Does Media Literacy Mitigate Risk for Reduced Body Satisfaction Following Exposure to Thin-Ideal Media?

McLean, Sian, Paxton, Susan J and Wertheim, EH (2016) Does Media Literacy Mitigate Risk for Reduced Body Satisfaction Following Exposure to Thin-Ideal Media? Journal of Youth and Adolescence, 45 (8). 1678 - 1695. ISSN 0047-2891

Does Media Literacy Mitigate Risk for Reduced Body Satisfaction Following Exposure to Thin-ideal Media?

Siân A. McLean[a], Susan J. Paxton[b] & Eleanor H. Wertheim[c]

[a]Corresponding author: Siân A. McLean, School of Psychology and Public Health, La Trobe University, Melbourne, Australia 3086, s.mclean@latrobe.edu.au

[b] Susan J. Paxton, School of Psychology and Public Health, La Trobe University, Melbourne, Australia 3086

[c] Eleanor H. Wertheim, School of Psychology and Public Health, La Trobe University, Melbourne, Australia 3086

Does Media Literacy Mitigate Risk for Reduced Body Satisfaction Following Exposure to Thin-ideal Media?

Abstract

Exposure to thin-ideal media can contribute to increased body dissatisfaction in adolescent girls. Understanding the factors that may prevent or exacerbate the negative effects of media exposure on body satisfaction is important to facilitate prevention of these problems. This study evaluated the effects of exposure to thin-ideal media images on body image in three instructional set experimental conditions: appearance comparison, peer norms, and control. An important aim was to examine baseline levels of media literacy as a protective factor and trait thin-ideal internalization and trait upward appearance comparison as risk factors. Early adolescent girls (*N* = 246) completed baseline measures and one week later viewed thin-ideal media images, before and after which they rated their state body satisfaction. Participants in the appearance comparison instruction but not peer norms instruction condition had significantly reduced body satisfaction. Media literacy, particularly high levels of critical thinking, mitigated the negative effects of trait thin-ideal internalization and trait upward appearance comparison on body satisfaction outcomes. These findings provide evidence for the role of media literacy as a protective factor against the negative effects on body satisfaction of exposure to thin-ideal media images, and also provide evidence to support the development and implementation of media literacy-based body image interventions.

Keywords: media literacy; thin-ideal internalization; appearance comparison; media; body satisfaction; moderators

Introduction

Exposure to thin-ideal media images in experimental studies has consistently been shown to reduce body satisfaction, and effects have been confirmed in meta-analyses (Groesz et al. 2002; Want 2009). Adverse effects are, however, not universal. Stability, or even improvement in body satisfaction following thin-ideal media exposure, has been observed (Durkin and Paxton 2002; Knobloch-Westerwick and Crane 2012). Authors have argued that effects are weak (Holmstrom 2004) or apparent only for those with existing vulnerability (Ferguson 2013). The aim of this study was to examine factors that predict change or stability in body satisfaction in early adolescent girls following exposure to thin-ideal media. The study investigated media literacy as a potential protective factor, and both trait internalization of the thin-ideal and upward appearance comparison tendencies as potential risk factors.

Body satisfaction problems are serious concerns, particularly for adolescent girls for whom body dissatisfaction is prevalent (Micali et al. 2014). Along with the distress that accompanies these concerns (Johnson and Wardle 2005), serious negative consequences can arise from body dissatisfaction. These include overweight and obesity (Haines et al. 2010; Loth et al. 2015), depressive symptoms and low self-esteem (Goldschmidt et al. 2016; Paxton et al. 2006), and disordered eating and the development of clinical eating disorders (Allen et al. 2015; Stice et al. 2011). Adolescence has been identified as a period of particular vulnerability for transition from body dissatisfaction to disordered eating (Rodgers et al. 2015a; Rohde et al. 2014). Thus, it is important to identify and understand the role of factors that may moderate or exacerbate the impact of negative influences, such as exposure to thin-ideal media, on body dissatisfaction in adolescent girls. Examination of protective and risk factors can contribute to such understanding.

Protective Factors: Media Literacy

The literature examining factors that protect against the negative effects of thin-ideal media is in its infancy. To date, only body appreciation, defined simply as acceptance of one's body, has been examined as a protective factor. Initial evidence supports its protective nature (Andrew et al. 2015; Halliwell 2013). Another factor that may be protective is media literacy. High levels of media literacy, characterised by the ability to think critically about media in general (Silverblatt 2001), and in particular the ability to make an assessment about how realistic or unrealistic a media image is, are proposed to reduce the credibility and persuasive influence of media (Berel and Irving 1998). It would then follow that individuals with high media literacy would be less likely to compare themselves with thin-ideal images that are perceived to be unrealistic, thus reducing body dissatisfaction.

Cross-sectional studies provide some support for these proposed relationships. The self-reported tendency to engage in protective media strategies, such as thinking critically about techniques used to produce highly stylised thin-ideal images, has been found to be associated with positive body image (Andrew et al. 2015). In addition, high scores on a media literacy measure capturing scepticism about the realism of media images (realism scepticism) were related to low body dissatisfaction in adolescent girls (McLean et al. 2013). In experimental studies, post-exposure reports of protective media strategies used while viewing thin-ideal images did not predict change in body dissatisfaction following media viewing (Andrew et al. 2015) and perceptions of the realism of thin-ideal images were not found to differ between experimental conditions in which participants did, or did not, view warning labels highlighting digital alterations of images (Tiggemann et al. 2013). Although these results were not supportive of media literacy as a protective factor, the design of these experiments was not optimal for that purpose. To our knowledge, no experimental studies have been conducted that have specifically examined the effect of pre-exposure levels of media literacy as a protective factor.

Risk Factors: Internalization of the Thin-Ideal and Upward Appearance Comparison Tendencies

In contrast to protective factors, risk factors have been extensively investigated as moderators of thin-ideal media induced body dissatisfaction. Internalization of the thin-ideal, in which societal ideals for appearance (an unrealistically thin-ideal for females) are adopted as personal standards, is proposed to increase risk for negative outcomes following thin-ideal media viewing. Although internalization of the thin-ideal is most commonly conceptualized and investigated as a predictor of increases in body dissatisfaction (Dakanalis et al. 2015; Rodgers et al. 2015b) or as a mediator of the media exposure-body dissatisfaction relationship (Thompson et al. 1999), recent advances have proposed that trait internalization of the thin-ideal could also be a moderator of sociocultural influences, such as media, on body dissatisfaction (Karazsia et al. 2013). In this vein, individuals high in thin-ideal internalization would be more vulnerable to thin-ideal media exposure. This outcome has been shown in experimental research, including with young adult females (Dittmar et al. 2009) and middle-adolescent girls (Durkin and Paxton 2002) exposed to thin-ideal images, and with college-aged females and males following exposure to sexually objectifying thin-ideal images (Krawczyk and Thompson 2015).

Trait appearance comparison, the tendency to compare one's appearance with others, has also been consistently demonstrated to be a moderator of body image outcomes following thin-ideal media viewing. For example, in middle-adolescent girls, higher levels of appearance comparison, assessed prior to media exposure, predicted lower body satisfaction following thin-ideal media viewing (Durkin and Paxton 2002). Similar findings were revealed in college age males with baseline appearance comparison predicting increases in body

satisfaction after viewing muscular and slender idealized media images (Galioto and Crowther 2013). It is assumed from these findings that appearance comparison tendencies predict poorer outcomes for body satisfaction because individuals engage in "upward" appearance comparisons whereby they compare themselves to superior targets and perceive that their appearance is inadequate, thus resulting in body dissatisfaction. The present study will extend previous research by specifically examining upward appearance comparison tendencies, rather than general appearance comparison tendencies, as a predictor of effects of thin-ideal media on body satisfaction.

