d = −.56) unexpectedly. The meta-analysis of changes in depression outcomes yielded a small but significant mean increase in depression symptoms (d = .11) and anger (d = .12). Results also indicated small estimates of mean increases in body dissatisfaction following exposure to idealized media (d = .03), but these ES's were not significant.

Prior to conducting moderator analyses, the heterogeneity of the estimated mean effects was also examined using forest plots and homogeneity analyses. Homogeneity analyses indicated significant heterogeneity among reported ES's for positive affect, $Q_{total}(7) = 20.9$, $p < .01$, $I^2 = 66.5\%$, negative affect, $Q_{total}(9) = 60.99$, $p < .01$, $I^2 = 85.2\%$, and body dissatisfaction, $Q_{total}(56) = 91.87$, $p < .01$, $I^2 = 39.0\%$. An examination of the random effects variance component (REVC), however, did indicate some random, unexplained variance among ES's for the meta-analyses of anxiety and depression outcomes. Forest plots confirmed the wide spread among the ES's for several analyses, including body dissatisfaction, depression, anxiety, positive affect, and negative affect. The forest plots also revealed, though, that for all analyses, the majority of reported ES's contained 0 within their 95% confidence intervals. Furthermore, the forest plots indicated the strong influence of one or two effects sizes from a single study on the mean estimated ES's for the positive affect (k = 2), negative affect (k = 2), and anxiety meta-analyses (k = 1). To test for the influence of these single ES's on the mean estimated ES's, the meta-analyses were conducted again, excluding the outlier ES's. After removal of the outlier ES's, the estimated mean ES for positive affect (d = −.21), negative affect (d = .09), and

Table 4
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for anxiety meta-analysis.

Author	Exp ES	Exp N	Cont ES	Cont N	Participant characteristics			
					Gender	Age group	Risk status	% White
Anxiety								
Agliata and Tantleff-Dunn (2004)	−0.28	81	−0.24	77	M	University	Universal	66
Becker and Frindell (2006)	−0.74	81	−0.55	77	F	University	Universal	69
Birkeland et al. (2005)	−0.07	81	−0.12	77	F	University	Universal	67
Cattarin et al. (2000)	−0.01	73	−0.52	69	F	University	Universal	77.8
Cattarin et al. (2000)	−0.14	73	−0.82	69	F	University	Universal	77.8
Cattarin et al. (2000)	−0.05	73	−0.45	70	F	University	Universal	77.8
DeBraganza (2004)	−0.06	73	−0.1	70	F	University	Universal	–
DeBraganza (2004)	0.04	81	–	–	F	University	Universal	–
Durkin and Paxton (2002)	−0.07	74	0	42	F	Middle	Universal	–
Durkin and Paxton (2002)	0.12	21	−0.33	15	F	High School	Universal	–
Fallon & Hausenblas (2005)	0.17	21	0.07	21	F	University	High	100
Fallon & Hausenblas (2005)	0.11	21	−0.18	21	F	University	High	100
Hausenblas et al. (2003)	0.06	21	−0.1	15	M	University	High	88.9
Hausenblas et al. (2003)	0.17	15	−0.18	15	M	University	Universal	88.9
Humphreys and Paxton (2004)	−0.06	21	−0.01	21	M	Middle	Universal	–
Tiggemann and Slater (2004)	−0.14	77	−0.18	79	F	University	Universal	–
Tiggemann and Slater (2004)	−0.05	77	−0.31	79	F	University	Universal	–
van den Berg and Thompson (2007)	−0.21	15	−0.43	15	F	University	Universal	58
van den Berg and Thompson (2007)	−0.21	15	−0.2	15	F	University	Universal	58

Author	Med	Control content	Exp content	Dur	Freq	Masked	Pub status	Random	Set	Measure
Anxiety										
Agliata and Tantleff-Dunn (2004)	TV	Ordinary	Muscular		16	Yes	Pub	Yes	No	VAS anxiety
Becker and Frindell (2006)	Mag	OverWght	Thin		15	Yes	UnPub	Yes	No	POMS tension
Birkeland et al. (2005)	Mag	Average	Thin			Yes	Pub	Yes	No	VAS anxiety
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS anxiety
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS anxiety
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	No	VAS anxiety
DeBraganza (2004)	Mag	Average	Thin	15	9	Yes	UnPub	Yes	No	VAS anxiety
DeBraganza (2004)	Mag	Average	Thin		9	Yes	UnPub	Yes	No	VAS anxiety
Durkin and Paxton (2002)	Mag	No people	Thin		10	Yes	Pub	Yes	No	VAS anxiety
Durkin and Paxton (2002)	Mag	No people	Thin		10	Yes	Pub	Yes	No	VAS anxiety
Fallon and Hausenblas (2005)	Mag	No people	Thin	10	9	Yes	Pub	Yes	No	VAS anxiety
Fallon and Hausenblas (2005)	Mag	No PEOPLE	Thin	10	9	Yes	Pub	Yes	No	VAS anxiety
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS anxiety
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS anxiety
Humphreys and Paxton (2004)	Mag	No people	Muscular	13	10	Yes	Pub	Yes	No	VAS anxiety
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	Yes	VAS anxiety
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	No	VAS anxiety
van den Berg and Thompson (2007)	Mag	OverWght	Thin	10	11	Yes	Pub	Yes	No	VAS anxiety
van den Berg and Thompson (2007)	Mag	No media	Thin	10	11	Yes	Pub	Yes	No	VAS anxiety

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = female; M = male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Model pics = model pictures; Mag = magazine; Ordinary = ordinary people; Average = average people; OverWgt = overweight people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub status = publication status; Pub = published study; UnPub = unpublished study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; and POMS =.

anxiety (d = −.06) were reduced to non-significance. Homogeneity analyses indicated no significant heterogeneity among ES's after removal of the outlier ES's.

Moderator analyses were then considered for all meta-analyses excluding positive affect, negative affect, and anxiety. No moderator analyses were considered for the later outcomes because all significant variance was explained by one or two ES's. Categorical moderator analyses were conducted for body dissatisfaction and depression only due to the moderator ES criterion stated previously. Simulated regression analyses were also used to test for the moderating effects of continuous variables for body dissatisfaction, anger, depression, and self-esteem. Anger, depression, and self-esteem were included due to the fact that moderators had been proposed for them a priori. The continuous moderators included ethnicity (as indicated by % of sample that was White), frequency of media exposures, duration of media exposure, and date of publication. Only one significant moderator across both categorical and continuous analyses emerged: risk status in the body dissatisfaction meta-analysis. For body dissatisfaction outcomes, participants identified as high risk (k = 10) for the development of eating disorders showed significant, moderate increases in body dissatisfaction, d = .34, $Q_{between}$ (1,56) = 12.88, p < .01, following exposure to idealized media images. Groups considered to be at universal risk for the development of eating disorders (k = 47), there was no significant change in body dissatisfaction from pre to post (d = −.03)

3.3. Meta-analyses for outcomes in control groups

Since the goal of this set of meta-analyses was to determine whether or not the nature and magnitude of change differed for groups exposed to idealized media images (i.e., experimental groups) and groups exposed to non-idealized media images or no media images (i.e., control groups), meta-analyses were also conducted for all outcomes for the control groups. Again, the outcomes examined were for positive affect, negative affect, body dissatisfaction, anxiety, depression, anger, and self-esteem. As expected, several meta-analyses yielded nonsignificant estimates of mean change from pre to post for the control groups. There was no significant mean change for the outcomes of anxiety (d = −.06), anger (d = −.07), and self-esteem (d = .04). However, significant estimated mean change was found for several meta-analyses of the outcomes, including positive affect (d = −.44), negative affect (d = −.20), body dissatisfaction (d = −.09), and depression (d = −.12).

Table 5
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for depression meta-analysis.