Interaction between Protective and Risk Factors

The effects of protective and risk factors have been examined in isolation but, as recent research highlights, it is also informative to consider their interaction. Using post-test only designs, interaction effects, between two risk factors or between protective and risk factors, have been shown to be different from the effect of the individual factor on body image following media viewing. Young adult women with high appearance comparison, and high internalization of the thin-ideal had poorer body image after viewing images of attractive average-sized models than did women with high appearance comparison but low internalization of the thin-ideal (Dittmar and Howard 2004). Similarly, the presence of both high body mass index (BMI) and high neuroticism was associated with greater body dissatisfaction following media viewing than the presence of high BMI but low neuroticism (Dalley et al. 2009). Interactions between the protective factor, body appreciation, and the risk factor, thin-ideal internalization, have also been investigated (Halliwell 2013). College-age women with high thin-ideal internalization and low body appreciation had negative body image outcomes following thin-ideal media viewing but this was not the case for individuals with high thin-ideal internalization and high body appreciation for whom there was no negative effect of media exposure on body image (Halliwell 2013). Thus, body appreciation mitigated the impact of internalization of the thin-ideal. The studies described above were limited by using post-test only designs, which do not allow for examination of the effects of risk and protective factors on change in body satisfaction following media exposure. Thus, the present study will extend these approaches by using a pre-post experimental design and examining the effect on change in body satisfaction of the interaction between protective and risk factors.

Image Processing: Appearance Comparison

As well as pre-existing levels of protective and risk factors, the ways in which individuals think about, or process the images they are viewing, has been found to influence body satisfaction outcomes of thin-ideal media exposure. Evidence is mounting that comparing one's appearance with media images during viewing is

critical to body image outcomes. Giving college-age women a simple instruction to compare their appearance with people in experimental stimuli prior to viewing television commercials featuring thin-ideal models led to an increase in appearance dissatisfaction relative to participants who did not receive such an instruction (Cattarin et al. 2000). Tiggemann and colleagues have also manipulated the extent to which appearance comparison processing is undertaken during media viewing through use of a subtle instructional set procedure. This subtle procedure manipulates processing of images by asking participants to rate their agreement with a series of statements, such as how thin they are compared with the person in the media images, while they are viewing thin-ideal images. Findings from one (Tiggemann et al. 2009), but not other studies (Tiggemann and McGill 2004; Tiggemann and Polivy 2010), demonstrated that, in an appearance comparison processing condition relative to a control condition, greater body dissatisfaction was reported following thin-ideal media viewing. Although the outcomes for experimental conditions were not consistent in these studies, levels of reported appearance comparison processing have been shown to impact body dissatisfaction outcomes. Specifically, post-viewing body dissatisfaction was related to greater appearance comparison during the viewing of thin-ideal images for college-age women (Tiggemann and McGill 2004; Tiggemann and Polivy 2010) and muscular-ideal images for college-age men (Galioto and Crowther 2013; Hargreaves and Tiggemann 2009), further strengthening evidence for the role of appearance comparison processing in body image outcomes during media viewing.

Image Processing: Peer Appearance Norms

Consideration of perceived peer norms for appearance, that is, interpretation of subcultural (or peer group) standards for appearance (Mills et al. 2012), may also influence the media exposure-body dissatisfaction relationship. It has been argued that media is a powerful source of influence on prevailing appearance norms (Hesse-Biber et al. 2006; López-Guimerà et al. 2010) and, further, that individuals are aware of the impact of media on others. Regarding perceptions of ideal body weight, an indicator of appearance norms, college-age women believe that their peers' ideal body weight perceptions are influenced by media exposure to a greater extent than their own perceptions (Chia 2007; David et al. 2002). It is perhaps this third person effect, the tendency to believe that others are more affected by media than oneself (Davison 1983; Perloff 2009), coupled with the negative effect that perceived peer appearance norms have on body satisfaction (Bair et al. 2014; Krcmar et al. 2008; Lin et al. 2015), that contributes to findings of interactions between perceptions of peers' appearance norms and media influence. Specifically, it has been found that the beliefs of women that others were influenced by media to prefer a thinner body size were associated with participants' own desire to be thin

(Park 2005). Mock peer comments about models' body size paired with thin-ideal images on a YouTube page were found to influence adolescent girls' post-exposure body dissatisfaction (Veldhuis et al. 2014). Furthermore, comments by adolescent girls in a qualitative study that they perceive they are judged by their peers against the standards for appearance presented in media (Milkie 1999) offer further insight into the interaction between media and peer appearance norms.

The Current Study

The current study examined effects of thin-ideal media exposure on body satisfaction in adolescent girls, a developmental period characterized by identity formation (Erikson 1968). Ecological perspectives highlight the universality of media as sources of information, including about societal attitudes such as appearance ideals, that shape adolescents' identity (Lloyd 2002). In addition, peer relationships provide a contextual influence through which adolescents interact with media. Peers may offer a reference point through which media is interpreted (McHale et al. 2009) and peers may also reinforce values and attitudes presented in media (Lloyd 2002). In light of the centrality of both media and peers to the adolescent developmental period (Erikson 1968; Lloyd 2002), the current study aimed to examine the effects of media exposure in the context of the ecological factor, peer appearance norms, as well as in the context of the individual factor, appearance comparisons.

Thus, the aim of this study was to evaluate the effects of exposure to thin-ideal media images on body satisfaction in three experimental conditions: appearance comparison, peer norms, and control. It was predicted that body satisfaction would be lower after viewing thin-ideal images and that the effect would be more pronounced when participants had been indirectly prompted to compare their appearance to thin-ideal media images (appearance comparison condition) or to consider their peers' tendency to do so (peer norms condition) compared to a control condition. An additional important aim was to examine whether protective and risk factors assessed at baseline, media literacy, and internalization of the thin-ideal and upward appearance comparison respectively, moderate the effects of exposure on body satisfaction. Media literacy was predicted to have a protective effect such that participants with higher levels of critical thinking and realism scepticism were expected to experience less negative change in body satisfaction following exposure to thin-ideal media images than participants with low levels of critical thinking and realism scepticism. Both thin-ideal internalization and upward appearance comparison were predicted to increase risk; participants with higher baseline levels of internalization and upward appearance comparison were expected to experience greater negative effects on body satisfaction of exposure to thin-ideal media images than participants with lower levels of internalization and

upward appearance comparison. In line with the postulated role of media literacy outlined above, it was predicted that media literacy would interact with both risk factors, internalization and upward appearance comparison, to mitigate their negative effects on body satisfaction.

Method

Participants

Participants were early adolescent girls from four secondary schools in Melbourne, Australia. Written parental consent and informed consent was obtained from all individual participants (N = 259) included in the study. The final sample for analysis was N=246 (M_{age} = 13.11 years, SD = 0.46). Data from three participants were excluded because they had made multiple attempts to access the online experiment and had been exposed to more than one experimental condition. Ten participants (appearance comparison n = 4, peer norms n = 3, control n = 3) did not complete the experiment. Reasons for non-completion were not given. The majority of participants were born in Australia or New Zealand (85.4%), and others were born in European (5.7%), South-East Asian (4.9%), or a diverse range of countries (4.1%).

Materials

Media images. The experimental stimuli were ten full length, or three-quarters body length, advertisements depicting thin-ideal images of young women. A pool of 25 advertisements were selected by the first author from the most popular magazines for female teenage readers (Roy Morgan 2012). The final ten images were selected on the basis of responses from a group of body image researchers (N = 8) who rated the images for consistency with the sociocultural thin-ideal and from responses of a group of early adolescent girls who took part in a pilot study (N = 10) and rated the images for attractiveness. Advertisements were modified slightly to remove distracting text.

Experimental manipulation. Subtle means, rather than overt direction, were used to facilitate appearance comparison and peer processing of images, which formed the experimental manipulation for the study. This approach has been used in previous research to prompt comparison processing (Mills et al. 2002; Tiggemann and Polivy 2010) and was the preferred approach as direct instructions have been found to be less effective (Want 2009). Following Tiggemann and Polivy (2010), six questions were presented alongside each image and participants responded to the questions in relation to each image they viewed. The questions were embedded in a "consumer response survey" to support the cover story that the study was about opinions on advertising. For the appearance comparison condition three of the six questions were designed to prompt appearance comparisons with the images. A sample item is "How much do you like the shape of your body

compared to the person in the ad?" For the peer norms condition, three of the six questions were designed to stimulate consideration of peer norms about appearance and the ways in which peers may use media to evaluate others within their environment. A sample item is "How much do girls in your class compare the shape of their friends' bodies to the body shape of the person in the ad?" For the control condition, all six questions were designed to ensure that participants attended to the stimulus materials, but they did not provoke a particular type of image processing. A sample item is "How much do you like the overall design of the ad?" The three additional questions in each of the appearance comparison and peer norms conditions were also designed to focus attention on the overall image. A sample item is "How much does the ad catch your attention?" For each question, participants indicated their responses on a visual analogue scale (VAS) from 0 (*not at all*) to 100 (*very much so*). Item responses were not analysed. The six questions for each image were presented in rotation to prevent order effects.

Measures

Participants completed demographic information (age, country of birth) and frequency of media exposure (magazine reading and digital media).

Independent variables.

Media literacy. Two measures assessed different aspects of media literacy and media processing. The Critical Thinking about Media Messages (CTMM) scale (Scull et al. 2010), assessed general critical thinking about media with six items, such as "I think about the things the advertisers do to get my attention". Responses were indicated on a 6-point scale from 0 (*never*) to 5 (*always*) and responses were summed to form a total score, ranging from 0 to 30. Higher scores reflect higher frequency of critical thinking about media. Cronbach's alpha in the current study was high ($\alpha = .90$).

Perceived realism of media images was assessed with the two item version of the Realism subscale of the Media Attitudes Questionnaire (Irving et al. 1998; McLean et al. 2015). Participants responded to items "Normally women (in real life) look like models in ads" and "Normally women (in real life) are as thin as the models in ads" on a 5-point scale from 1 (*completely disagree*) to 5 (*completely agree*). Responses were reverse coded and summed to form a total score, ranging from 2 to 10. For the purposes of the current study the realism subscale is referred to as realism scepticism to indicate that higher scores reflect higher scepticism about the realism of media images. Internal consistency for the current study was high (Spearman Brown coefficient = .81).

Scores on both the CTMM and realism scepticism scales have been found to be internally consistent,

have good test-retest reliability, and have adequate construct validity in early adolescent girls. The factor structure of the scales was also supported (McLean et al. 2015).

Internalization of the thin-ideal. Four items from the Internalization - General subscale of the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ; Thompson et al. 2004) assessed internalization of the thin-ideal from media sources. Items that explicitly assessed comparison with people in media, such as "I compare my body to the bodies of TV and movie stars" were omitted from the current study to minimize confounding with assessment of upward appearance comparison. Participants responded to items such as "I would like my body to look like the people who are on TV" on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Item responses were summed to form a total scale score ranging from 4 to 20, with higher scores reflecting higher internalization of the thin ideal. Scores on this scale have shown high internal consistency in young adolescent girls (Ross et al. 2013), and convergent validity in college age samples (Thompson et al. 2004). In the current study, scores from the 4-item version of the scale correlated highly with scores on the body dissatisfaction subscale of the Eating Disorders Inventory (Garner 1991), and the Physical Appearance Comparison Scale (Thompson et al. 1991) ($r_{(246)} = .59$, $p < .001$; $r_{(246)} = .68$, $p < .001$, respectively), supporting construct validity. Cronbach's alpha in the current study was high ($\alpha = .91$).

Upward appearance comparison tendencies. Five items from the ten item Upward Physical Appearance Comparison Scale (O'Brien et al. 2009) were used to assess upward appearance comparison tendencies. Scores on this scale have shown adequate test-retest reliability and construct validity in a young adult female sample (O'Brien et al. 2009). Five items with lower factor loadings (O'Brien et al. 2009) were omitted for the current study to reduce participant burden. Participants responded to items such as "I compare my body to people who have a better body then me" on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). A mean score of item responses was calculated to form a scale score ranging from 1 to 5, with higher scores reflecting greater tendency to compare appearance with physically attractive targets. Supporting construct validity in early adolescent girls, in the current study scores from the upward appearance comparison measure were strongly positively correlated ($r_{(243)} = .79$, $p < .001$) with scores on the physical appearance comparison scale (Thompson et al. 1991). Cronbach's alpha in the current study was high ($\alpha = .97$).

Dependent variable. State body satisfaction was assessed with visual analogue scales (VAS) (Heinberg and Thompson 1995) immediately before and after exposure to thin-ideal media images. Previous research has found VAS to yield reliable and valid body satisfaction scores (Durkin and Paxton 2002; Heinberg and Thompson 1995). Following Richardson and Paxton (2010), four scales assessing satisfaction with body

shape, with weight, with appearance and feelings of attractiveness were used. An example item is "I feel satisfied with my body shape". Participants were asked to indicate how they "feel right now" and responses were indicated on a 100-point line from 0 (*not at all*) to 100 (*very much so*). A mean score across the four items was calculated to represent the scale score, which ranged from 0 to 100 with higher scores indicating higher state body satisfaction. Supporting construct validity, in the current study pre-exposure state body satisfaction was strongly inversely correlated with scores on the body dissatisfaction subscale of the Eating Disorders Inventory (Garner 1991) at baseline ($r_{(246)} = .77$, $p < .001$). Internal consistency values were high in the current study (pre-exposure $\alpha = .94$; post-exposure $\alpha = .96$).

Distractor questions. Three additional VAS items were included before and after participants viewed the thin ideal images. These asked about participants' opinions of viewing advertisements, such as "I like ads that make me laugh". These items were included as distractor questions and also supported the cover story for the study. Responses to these items were not analysed.

Manipulation check. Following (Tiggemann and Polivy 2010), two questions assessed the degree to which the instructional set, embedded in the consumer response survey, resulted in the intended type of image processing. Participants rated the extent to which they compared themselves with how the model looked in the ad, consistent with the appearance comparison instruction set, and how much they thought about friends comparing one another to how the model looked in the ad, consistent with the peer norms instruction set. Items were presented in random order and responses were indicated from 0 (*none*) to 100 (*a lot*).

Procedure

Ethics approval was given by the University Human Ethics Committee. Participants were asked to take part in a study to evaluate adolescents' opinions on advertising. The cover story was used to mask the purpose of the study. Participants completed all study requirements using online survey software. Sessions were supervised by a researcher and a teacher was present. Independent variables and questions about magazine and digital media use were assessed in an initial session, and one week later, participants took part in the experimental study. For the experimental study, participants completed the pre-exposure body satisfaction and distractor VAS and were then randomly assigned to experimental condition (appearance comparison $n = 82$; peer norms $n = 81$; control $n = 83$). Participants then viewed the 10 thin-ideal images, which were presented in the same order for each experimental condition, and responded to questions about the images in the consumer response survey according to random assignment to experimental condition. Following image viewing, participants answered the post-exposure body satisfaction and distractor VAS, and then completed the

manipulation check questions. Participants' progress through the experiment was self-paced to allow for different reading and response speeds of the adolescent participants and to simulate natural viewing settings.

Data Analysis

A series of mixed between-within repeated measures analyses of variance (ANOVA) were conducted to test for effects on body satisfaction of exposure to thin-ideal media images across time, experimental conditions and baseline levels of risk (thin-ideal internalization and upward appearance comparison tendencies) and protective (critical thinking and realism scepticism) factors. Four separate ANOVAs were conducted, each with a 2 (time) x 3 (experimental condition) x 2 (baseline protective factor: high, low) x 2 (baseline risk factor: high, low) design. For each ANOVA, state body satisfaction was the dependent variable, time (pre-post-exposure) was the within-subjects factor, and experimental condition (appearance comparison, peer norms, control) a between subjects factor. Additional between subjects' factors were: ANOVA 1) critical thinking (high, low) and thin-ideal internalization (high, low), ANOVA 2) critical thinking (high, low) and upward appearance comparisons (high, low), ANOVA 3) realism scepticism (high, low) and thin-ideal internalization (high, low), and ANOVA 4) realism scepticism (high, low) and upward appearance comparisons (high, low). Protective and risk factors were converted to dichotomous variables, based on a median split, to form high and low score groups. Post-hoc pairwise comparisons with Bonferroni adjustments were interpreted for multivariate and between subjects' effects that were significant and marginally significant.

Results

Participant Characteristics

Participants in the three experimental conditions did not differ in age, F (243) = 0.39, p = .680, η^2 < .01, frequency of magazine reading, F (243) = 0.65, p = .524, η^2 < .01, or time spent on digital media, F (243) = 0.44, p = .643, η^2 < .01. There were also no differences between groups in thin-ideal internalization F (243) = 0.42, p = .657, η^2 < .01, upward appearance comparison, F (243) = 0.52, p = .595, η^2 < .01, or realism scepticism, F (243) = 0.526, p = .592, η^2 < .01. There was, however, a difference between groups in critical thinking, F (243) = 4.37, p = .014, η^2 = .03, with post-hoc tests revealing that the peer norms condition had significantly higher levels of critical thinking than the appearance comparison condition, p = .011.