Author	Exp ES	Exp N	Cont ES	Cont N	Participant characteristics			
					Gender	Age group	Risk status	% White
Depression								
Agliata and Tantleff-Dunn (2004)	0.15	67	−0.19	28	M	University	Universal	66
Becker and Frindell (2006)	−0.33	67	−0.68	58	F	University	Universal	69
Birkeland et al. (2005)	−0.02	67	0.18	58	F	University	Universal	67
Cattarin et al. (2000)	0.18	74	−0.5	42	F	University	Universal	77.8
Cattarin et al. (2000)	0.09	74	−0.7	42	F	University	Universal	77.8
Cattarin et al. (2000)	0.18	74	−0.34	42	F	University	Universal	77.8
DeBraganza (2004)	0.2	74	0.01	42	F	University	Universal	–
DeBraganza (2004)	0.05	67	–	–	F	University	Universal	–
Durkin and Paxton (2002)	0.06	71	0	67	F	Middle	Universal	–
Durkin and Paxton (2002)	0.18	71	−0.12	67	F	High school	Universal	–
Fallon and Hausenblas (2005)	0.59	50	−0.03	50	F	University	High	100
Fallon and Hausenblas (2005)	0.72	50	0.12	50	F	University	High	100
Hausenblas et al. (2003)	−0.06	71	−0.16	67	M	University	High	88.9
Hausenblas et al. (2003)	0.02	71	−0.14	67	M	University	Universal	88.9
Heinberg and Thompson (1995)	0.28	71	−0.15	67	F	University	High	100
Heinberg and Thompson (1995)	−0.05	71	0.03	67	F	University	Universal	100
Heinberg and Thompson (1995)	0.24	71	−0.11	67	F	University	High	100
Heinberg and Thompson (1995)	−0.09	71	−0.01	67	F	University	Universal	100
Humphreys and Paxton (2004)	0.01	86	0.03	87	M	Middle	Universal	–
Tiggemann and Slater (2004)	0.24	15	−0.06	15	F	University	Universal	–
Tiggemann and Slater (2004)	0.19	15	0.3	15	F	University	Universal	–
van den Berg and Thompson (2007)	0.01	50	−0.13	50	F	University	Universal	58
van den Berg and Thompson (2007)	0.01	52	−0.08	52	F	University	Universal	58

Author	Med	Control content	Exp content	Dur	Freq	Masked	Pub status	Random	Set	Measure
Depression										
Agliata and Tantleff-Dunn (2004)	TV	Ordinary	Muscular		16	Yes	Pub	Yes	No	VAS depression
Becker and Frindell (2006)	Mag	OverWght	Thin		15	Yes	UnPub	Yes	No	POMS depression
Birkeland et al. (2005)	Mag	Average	Thin			Yes	Pub	Yes	No	VAS depression
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS depression
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS depression
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	No	VAS depression
DeBraganza (2004)	Mag	Average	Thin	15	9	Yes	UnPub	Yes	No	VAS depression
DeBraganza (2004)	Mag	Average	Thin		9	Yes	UnPub	Yes	No	VAS depression
Durkin and Paxton (2002)	Mag	No people	Thin		10	Yes	Pub	Yes	No	VAS depression
Durkin and Paxton (2002)	Mag	No people	Thin		10	Yes	Pub	Yes	No	VAS depression
Fallon and Hausenblas (2005)	Mag	No people	Thin	10	9	Yes	Pub	Yes	No	VAS depression
Fallon and Hausenblas (2005)	Mag	No people	Thin	10	9	Yes	Pub	Yes	No	VAS depression
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS depression
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS depression
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS depression
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS depression
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS depression
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS depression
Humphreys and Paxton (2004)	Mag	No people	Muscular	13	10	Yes	Pub	Yes	No	VAS depression
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	Yes	VAS depression
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	No	VAS depression
van den Berg and Thompson (2007)	Mag	OverWght	Thin	10	11	Yes	Pub	Yes	No	VAS depression
van den Berg and Thompson (2007)	Mag	No media	Thin	10	11	Yes	Pub	Yes	No	VAS depression

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = female; M = male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Model pics = model pictures; Mag = magazine; Ordinary = ordinary people; Average = average people; OverWgt = overweight people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub status = publication status; Pub = published study; UnPub = unpublished study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; and POMS =.

Homogeneity analyses indicated the presence of significant heterogeneity among ES's for positive affect, $Q_{total}(7) = 22.46$, $p < .01$, $I^2 = 68.8\%$, and negative affect, $Q_{total}(9) = 56.11$, $p < .01$, $I^2 = 83.9\%$. An examination of the forest plot of ES's for these two meta-analyses again revealed the presence of two outlier ES's from a single study as in the previous set of meta-analyses, explaining the large percentage of heterogeneity observed in these two analyses. Removal of these two ES's from both meta-analyses caused a reduction of the ES's for positive affect ($d = -.21$) and negative affect ($d = -.31$) to non-significance. There was no significant heterogeneity left over among the ES's after the removal of the two ES's from each of the analyses. While the meta-analyses of the remaining outcomes did not produce significant heterogeneity among ES's, the REVC indicated the presence of unaccounted for, random variance among the ES's for body dissatisfaction and depression. Forest plots of the ES's in these analyses did indicate some spread among the ES's.

Moderator analyses proceeded as planned for all meta-analyses, with the exception of the meta-analyses for positive and negative affect, because they had been hypothesized a priori. No significant continuous moderators emerged from analyses. Several significant categorical moderators of the ES's did emerge for the outcomes of body dissatisfaction and depression. For the meta-analysis of body dissatisfaction, the content of the control exposure emerged as a significant moderator of the observed ES's, $Q_{between}(1,55) = 17.18$, $p < .01$. Participants in a control condition who viewed images of overweight persons ($k = 13$) showed a moderate and significant reduction in body dissatisfaction following viewing ($d = -.31$). Control images of average weight persons ($k = 33$) produced no significant change in

Table 6
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for anger meta-analysis.

Author	Exp ES	Exp N	Cont ES	Cont N	Participant characteristics			
					Gender	Age group	Risk status	% White
Anger								
Agliata and Tantleff-Dunn (2004)	−0.22	20	−0.38	16	M	University	Universal	66
Becker and Frindell (2006)	−0.54	17	−0.47	21	F	University	Universal	69
Birkeland et al. (2005)	0.17	17	−0.11	15	F	University	Universal	67
Cattarin et al. (2000)	0.39	17	−0.23	15	F	University	Universal	77.8
Cattarin et al. (2000)	0.06	15	−0.3	16	F	University	Universal	77.8
Cattarin et al. (2000)	0.32	15	−0.05	16	F	University	Universal	77.8
DeBraganza (2004)	0.05	15	0.12	16	F	University	Universal	–
DeBraganza (2004)	0.08	15	–	–	F	University	Universal	–
Durkin and Paxton (2002)	−0.02	71	−0.05	70	F	Middle	Universal	–
Durkin and Paxton (2002)	0.09	71	0	70	F	High School	Universal	–
Fallon and Hausenblas (2005)	0.3	71	−0.29	71	F	University	High	100
Fallon and Hausenblas (2005)	0.37	71	0.1	71	F	University	High	100
Hausenblas et al. (2003)	0.06	71	0.03	70	M	University	High	88.9
Hausenblas et al. (2003)	0.13	71	−0.05	70	M	University	Universal	88.9
Heinberg and Thompson (1995)	0.19	71	−0.17	71	F	University	High	100
Heinberg and Thompson (1995)	−0.21	71	0.06	71	F	University	Universal	100
Tiggemann and Slater (2004)	0.47	17	−0.11	15	F	University	Universal	–
Tiggemann and Slater (2004)	0.35	17	0.1	15	F	University	Universal	–
van den Berg and Thompson (2007)	0.17	71	−0.1	71	F	University	Universal	58
van den Berg and Thompson (2007)	0.17	25	−0.01	25	F	University	Universal	58

Author	Med	Control content	Exp content	Dur	Freq	Masked	Pub status	Random	Set	Measure
Anger										
Agliata and Tantleff-Dunn (2004)	TV	Ordinary	Muscular		16	Yes	Pub	Yes	No	VAS anger
Becker and Frindell (2006)	Mag	OverWght	Thin		15	Yes	UnPub	Yes	No	POMS anger
Birkeland et al. (2005)	Mag	Average	Thin			Yes	Pub	Yes	No	VAS anger
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS anger
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	Yes	VAS anger
Cattarin et al. (2000)	TV	Average	Thin		25	Yes	Pub	Yes	No	VAS anger
DeBraganza (2004)	Mag	Average	Thin	15	9	Yes	UnPub	Yes	No	VAS anger
DeBraganza (2004)	Mag	Average	Thin		9	Yes	UnPub	Yes	No	VAS anger
Durkin and Paxton (2002)	Mag	No people	Thin		10	Yes	Pub	Yes	No	VAS anger
Durkin and Paxton (2002)	Mag	No people	Thin		10	Yes	Pub	Yes	No	VAS anger
Fallon and Hausenblas (2005)	Mag	No people	Thin	10	9	Yes	Pub	Yes	No	VAS anger
Fallon and Hausenblas (2005)	Mag	No people	Thin	10	9	Yes	Pub	Yes	No	VAS anger
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS anger
Hausenblas et al. (2003)	Model pics	No people	Muscular	26	8	Yes	Pub	No	No	VAS anger
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS anger
Heinberg and Thompson (1995)	TV	Average	Thin	30	20	Yes	Pub	Yes	No	VAS anger
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	Yes	VAS anger
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	No	VAS anger
van den Berg and Thompson (2007)	Mag	OverWght	Thin	10	11	Yes	Pub	Yes	No	VAS anger
van den Berg and Thompson (2007)	Mag	No media	Thin	10	11	Yes	Pub	Yes	No	VAS anger