Manipulation Check

One-way ANOVAs tested the difference between experimental conditions of self-ratings of the degree to which participants engaged in different types of image processing, as per the instruction set, embedded in the consumer response survey. See Table 1 for means and standard deviations. Experimental conditions differed for

the appearance comparison processing item, F (242) = 3.97, p = .020, η^2 = .03, with post-hoc tests revealing that the appearance comparison condition had significantly higher ratings of appearance comparison processing than the control condition, p = .015. The difference between conditions for the peer norms processing item was marginally significant, F (242) = 2.49, p = .085, η^2 = .02, with post-hoc tests revealing that the peer norms condition had marginally significantly higher ratings of peer norms processing than the control condition, p = .069. These outcomes generally support the success of the experimental manipulations, particularly that of appearance comparison, although the appearance comparison and peer norms conditions were not significantly differentiated on comparisons of self to media images and comparisons by friends to media images.

Effects of Thin-ideal Media Exposure on Body Satisfaction

Means and standard deviations for pre- and post-exposure body satisfaction scores and baseline protective and risk factors for each experimental condition are shown in Table 1. Body satisfaction means and standard deviations, according to pre-and post-exposure, experimental condition, media literacy, and risk factors are shown in Appendices A through D.

Repeated Measures (Time) Effects

Effects of experimental condition. Change in body satisfaction across time and across experimental conditions was apparent in the significant 2-way interactions between time and experimental condition. None of the 4-way interactions between time, experimental condition, media literacy, and internalization/upward comparison or the 3-way interactions between time, experimental condition and media literacy, or between time, experimental condition, and internalization/upward comparison were significant. See Table 2 for summary statistics for interaction and main effects.

For the 2-way interaction effects between time and experimental condition that were significant (with internalization as a between-subjects risk factor; ANOVA 1. F (234) = 3.43, p = .034, η_p^2 = .028; ANOVA 3. F (234) = 3.87, p = .022, η_p^2 = .032) and marginally significant (with upward appearance comparison as a between-subjects risk factor: ANOVA 2. F (234) = 2.39, p = .094, η_p^2 = .020; ANOVA 4. F (234) = 2.59, p = .077, η_p^2 = .022), post-hoc pairwise comparisons with Bonferroni adjustments were interpreted (see Table 2). These showed that participants in the appearance comparison condition but not participants in the peer norms or control conditions, reported significantly lower post-exposure body satisfaction than pre-exposure body satisfaction.

These interactions between time and experimental condition showed that experimental condition had an effect on body satisfaction following thin-ideal media exposure regardless of level of protective factor or level

of risk factor, or their interaction. Effects were observed only in the appearance comparison condition whereby participants experienced reduced body satisfaction following media viewing. No change in body satisfaction was observed for participants in the peer norms or control conditions.

Effects of protective and risk factors and their interaction. Change in body satisfaction across time and across level of protective or risk factors was apparent in the significant 3-way interactions between time, media literacy, and internalization/ upward appearance comparison. In addition, marginally significant 2-way interactions between time and media literacy (critical thinking only) were revealed.

In relation to the 3-way interactions, there were significant interactions between time, critical thinking, and internalization, ANOVA 1. F (234) = 4.69, p = .031, η_p^2 = .020, and time, realism scepticism, and upward comparisons, ANOVA 4. F (234) = 6.00, p = .015, η_p^2 = .025, and a marginally significant interaction between time, critical thinking, and upward comparisons, ANOVA 2. F (234) = 3.40, p = .066, η_p^2 = .015. The interaction between time, realism scepticism, and internalization was not significant, ANOVA 3. F (234) = 1.12, p = .291, η_p^2 = .005. For each significant, or marginally significant interaction effect, post-hoc pairwise comparisons with Bonferroni adjustments were interpreted (see Table 2). For the 3-way interactions, these revealed significantly lower post-exposure compared with pre-exposure body satisfaction for participants with low levels of media literacy, either critical thinking or realism scepticism, and high levels of either risk factor, internalization or upward comparison. In contrast, post-hoc comparisons showed no differences between pre-exposure and post-exposure levels of body satisfaction for participants with high levels of media literacy and high risk factors levels, which indicates a protective effect of high media literacy in participants with high internalization or high upward comparison tendencies. To illustrate this effect, Figures 1 and 2 show change in body satisfaction according to level of protective and risk factors.

For the marginally significant 2-way interactions between time and critical thinking, ANOVA 1. F (234) = 3.27, p = .072, η_p^2 = .014; ANOVA 2. F (234) = 2.93, p = .088, η_p^2 = .013, post-hoc pairwise comparisons were interpreted. Results revealed that participants with low critical thinking, but not high critical thinking, reported significantly lower body satisfaction at post-exposure, compared with pre-exposure (see Table 2).

These interactions between time and protective and risk factors showed that body satisfaction was adversely affected by thin-ideal media viewing for participants low in media literacy and high in internalization of the thin-ideal or high in upward appearance comparison. In contrast, body satisfaction did not change following media viewing for participants with high levels of media literacy. Thus, baseline media literacy

conferred a protective effect for media viewing of thin-ideal images.

Between Subjects' Effects

The between subjects' effects examining experimental condition, protective and risk factors, and their interactions, regardless of change across time, did not address the central aims of the study which were to evaluate change in state body dissatisfaction following media viewing. Thus those results are not presented in text but are available from the authors upon request.

Discussion

Media is a pervasive influence on adolescents' development, affecting attitudes, decision making and behaviors (Strasburger et al. 2010). Attitudes towards, and evaluation of one's body image have consistently been found to be adversely affected by exposure to thin-ideal media, although studies do also find that some individuals are unaffected by such exposure (Durkin and Paxton 2002; Knobloch-Westerwick and Crane 2012). Understanding the factors that protect against, or that heighten, the negative effects of media exposure is important to facilitate efforts to prevent body dissatisfaction. The current study aimed to examine effects on state body satisfaction of exposure to thin-ideal media images in three experimental conditions: appearance comparison, peer norms, and control. An important aim was to also examine the moderating influences on body satisfaction of the interaction between protective (media literacy: critical thinking and realism scepticism) and risk (trait internalization of the thin-ideal and upward appearance comparison tendencies) factors. The results showed significant decreases in body satisfaction following media viewing for participants in the appearance comparison but not peer norms or control experimental conditions, for participants low in critical thinking and high in trait thin-ideal internalization, and for participants low in critical thinking or low in realism scepticism and also high in upward appearance comparison tendencies. High critical thinking was protective for participants with high internalization of the thin ideal and both high critical thinking and high realism scepticism were protective for participants with high upward appearance comparison. Overall, the pattern of results suggests that critical thinking is highly important in determining the response to media viewing for body satisfaction.

The findings of this study add to the body of evidence suggesting that individuals are differentially affected by exposure to thin-ideal media (Ferguson 2013). Of most interest are the novel findings relating to media literacy that show contrasting effects for participants with high and low levels of this protective factor. Consistent with predictions, media literacy produced a protective effect. Participants with low critical thinking were negatively affected by viewing thin ideal media images, reflected by significantly lower body satisfaction

at post-exposure, compared with pre-exposure. In contrast, body satisfaction for participants with high critical thinking did not differ across time. In addition, as predicted, both critical thinking and realism scepticism mitigated the negative effects of pre-existing levels of risk related to thin-ideal internalization and upward comparison. In participants with high thin-ideal internalization or high upward comparison, only those with low critical thinking or low realism scepticism reported lower body satisfaction following media viewing. Those with high media literacy were protected from the negative impact of high levels of risk factors.

Although media literacy has not previously been examined as a protective factor for thin-ideal media viewing effects, the pattern of results is similar to research that has looked at the protective effects of body appreciation. College-age women with low body appreciation experienced an increase in body dissatisfaction following exposure to thin-ideal advertising images, whereas those with high body appreciation did not experience this negative effect (Andrew et al. 2015). Examining interactions between body appreciation, and the risk factor thin-ideal internalization, Halliwell (2013) found negative effects of media viewing on body image for women with high internalization and low body appreciation. In line with the findings of the current study, women with high internalization who also had high levels of the protective factor, body appreciation, did not experience any effects of media exposure (Halliwell 2013). The interaction effects demonstrated in the current study and in previous research show that protective factors, either media literacy or body appreciation, have a mitigating, but not enhancing, effect. In other words, the presence of high levels of protective factors mitigates the negative effects of high levels of pre-existing risk, but do not interact with low levels of risk.