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = female; M = male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Model pics = model pictures; Mag = magazine; Ordinary = ordinary people; Average = average people; OverWgt = overweight people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub Status = publication status; Pub = published study; UnPub = unpublished study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; and POMS =.

body dissatisfaction. The medium of media used for exposure also moderated control group effect sizes. In the control groups, when comparing magazine exposure (k = 47) versus television exposure (k = 10), results showed that magazine exposure resulted in no change in body dissatisfaction from pre to post (d = −.03) but that television exposure actually resulted in an increase in body dissatisfaction (d = .34, t = 3.63, p < .01). Last, moderator analyses for depression ES's revealed that viewing videos (k = 10), $Q_{between}(2,21) = 11.77$, p < .01, produced larger, significant reductions in depression compared to flipping through magazines (k = 11). For depression, flipping through magazines produced no significant change in depression pre to post (d = −.03), but watching videos (content not specified) resulted in a small, significant decrease in depression scores from pre to post (d = −.18).

3.4. Publication bias

To assess for publication bias, Rosenthal's fail-safe N was calculated according to the formula provided by Rosenthal (1979). The fail-safe N provides an estimate of the number of studies sitting in the "file drawer" with non-significant results that would be needed to reduce the weighted mean ES to non-significance. For our significant effect size findings, N_{fs} should exceed the following values to ensure that publication bias was not a problem in the present set of analyses: 50 studies for positive affect, 60 for negative affect, 105 studies for anxiety, 125 studies for depression, and 50 studies for self-esteem. For the meta-analyses of media exposure group studies, approximately 69 studies would be needed to reduce the ES for positive affect to .05, 27 studies would be needed to reduce the ES for anxiety to .05, 28 studies would be needed to reduce the ES's for depression and anger to .05, and 26 studies would be needed to reduce the ES for self-esteem to .05. Therefore it seems that among this group of analyses, publication bias may be a problem for the significant findings in the anxiety, depression, and self-esteem analyses.

Similar patterns were found for the control group meta-analyses. For significant effect size findings, N_{fs} should exceed the following values to ensure that publication bias was not a problem in the present set of analyses: 50 studies for positive affect, 60 for negative affect, 290 studies for body dissatisfaction, and 120 studies for depression. According to

Table 7
Table of included studies, effect sizes, participant characteristics, and methodological characteristics for self-esteem meta-analysis.

Author	Exp ES	Exp N	Cont ES	Cont N	Participant characteristics			
					Gender	Age group	Risk status	% White
Self-esteem								
Birkeland et al. (2005)	−0.16	35	0.05	34	F	University	Universal	67
Rocchio (1996)	−0.09	21	0.09	18	F	University	Universal	82.1
Seddon and Berry (1996)	0.04	17	0.23	21	F	University + Adults	Universal	–
Seddon and Berry (1996)	−0.11	20	0	16	F	University + Adults	High	–
Tiggemann and Slater (2004)	−0.36	25	0.13	25	F	University	Universal	–
Tiggemann and Slater (2004)	−0.49	21	−0.21	21	F	University	Universal	–
van den Berg and Thompson (2007)	−0.28	20	0.09	20	F	University	Universal	58
van den Berg and Thompson (2007)	−0.28	12	−0.23	12	F	University	Universal	58