Unexpectedly, the interactions between and time and internalization of the thin-ideal from media sources, and time and upward comparison were non-significant, whereas the inclusion of media literacy in these interactions produced significant effects. This demonstrates that poor body satisfaction outcomes for participants with high levels of risk were apparent only if they also had low media literacy, as discussed above. Previous research has typically found that thin-ideal internalization and appearance comparison tendencies predict change in body image following media viewing (Dittmar et al. 2009; Dittmar and Howard 2004; Durkin and Paxton 2002; Krawczyk and Thompson 2015); however, this is not always the case. The mitigating effects of media literacy, or other protective factors, may explain the current, and previous null findings (Durkin and Paxton 2002, grade 7 girls; Homan et al. 2012). Future research employing experimental manipulation of media literacy and examining additional outcomes, such as drive for thinness and disordered eating, may differentiate these effects and contribute to the understanding of causal effects of protective factors on body satisfaction following exposure to thin-ideal media. It is also possible that the timeframe within which the experiment was conducted

may have influenced results. The time-span between pre- and post-exposure assessments of body satisfaction was brief, and the baseline measures of protective and risk factors were assessed one week prior to the experimental component of the study. Alterations in the timing of the experimental protocol may have produced different results.

The negative effects for body satisfaction in the appearance comparison processing condition were consistent with our predictions and with past research. The current study is the first to establish these effects in adolescent girls, having previously been demonstrated with college-age women (Cattarin et al. 2000; Tiggemann et al. 2009). The findings reinforce the notion described above that the processing of images is a crucial determinant of the effects on body image. However, in contrast to our predictions, only appearance comparison processing, not peer norms processing, led to lower body satisfaction following thin-ideal media viewing. The reasons for these findings are unclear but one explanation is that the procedure to prompt peer norms processing was not sufficiently potent. Although participants in the peer norms condition engaged in marginally greater peer norm processing than the control condition, as evidenced by the manipulation check, this may not have been adequate to prompt consideration of the evaluation of one's appearance by others. Another explanation is that the peer norms prompts used in the current study were inconsistent with the ways in which adolescents integrate peer appearance norms into their processing of thin-ideal media images in natural settings. Refined procedures may facilitate understanding of the effects of peer norms on media exposure. In addition, assessing levels of recognition and internalization of peer appearance norms at a baseline assessment may provide further understanding of the interaction between peer norms and effects of exposure to thin-ideal media on body satisfaction.

Alternatively, the lack of effects for the peer norms condition may have resulted from a buffering effect in some participants. The intended outcome of the peer norms processing instruction set was for participants to consider the ways in which their peers may use thin-ideal media to evaluate others' appearance, including the appearance of the participant. However, in line with suggestions by Hillard et al. (2016), the inclusion of items to engage participants in consideration of their peers' appearance comparison behaviors or desires to look like media images, which were used to set up the premise that peers use media to compare themselves and others, could have produced a feeling of cohesion, or bonding between participants and their perceptions of their peers (Bassett Greer et al. 2015; Hillard et al. 2016), which reduced negative outcomes for some participants.

In light of the findings of previous research that some participants experience increased body satisfaction following exposure to thin ideal images (Durkin and Paxton 2002; Knobloch-Westerwick and Crane

2012), it is perhaps unsurprising that participants in the control condition, in the absence of prompts to compare themselves to the images, or to engage other appearance related processes, did not have reduced body satisfaction after thin-ideal media viewing. A number of possibilities may account for this null effect. First, as has been suggested in previous research in which some participants have been found to rate their own appearance more highly after viewing thin-ideal images (Mills et al. 2002), some participants in the control condition of the current study may also have been inspired towards self-enhancement by viewing thin-ideal images (Mills et al. 2002), resulting in greater body satisfaction. Second, the experimental images were conservative relative to other studies (Krawczyk and Thompson 2015), and did not show the extreme levels of thinness that may be required to produce body satisfaction changes, or third, the ubiquity of thin-ideal media images in Western cultures may have reduced their impact such that presentation of ten thin-ideal images in a controlled setting is not sufficient to change body satisfaction (Perloff 2014).

This study, with a young female adolescent sample, is the first to have examined the relationship between media literacy and change in body satisfaction following exposure to thin-ideal media. It is unclear whether the same outcomes would be replicated with an older sample. At present no data exist that have examined the relationship between age or developmental stage and media literacy skills, thus we cannot be certain whether young adolescents, relative to their older counterparts, have particularly low levels of media literacy, and are generally accepting of the images they view. It may be that critical thinking skills naturally develop with age in parallel with the development of operational thinking. Higher levels of critical thinking, if they are present in older adolescents and young adults, may result in different interactions with levels of risk factors.

The findings of this study have clear implications for prevention. In particular, they provide evidence to support the use of media literacy interventions (Espinoza et al. 2013; Wilksch et al. 2015). The results of this study indicate that facilitating the development of critical thinking skills, in addition to highlighting the lack of realism in thin-ideal media images, as is typically done in some media literacy interventions, may be crucial in enhancing the impact of media literacy-based approaches. Although both critical thinking and realism scepticism mitigated the impact of risk factors, the patterns of interactions between each media literacy variable and the risk factors, internalization of the thin-ideal and upward appearance comparison, were slightly different. This suggests that different media literacy skills and processes may be used to target particular outcomes. Less clear is our understanding of how critical thinking and realism scepticism develop in the context of body image, or whether other media literacy skills such as advocacy, or understanding the values and points of view inherent

in media, are also important for reducing risk of developing body dissatisfaction. Prevention efforts would benefit from understanding this development and the differential impact of separate media literacy constructs in order to effectively enhance media literacy, leading to positive outcomes for body satisfaction.

The current study also has some limitations. Height and weight measures were not collected, therefore BMI could not be used as a covariate in the analyses. Although the inclusion of BMI as a covariate may have changed the pattern of results, previous research has found that BMI did not predict change in body satisfaction following exposure to thin-ideal images for early- and mid-adolescent girls (Durkin and Paxton 2002). In addition, neither eating disorder nor dieting status were assessed and also could not be included as covariates. It is unclear how the inclusion of these variables may have affected outcomes. In order to simulate natural viewing processes, participants viewed images at their own pace, so the length of exposure to stimuli (photos) varied. Replication involving measuring self-selected viewing time could clarify possible mediating effects of exposure time. Alternatively, standardizing length of exposure could control for this variable. We also did not assess whether participants were aware of the specific nature of the study, and it is possible that expectancy effects occurred for some participants. Further, the study may have been underpowered to detect 4-way interaction effects and a large number of comparisons were conducted so it is possible that some findings were spurious.

Conclusion

Addressing the adverse impact of media exposure on adolescents is crucial in light of the importance that values portrayed in media play in the development of adolescents' sense of self (Lloyd 2002), an important component of which is body image (Markey 2010). Understanding the factors that lead to change in body satisfaction following thin-ideal media exposure has been limited by a focus on examining risk factors, rather than on also examining protective factors. The current study addressed this limitation by concurrently examining the impact of media literacy as a protective factor, and both trait internalization of the thin-ideal and upward appearance comparison tendencies as risk factors in early adolescence. The novel findings, that media literacy, and tendency to engage in critical thinking in particular, mitigated the negative impact of high levels of risk factors on change in body satisfaction, provide the first experimental evidence for the role of media literacy as a protective factor for body satisfaction against the negative effects of exposure to thin-ideal images. In addition, the results of adverse outcomes for body satisfaction in the appearance comparison condition, but not the peer norms or control conditions further emphasise that pre-existing characteristics and appearance comparison processing are key contributors to the link between media exposure and reductions in body satisfaction. Future research should examine the development of media literacy to determine not just when and how critical thinking

skills develop, but under what circumstances adolescents utilize their skills when confronted with potentially harmful media.

References

Allen, K. L., Byrne, S. M., & Crosby, R. D. (2015). Distinguishing between risk factors for bulimia nervosa, binge eating disorder, and purging disorder. *Journal of Youth and Adolescence, 44*(8), 1580-1591, doi:10.1007/s10964-014-0186-8.

Andrew, R., Tiggemann, M., & Clark, L. (2015). The protective role of body appreciation against media-induced body dissatisfaction. *Body Image, 15*, 98-104, doi:10.1016/j.bodyim.2015.07.005.

Bair, A., Steele, J. R., & Mills, J. S. (2014). Do these norms make me look fat? The effect of exposure to others' body preferences on personal body ideals. *Body Image, 11*(3), 275-281, doi:10.1016/j.bodyim.2014.04.004.

Bassett Greer, K., Campione-barr, N., & Lindell, A. K. (2015). Body talk: Siblings' use of positive and negative body self-disclosure and associations with sibling relationship quality and body-esteem. *Journal of Youth and Adolescence, 44*(8), 1567-1579, doi:10.1007/s10964-014-0180-1.

Berel, S., & Irving, L. M. (1998). Media and disturbed eating: An analysis of media influence and implications for prevention. *Journal of Primary Prevention, 18*(4), 415-430, doi:10.1023/a:1022601625192.

Cattarin, J. A., Thompson, J. K., Thomas, C., & Williams, R. (2000). Body image, mood, and televised images of attractiveness: The role of social comparison. *Journal of Social and Clinical Psychology, 19*(2), 220-239.

Chia, S. C. (2007). Third-person perceptions about idealized body image and weight-loss behavior. *Journalism & Mass Communication Quarterly, 84*(4), 677-694.

Dakanalis, A., Carrà, G., Calogero, R., Fida, R., Clerici, M., Zanetti, M. A., et al. (2015). The developmental effects of media-ideal internalization and self-objectification processes on adolescents' negative body-feelings, dietary restraint, and binge eating. *European Child and Adolescent Psychiatry, 24*(8), 997-1010, doi:10.1007/s00787-014-0649-1.

Dalley, S. E., Buunk, A. P., & Umit, T. (2009). Female body dissatisfaction after exposure to overweight and thin media images: The role of body mass index and neuroticism. *Personality and Individual Differences, 47*(1), 47-51, doi:10.1016/j.paid.2009.01.044.

David, P., Morrison, G., Johnson, M. A., & Ross, F. (2002). Body image, race, and fashion models: Social distance and social identification in third-person effects. *Communication Research, 29*(3), 270-294, doi:10.1177/0093650202029003003.

Davison, W. (1983). The third-person effect in communication. *Public Opinion Quarterly, 47*(1), 1-15, doi:10.1086/268763.

Dittmar, H., Halliwell, E., & Stirling, E. (2009). Understanding the impact of thin media models on women's body-focused affect: The roles of thin-ideal internalization and weight-related self-discrepancy activation in experimental exposure effects. *Journal of Social and Clinical Psychology, 28*(1), 43-72.

Dittmar, H., & Howard, S. (2004). Thin-ideal internalization and social comparison tendency as moderators of media models' impact on women's body-focused anxiety. *Journal of Social and Clinical Psychology, 23*(6), 768-791.

Durkin, S. J., & Paxton, S. J. (2002). Predictors of vulnerability to reduced body image satisfaction and psychological wellbeing in response to exposure to idealized female media images in adolescent girls. *Journal of Psychosomatic Research, 53*(5), 995-1005, doi:10.1016/s0022-3999(02)00489-0.

Erikson, E. H. (1968). Identity: Youth and crisis. New York: Norton.

Espinoza, P., Penelo, E., & Raich, R. M. (2013). Prevention programme for eating disturbances in adolescents. Is their effect on body image maintained at 30 months later? *Body Image, 10*(2), 175-181, doi:10.1016/j.bodyim.2012.11.004.

Ferguson, C. J. (2013). In the eye of the beholder: Thin-ideal media affects some, but not most, viewers in a meta-analytic review of body dissatisfaction in women and men. [Meta Analysis]. *Psychology of Popular Media Culture, 2*(1), 20-37, doi:10.1037/a0030766.

Galioto, R., & Crowther, J. H. (2013). The effects of exposure to slender and muscular images on male body dissatisfaction. [Empirical Study; Quantitative Study]. *Body Image, 10*(4), 566-573, doi:10.1016/j.bodyim.2013.07.009.

Garner, D. M. (1991). *Eating Disorder Inventory-2 manual*. Odessa, FL: Psychological Assessment Resources, Inc.

Goldschmidt, A. B., Wall, M., Choo, T.-H. J., Becker, C., & Neumark-Sztainer, D. (2016). Shared risk factors for mood-, eating-, and weight-related health outcomes. *Health Psychology*, Advance online publication, doi:10.1037/hea00002.

Groesz, L. M., Levine, M. P., & Murnen, S. K. (2002). The effect of experimental presentation of thin media images on body satisfaction: A meta-analytic review. *International Journal of Eating Disorders, 31*(1), 1-16, doi:10.1002/eat.10005.

Haines, J., Kleinman, K. P., Rifas-Shiman, S. L., Field, A. E., & Austin, S. B. (2010). Examination of shared risk and protective factors for overweight and disordered eating among adolescents. *Archives of Pediatrics and Adolescent Medicine, 164*(4), 336-343.

Halliwell, E. (2013). The impact of thin idealized media images on body satisfaction: Does body appreciation protect women from negative effects? *Body Image, 10*(4), 509-514, doi:10.1016/j.bodyim.2013.07.004.

Hargreaves, D. A., & Tiggemann, M. (2009). Muscular ideal media images and men's body image: Social comparison processing and individual vulnerability. *Psychology of Men & Masculinity, 10*(2), 109-119.

Heinberg, L. J., & Thompson, J. (1995). Body image and televised images of thinness and attractiveness: A controlled laboratory investigation. *Journal of Social and Clinical Psychology, 14*(4), 325.

Hesse-Biber, S., Leavy, P., Quinn, C. E., & Zoino, J. (2006). The mass marketing of disordered eating and eating disorders: The social psychology of women, thinness and culture. *Women's Studies International Forum, 29*(2), 208-224.

Hillard, E. E., Gondoli, D. M., Corning, A. F., & Morrissey, R. A. (2016). In it together: Mother talk of weight concerns moderates negative outcomes of encouragement to lose weight on daughter body dissatisfaction and disordered eating. *Body Image, 16*, 21-27, doi:10.1016/j.bodyim.2015.09.004.

Holmstrom, A. J. (2004). The effects of the media on body image: A meta-analysis. *Journal of Broadcasting & Electronic Media, 48*(2), 196-217, doi:10.1207/s15506878jobem4802_3.

Homan, K., McHugh, E., Wells, D., Watson, C., & King, C. (2012). The effect of viewing ultra-fit images on college women's body dissatisfaction. *Body Image, 9*(1), 50-56, doi:10.1016/j.bodyim.2011.07.006.

Irving, L. M., DuPen, J., & Berel, S. (1998). A media literacy program for high school females. *Eating Disorders: The Journal of Treatment & Prevention, 6*(2), 119-132, doi:10.1080/10640269808251248.

Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction and psychological distress: A prospect analysis. *Journal of Abnormal Psychology, 114*, 119-125.

Karazsia, B. T., van Dulmen, M. H. M., Wong, K., & Crowther, J. H. (2013). Thinking meta-theoretically about the role of internalization in the development of body dissatisfaction and body change behaviors. *Body Image, 10*(4), 433-441, doi:10.1016/j.bodyim.2013.06.005.

Knobloch-Westerwick, S., & Crane, J. (2012). A losing battle: Effects of prolonged exposure to thin-ideal images on dieting and body satisfaction. *Communication Research, 39*(1), 79-102, doi:10.1177/0093650211400596.

Krawczyk, R., & Thompson, J. K. (2015). The effects of advertisements that sexually objectify women on state body dissatisfaction and judgments of women: The moderating roles of gender and internalization. *Body Image, 15*, 109-119, doi:10.1016/j.bodyim.2015.08.001.

Krcmar, M., Giles, S., & Helme, D. (2008). Understanding the process: How mediated and peer norms affect young women's body esteem. *Communication Quarterly, 56*(2), 111-130, doi:10.1080/01463370802031844.

Lin, L., McCormack, H., Kruczkowski, L., & Berg, M. B. (2015). How women's perceptions of peer weight preferences are related to drive for thinness. *Sex Roles, 72*(3-4), 117-126, doi:10.1007/s11199-015-0446-4.