Author	Med	Control Content	Exp Content	Dur	Freq	Masked	Pub Status	Random	Set	Measure
Self-Esteem										
Birkeland et al. (2005)	Mag	Average	Thin			Yes	Pub	Yes	No	VAS confidence
Rocchio (1996)	Mag	No people	Thin	10	30	Yes	UnPub	No	No	R-SES
Seddon and Berry (1996)	TV	Ordinary	Thin			Yes	Pub	Yes	No	SSES
Seddon and Berry (1996)	TV	Ordinary	Thin			Yes	Pub	Yes	No	SSES
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	Yes	VAS confident
Tiggemann and Slater (2004)	Music vid	Ordinary	Thin		6	Yes	Pub	Yes	No	VAS confident
van den Berg and Thompson (2007)	Mag	OverWght	Thin	10	11	Yes	Pub	Yes	No	VAS-SC
van den Berg and Thompson (2007)	Mag	No media	Thin	10	11	Yes	Pub	Yes	No	VAS-SC

Note. Exp ES = Experimental group effect size; Cont ES = Control group effect size; F = female; M = male; % White = % of participants that were White; Med = Medium of media presentation; Music vid = Music video; Mag = magazine; Ordinary = ordinary people; Average = average people; OverWgt = overweight people; Thin = thin ideal; Muscular = muscular ideal; Dur = duration of presentation in seconds; Freq = total number of stimuli presented; Pub status = publication status; Pub = published study; UnPub = unpublished study; Random = use of random assignment; Set = use of instructional set; VAS = visual analog scale; SSES = State Self Esteem Scale; and R-SES = Rosenberg Self-Esteem Scale.

Rosenthal's N_{fs}, 62 and 112 studies would be needed to reduce the ES's for positive affect and negative affect to .05 respectively, 45 studies to reduce the ES for body image dissatisfaction to .05, and 31 to reduce the ES for depression to .05. Again, it appears that the results for negative affect, body dissatisfaction, and depression may be subject to publication bias. However, given the small sample of studies initially extracted for inclusion in the meta-analyses, it seems unlikely that as many as 26, let alone up to 112, studies are sitting "in the file drawer" with null effects. Furthermore, an effort was made to request unpublished data sets from researchers through listservs during the initial phase of the project and moderator analyses were conducted for all meta-analyses that assessed for differences in effect sizes between published and unpublished data sets. These analyses yielded no significant differences between the two types of studies.

Table 8
Meta-analysis results for media-exposure groups and control groups.

	d	k	N	z	95% CI	SE_d	REVC[a]
Positive affect							
Media exposure	−.49	8	202	−2.50*	−.83, −.14	.10	.16
Control group	−.54	8	204	−2.71*	−.42, .02	.20	.18
Negative affect							
Media exposure	−.56	10	244	−3.70**	−.86, −.26	.15	.17
Control group	−.20	10	246	−2.91*	−.33, −.06	.16	.20
Body image dissatisfaction							
Media exposure	.03	57	1,930	.88	−.05, .12	.04	.04
Control group	−.09	56	1,770	−2.51*	−.17, −.02	.04	.01
Anxiety							
Media exposure	−.12	19	994	−2.29*	−.21, −.02	.05	.005
Control group	−.06	18	847	−1.38	−.16, .03	.05	0
Depression							
Media exposure	.11	23	1,450	2.49*	.02, .19	.04	.009
Control group	−.12	22	1,167	−2.53*	−.22, −.03	.05	.01
Anger							
Media exposure	.12	20	829	2.38*	.02, .21	.05	0
Control group	−.07	19	805	−1.42	−.17, .03	.05	0
Self-esteem							
Media exposure	−.21	8	171	−1.96*	−.43, 0	.11	0
Control group	.04	8	167	.33	−.18, .25	.11	0

Note. d = ES Cohen's d weighted by study sample size, k = number of ESs, N = total sample size, Z = value of the statistical significance test; SE_d = standard error of d; and REVC = random effects variance component.
* p<.05.
** p<.01.
[a] Significant difference between experimental and control groups.

4. Discussion

The objective of our study was to meta-analytically review the experimental literature examining the media's portrayal of the ideal physique on people's eating disorder symptoms and the mechanisms that moderate this effect. In total, we conducted meta-analyses for the following eating disorder-related outcomes: body dissatisfaction, positive/negative affect, depression, anxiety, anger, and self-esteem. Effect sizes for control and experimental groups were calculated separately to allow for additional analyses of moderator effects of the effect sizes. Our results provided partial support for the causal effect of viewing idealized media images on increasing eating disorder symptoms.