Lloyd, B. T. (2002). A conceptual framework for examining adolescent identity, media influence, and social development. *Review of General Psychology, 6*(1), 73-91, doi:10.1037//1089-2680.6.1.73.

López-Guimerà, G., Levine, M. P., Sànchez-Carracedo, D., & Fauquet, J. (2010). Influence of mass media on body image and eating disordered attitudes and behaviors in females: A review of effects and processes. *Media Psychology, 13*(4), 387-416, doi:10.1080/15213269.2010.525737.

Loth, K. A., Watts, A. W., van den Berg, P., & Neumark-Sztainer, D. (2015). Does body satisfaction help or harm overweight teens? A 10-year longitudinal study of the relationship between body satisfaction and body mass index. *Journal of Adolescent Health, 57*(5), 559-561, doi:10.1016/j.jadohealth.2015.07.008.

Markey, C. (2010). Invited commentary: Why body image is important to adolescent development. *Journal of Youth and Adolescence, 39*(12), 1387-1391, doi:10.1007/s10964-010-9510-0.

McHale, S. M., Dotterer, A., & Kim, J.-Y. (2009). An ecological perspective on the media and youth development. *American Behavioral Scientist, 52*(8), 1186-1203, doi:10.1177/0002764209331541.

McLean, S. A., Paxton, S. J., & Wertheim, E. H. (2013). Mediators of the relationship between media literacy and body dissatisfaction in early adolescent girls: Implications for prevention. *Body Image, 10*(3), 282-289, doi:10.1016/j.bodyim.2013.01.009.

McLean, S. A., Paxton, S. J., & Wertheim, E. H. (2015). The measurement of media literacy in eating disorder risk factor research: Psychometric properties of six measures. Manuscript submitted for publication.

Micali, N., Ploubidis, G., De Stavola, B., Simonoff, E., & Treasure, J. (2014). Frequency and patterns of eating disorder symptoms in early adolescence. *Journal of Adolescent Health, 54*(5), 574-581, doi:10.1016/j.jadohealth.2013.10.200.

Milkie, M. A. (1999). Social comparisons, reflected appraisals, and mass media: The impact of pervasive beauty images on black and white girls' self-concepts. *Social Psychology Quarterly, 62*(2), 190-210.

Mills, J. S., Jadd, R., & Key, B. L. (2012). Wanting a body that's better than average: The effect of manipulated body norms on ideal body size perception. *Body Image, 9*(3), 365-372, doi:10.1016/j.bodyim.2012.03.004.

Mills, J. S., Polivy, J., Herman, C. P., & Tiggemann, M. (2002). Effects of exposure to thin media images: Evidence of self-enhancement among restrained eaters. *Personality and Social Psychology Bulletin, 28*(12), 1687-1699, doi:10.1177/014616702237650.

O'Brien, K. S., Caputi, P., Minto, R., Peoples, G., Hooper, C., Kell, S., et al. (2009). Upward and downward physical appearance comparisons: Development of scales and examination of predictive qualities. *Body Image, 6*(3), 201-206, doi:10.1016/j.bodyim.2009.03.003.

Park, S.-Y. (2005). The influence of presumed media influence on women's desire to be thin. *Communication Research, 32*(5), 594-614, doi:10.1177/0093650205279350.

Paxton, S. J., Neumark-Sztainer, D., Hannan, P. J., & Eisenberg, M. E. (2006). Body dissatisfaction prospectively predicts depressive mood and low self-esteem in adolescent girls and boys. *Journal of Clinical Child & Adolescent Psychology, 35*(4), 539-549, doi:10.1207/s15374424jccp3504_5.

Perloff, R. M. (2009). Mass media, social perception, and the third-person effect. In J. Bryant, & M. B. Oliver (Eds.), *Media effects: Advances in Theory and Research* (3rd ed., pp. 252-268). New York: Routledge.

Perloff, R. M. (2014). Social media effects on young women's body image concerns: Theoretical perspectives and an agenda for research. *Sex Roles, 71*, 363-377, doi:10.1007/s11199-014-0384-6.

Richardson, S. M., & Paxton, S. J. (2010). An evaluation of a body image intervention based on risk factors for body dissatisfaction: A controlled study with adolescent girls. *International Journal of Eating Disorders, 43*(2), 112-122, doi:10.1002/eat.20682.

Rodgers, R. F., McLean, S. A., Marques, M., Dunstan, C. J., & Paxton, S. J. (2015a). Trajectories of body dissatisfaction and dietary restriction in early adolescent girls: A latent class growth analysis. *Journal of Youth and Adolescence*, Advance online publication, doi:10.1007/s10964-015-0356-3.

Rodgers, R. F., McLean, S. A., & Paxton, S. J. (2015b). Longitudinal relationships among internalization of the media ideal, peer social comparison, and body dissatisfaction: Implications for the tripartite influence model. *Developmental Psychology, 51*(5), 706-713, doi:10.1037/dev0000013.

Rohde, P., Stice, E., & Marti, C. N. (2014). Development and predictive effects of eating disorder risk factors during adolescence: Implications for prevention efforts. *International Journal of Eating Disorders*, n/a-n/a, doi:10.1002/eat.22270.

Ross, A., Paxton, S. J., & Rodgers, R. F. (2013). Y's Girl: Increasing body satisfaction among primary school girls. *Body Image, 10*(4), 614-618, doi:10.1016/j.bodyim.2013.06.009.

Roy Morgan (2012). Young Australians Readership: 12 Months to December 2011. http://www.roymorgan.com/news/press-releases/2012/1586/. Accessed 11 July 2012.

Scull, T. M., Kupersmidt, J. B., Parker, A. E., Elmore, K. C., & Benson, J. W. (2010). Adolescents' media-related cognitions and substance use in the context of parental and peer influences. *Journal of Youth and Adolescence, 39*(9), 981-998, doi:10.1007/s10964-009-9455-3.

Silverblatt, A. (2001). *Media Literacy: Keys to Interpreting Media Messages* (2nd ed.). Westport, CT: Praeger Publishers.

Stice, E., Marti, C. N., & Durant, S. (2011). Risk factors for onset of eating disorders: Evidence of multiple risk pathways from an 8-year prospective study. *Behaviour Research and Therapy, 49*(10), 622-627, doi:10.1016/j.brat.2011.06.009.

Strasburger, V. C., Jordan, A. B., & Donnerstein, E. (2010). Health effects of media on children and adolescents. *Pediatrics, 125*(4), 756-767, doi:10.1542/peds.2009-2563.

Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty: Theory, assessment, and treatment of body image disturbance*. Washington, DC, USA: American Psychological Association.

Thompson, J. K., Heinberg, L. J., & Tantleff, S. (1991). The Physical Appearance Comparison Scale (PACS). *The Behavior Therapist, 14*, 174.

Thompson, J. K., van den Berg, P., Roehrig, M., Guarda, A. S., & Heinberg, L. J. (2004). The Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3): Development and validation. *International Journal of Eating Disorders, 35*(3), 293-304, doi:10.1002/eat.10257.

Tiggemann, M., & McGill, B. (2004). The role of social comparison in the effect of magazine advertisements on women's mood and body dissatisfaction. *Journal of Social & Clinical Psychology, 23*(1), 23-44.

Tiggemann, M., & Polivy, J. (2010). Upward and downward: Social comparison processing of thin idealized media images. *Psychology of Women Quarterly, 34*(3), 356-364.

Tiggemann, M., Polivy, J., & Hargreaves, D. (2009). The processing of thin ideals in fashion magazines: A source of social comparison or fantasy? *Journal of Social and Clinical Psychology, 28*(1), 73-93.

Tiggemann, M., Slater, A., Bury, B., Hawkins, K., & Firth, B. (2013). Disclaimer labels on fashion magazine advertisements: Effects on social comparison and body dissatisfaction. *Body Image, 10*(1), 45-53, doi:10.1016/j.bodyim.2012.08.001.

Veldhuis, J., Konijn, E. A., & Seidell, J. C. (2014). Negotiated media effects. Peer feedback modifies effects of media's thin-body ideal on adolescent girls. *Appetite, 73*(0), 172-182, doi:10.1016/j.appet.2013.10.023.

Want, S. C. (2009). Meta-analytic moderators of experimental exposure to media portrayals of women on female appearance satisfaction: Social comparisons as automatic processes. *Body Image, 6*(4), 257-269, doi:10.1016/j.bodyim.2009.07.008.