Several outcomes were consistent with our hypothesis that viewing idealized images in the media would increase eating disorder symptoms. We found that viewing these idealized images resulted in increases in depression and anger, and a decrease in self-esteem. In further support of the causal relationship between idealized images and these negative outcomes, control group comparisons showed either no effect on eating disorder outcomes or a reverse, positive effect on outcomes (i.e., no change in anger and self-esteem, decrease in depression). However, there were a few outcomes that were unexpected. Viewing idealized images did not necessarily increase body dissatisfaction across all participants and state anxiety actually decreased after viewing these images. Control group analyses, though, remained consistent with hypotheses and in these groups, no change in anxiety and a small decrease in body dissatisfaction were observed.

Moderator analyses revealed further information regarding the media's causal effect on eating disorder symptoms. In particular, our results indicated that idealized images in the media may have the most harmful and substantial impact on those individuals already at risk for developing an eating disorder. Individuals in the high risk group showed a moderate and significant increase in depression (ES = .31) and body dissatisfaction (ES = .34), while individuals who were considered to be

at universal risk for developing these disorders showed no changes in these outcomes from pre to post. Again, as defined by this study and previous research, high risk individuals include those who: are overweight and/or obese, internalized the belief that thinness is the ideal of beauty, are high self-objectifiers, have low self-esteem, and already evidence some level of disordered eating. In control group analyses, risk status produced no differential effects on eating disorder symptom outcomes.

These moderator results are consistent with an etiological model in which the media, and the messages of our culture of thinness in general, act as potential triggers for the onset of eating disorder symptoms. In other words, these results offer some support to the notion that eating disorders are, to some extent, culturally influenced disorders (e.g., Keel & Klump, 2003). Furthermore, these moderator results are not necessarily in conflict with genetic/biological perspectives on the development of eating disorders. A few of the risk factors in our study (e.g., disordered eating level) are, to some extent, heritable characteristics (Klump, Suisman, Burt, McGue, & Iacona, 2009). Other heritable characteristics of eating disorders identified by Klump et al. (2009) are weight preoccupation (i.e., preoccupation with dieting, weight loss, and thinness) and body dissatisfaction, both of which may be motivators for some individuals to pursue or seek out media information regarding the thin ideal (e.g., reading magazines for diet tricks and tips). Therefore, extrapolating from the effects of media viewing in high risk groups in this study, it is possible that media (and thus cultural messages of thinness) may be still be an important trigger (and potential) contributor to eating disorder development in individuals who have a genetic predisposition to these disorders. The interaction between genetic contributions and sociocultural influences, though, is still one that needs to be further investigated.

While most moderators of the effect for experimental groups did not emerge, some are still equally as important to discuss. As far as participant characteristics were concerned, it was interesting to note that gender did not emerge as a moderator of any of the experimental effect sizes, meaning that the effects of viewing idealized media images were not significantly different between men and women. This finding provides support to the idea that it is not only women who are susceptible to idealizes images of beauty presented by the media. In fact, this finding supports the recent trend in body image research that has focused on the increasingly unattainable and unrealistic ideal being portrayed by the media for men (e.g., very large muscles and little to no body fat; e.g., Leit, Pope, & Gray, 2001; Thompson & Cafri, 2007). While men may account for a minority proportion of eating disorder cases, researchers have argued that the presentation of the disorders among males are similar to that of females and that body dissatisfaction and the pursuit of a muscular ideal can lead to other mental health disorders, such as drive for muscularity (see e.g., McCabe & Ricciardelli, 2004).

Looking at methodological moderators of the effect size, we also found that a variety of methodological differences among studies also did not moderate the effect. We found no differences among the experimental effects with regard to frequency of exposure, length of exposure, use of instructional set, date the study was published, publication status, and type of media (e.g., magazines versus television/video). These later results were surprising in light of research that claims magazines more consistency predict body dissatisfaction and disturbed eating than watching television because reading magazines is thought to be a more active form of media consumption (Levine & Smolak, 1996). Perhaps, in light of the significance of risk status as a moderator of experimental effects, the level of attention paid to media images (i.e., active or passive consumption) is less important than whether or not the images are consistent with a person's schemas about dieting, weight loss, and the importance of thinness.

The findings regarding moderator analyses of control group effects were less clear to interpret, although results bring to light a number of methodological concerns regarding comparison control groups in media exposure studies. In the analysis of body image, viewing "control" television images actually produced an increase in body dissatisfaction among control participants (ES = .34) similar to the effects seen among high risk, experimental group participants. In addition, viewing control images of overweight persons also caused an increase in body dissatisfaction (ES = .31). One question that could be asked on the basis of these results is whether or not television images are truly appropriate control images? Consistent with these findings, some experimental studies have found that increased individual body mass index is associated with an increase in body dissatisfaction after viewing images of overweight persons (Dalley & Buunk, 2009; Smeesters, Mussweiler, & Mandel, 2010). It is also difficult to determine exactly why viewing television images may also have resulted in increased body dissatisfaction. Perhaps the television clips or images included images of individuals that unintentionally induced body dissatisfaction. In other words, images in the control television clips contained individuals that also resembled idealized (or overweight) individuals. These results may suggest that it is difficult to control for all bodies present in television clips. Alternatively, perhaps the content of the television clips was such that it invoked body dissatisfaction.

Several limitations of the literature included in the current analysis do exist. First, a limitation of the research is the reliance on self-report measures for studying media effect outcomes. The use of self-report measures in repeated measures experimental design may be problematic due to demand characteristics, response bias, and defensiveness. Future research needs to move beyond this in the next generation and use more objective, behavioral measures, perhaps in naturalistic settings. However, we also feel that the inclusion of studies that contained assessment at both pre and post is a strength of our analysis because it allowed us to control for initial levels of the outcome variables, therefore calculating an effect size that measure true participant change after exposure to the idealized media images.

An additional limitation of our results was the inability to address the long term cumulative effect of media exposure on the development of body image and other eating disorder symptoms, which necessarily takes place over time. The results of our meta-analysis does not indicate how long the effects of media exposure last because were able to locate only three studies that examined the extended effects of media exposure. These studies reported that the negative mood associated with a brief viewing persisted for 15 min (Hargreaves & Tiggemann, 2003), 2 h (Hausenblas, Janelle, Ellis Gardner, & Focht, 2004), and 2 years (Hargreaves & Tiggemann, 2003) after exposure. Thus, negative effect of exposure may not be limited to an immediate reaction, but can be maintained over at least a short period, and potentially may lead to the development of longer-term body image concerns and related effects. For example, Hargreaves and Tiggemann (2003) found that girls who were most strongly negatively affected by viewing appearance-related commercials at age 15 years felt more dissatisfied with their bodies and expressed greater drive for thinness 2 years later. In other words, they found that that these reactive 'episodes' of dissatisfaction may accumulate over time leading to the development of longer-term body dissatisfaction.

Even though the impact of any one brief media exposure on mood and body image is small, the limited longitudinal research suggests that over time, the effects of many such small changes may cumulate to actually elevate body image disturbance. This reasoning may explain why immediate changes in body dissatisfaction were not observed in these brief exposure studies. The link between the initiation, maintenance, and resolution of increased state body dissatisfaction may be relevant to understanding of the assumed cumulative effect of exposure to media images, and it warrants further research. The results of our meta-analyses illustrate that experimental studies showed immediate effects of acute exposure to the idealized thin or muscular image, albeit small effects. Here the causal direction is clear: from media exposure to body image and other eating disorder-related symptoms. The results of our study support the conclusion of the Surgeon General's Report on Mental Health that mental illness and related health problems must be understood in a social and cultural context. Of greater importance,

the results of our meta-analysis provide important information for further research in this area and for developing effective media-literacy interventions. The results of this meta-analysis provide valuable information for further experimental research and media literacy interventions (Levine, Piran, & Stoddard, 1999). A number of studies have shown that media literacy prevention interventions can contribute to decreases in eating disorder risk factors (e.g., body dissatisfaction, drive for thinness, internalization (Berel & Irving, 1998; Coughlin & Kalodner, 2006; Irving, 2001; Wade, Davidson, & O'Dea, 2003). Our results suggest specifically, though, that these interventions may be most effective and necessary in at at-risk populations.

In summary, our meta-analysis clearly reveals that media exposure of the ideal physique results in small changes in eating disorder symptoms, particularly with participants at high risk for developing an eating disorder. With the ever increasing media use of people of all ages, future researchers are encouraged to examine the effects of social network media on eating disorder symptoms (Haferkamp & Kramer, 2011).

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