Wilksch, S. M., Paxton, S. J., Byrne, S. M., Austin, S. B., McLean, S. A., Thompson, K. M., et al. (2015). Prevention Across the Spectrum: A randomized controlled trial of three programs to reduce risk factors for both eating disorders and obesity. *Psychological Medicine, 45*(9), 1811-1823, doi:10.1017/S003329171400289X.

Table 1

Means (standard deviations) for state body satisfaction, and baseline media literacy, internalization of the thin ideal, and appearance comparison for each experimental condition

	Experimental condition		
	Appearance comparison (n = 82)	Peer norms (n = 81)	Control (n = 83)
State body satisfaction			
Pre-exposure	53.94 (24.44)	54.60 (28.11)	59.71 (28.52)
Post-exposure	50.21 (27.51)	54.60 (28.86)	60.03 (29.97)
Media literacy			
Critical thinking	15.35 (6.26)	18.33 (6.25)	17.24 (6.99)
Realism scepticism	8.21 (1.80)	8.38 (1.84)	8.08 (1.96)
Internalization of the thin-ideal	11.32 (4.45)	10.81 (4.46)	11.45 (5.00)
Upward appearance comparison[a]	2.96 (1.22)	3.13 (1.23)	3.00 (1.27)
Manipulation check - self comparison to others	55.52 (32.41)	47.20 (33.04)	41.07 (33.29)
Manipulation check - friends compare with others	40.70 (29.30)	45.20 (29.00)	35.11 (28.79)

[a] Sample sizes for upward appearance comparisons were: appearance comparison condition (n = 81), peer norms condition (n = 79), control condition (n = 83)

Table 2

Summary Statistics for Mixed Between-Within Repeated Measures ANOVAs and Post-hoc Pairwise Comparisons for Significant Interactions Evaluating Effects on Body Satisfaction of Time, Experimental Condition, and Protective and Risk Factors

	1. Time, condition, critical thinking, and internalization			2. Time, condition, critical thinking and upward comparison			3. Time, condition, realism scepticism and internalization			4. Time, condition, realism scepticism and upward comparison		
	F	p^c	η_p^2	*F*	p^c	η_p^2	*F*	p^c	η_p^2	*F*	p^c	η_p^2
Repeated measures effects												
Time by experimental condition by media literacy by internalization[a] / upward comparison[b]	1.09	.339	.009	0.44	.646	.004	1.96	.143	.017	1.45	.238	.012
Time by experimental condition by media literacy	0.06	.945	< .01	0.27	.764	.002	0.22	.801	.002	0.33	.718	.003
Time by experimental condition by internalization / upward comparison	0.09	.913	.001	1.55	.215	.013	1.12	.291	.005	1.86	.157	.016
Time by media literacy by internalization / upward comparison	**4.69**	**.031**	**.020**	**3.40**	**.066**	**.015**	1.12	.291	.005	**6.00**	**.015**	**.025**
High internalization / upward comparison and low media literacy by time (pre vs post)	**3.34**	**.034**	**.028**	**9.63**	**.002**	**.040**	NA			**7.25**	**.008**	**.030**
High internalization / upward comparison and high media literacy by time (pre vs post)	0.30	.584	< .01	0.18	.671	< .01	NA			0.12	.725	< .01
Time by experimental condition	**3.43**	**.034**	**.028**	**2.39**	**.094**	**.020**	**3.87**	**.022**	**.032**	**2.59**	**.077**	**.022**
Appearance comparison by time (pre vs post)	**8.82**	**.003**	**.036**	**7.16**	**.008**	**.030**	**8.98**	**.003**	**.037**	**6.37**	**.012**	**.027**
Peer norms by time (pre vs post)	< 0.01	.974	< .01	0.06	.812	< .01	0.33	.566	< .01	0.09	.766	< 0.01
Control by time (pre vs post)	0.19	.661	< .01	0.03	.872	< .01	0.06	.808	< .01	0.06	.808	< 0.01
Time by media literacy	**3.27**	**.072**	**.014**	**2.93**	**.088**	**.013**	0.25	.617	.001	0.14	.706	.001
Low critical thinking by time (pre-vs post)	**5.42**	**.021**	**.023**	**5.59**	**.019**	**.024**	NA			NA		
High critical thinking by time (pre- vs post)	0.05	.823	< .01	< 0.01	.943	< .01	NA			NA		
Time by internalization/comparison	1.94	.165	.008	1.25	.265	.005	1.31	.253	.006	0.91	.341	.004
Time	2.23	.137	.009	2.59	.109	.011	1.53	.217	.007	1.28	.260	.005

[a]Internalization = baseline internalization of the thin-ideal
[b]Comparison = baseline upward appearance comparison
[c]Adjustment for multiple comparisons (Bonferroni)
Significant and marginally significant repeated measures effects are in bold

Appendix A

Table A1

Pre- and post-exposure body satisfaction means and standard deviations for experimental condition, baseline thin-ideal internalization and baseline critical thinking

Experimental condition			Body satisfaction means (*SD*)	
			Pre-exposure	Post-exposure
Control	Low internalization	Low critical thinking	76.72 (25.18)	77.63 (25.74)
		High critical thinking	77.50 (18.27)	79.70 (18.67)
		Total	77.16 (21.16)	78.81 (21.65)
	High internalization	Low critical thinking	47.48 (28.97)	44.94 (30.48)
		High critical thinking	46.41 (23.97)	47.97 (24.90)
		Total	46.99 (26.52)	46.33 (27.81)
	Total	Low critical thinking	58.18 (30.82)	56.90 (32.66)
		High critical thinking	61.21 (26.38)	63.08 (27.14)
Appearance comparison	Low internalization	Low critical thinking	59.55 (20.69)	56.58 (22.75)
		High critical thinking	75.20 (16.79)	73.52 (17.99)
		Total	64.88 (20.66)	62.35 (22.55)
	High internalization	Low critical thinking	37.84 (23.17)	30.43 (24.36)
		High critical thinking	45.10 (21.63)	42.53 (27.43)
		Total	41.28 (22.45)	36.16 (26.23)
	Total	Low critical thinking	50.69 (24.05)	45.90 (26.56)
		High critical thinking	58.78 (24.57)	56.61 (28.05)
Peer Norms	Low internalization	Low critical thinking	60.56 (30.22)	63.15 (30.87)
		High critical thinking	62.15 (22.86)	60.66 (22.34)
		Total	61.51 (25.73)	61.66 (25.78)
	High internalization	Low critical thinking	56.73 (28.02)	52.14 (32.40)
		High critical thinking	37.36 (27.26)	40.69 (28.51)
		Total	45.97 (28.90)	45.78 (30.40)
	Total	Low critical thinking	58.76 (28.83)	57.97 (31.61)
		High critical thinking	51.60 (27.49)	52.16 (26.78)
Total	Low internalization	Low critical thinking	63.99 (25.48)	63.58 (26.96)
		High critical thinking	70.26 (21.06)	69.91 (21.64)
		Total	67.13 (23.49)	66.75 (24.55)
	High internalization	Low critical thinking	46.76 (27.51)	42.12 (29.97)
		High critical thinking	43.00 (24.39)	43.91 (26.64)
		Total	44.91 (25.98)	43.00 (28.28)
	Total	Low critical thinking	55.38 (27.78)	52.85 (30.37)
		High critical thinking	56.11 (27.10)	57.12 (27.43)

Appendix B

Table B1

Pre- and post-exposure body satisfaction means and standard deviations for experimental condition, baseline critical thinking and baseline upward appearance comparison

Experimental condition			Body satisfaction means (*SD*)	
			Pre-exposure	Post-exposure
Control	Low upward comparison	Low critical thinking	74.85 (22.93)	77.63 (25.74)
		High critical thinking	75.43 (20.17)	79.7 (18.67)
		Total	75.13 (21.38)	78.81 (21.65)
	High upward comparison	Low critical thinking	36.88 (26.41)	44.94 (30.48)
		High critical thinking	45.58 (23.68)	47.97 (24.90)
		Total	41.45 (25.06)	46.33 (27.81)
	Total	Low critical thinking	58.18 (30.82)	56.90 (32.66)
		High critical thinking	61.21 (26.38)	63.08 (27.14)
Appearance comparison	Low upward comparison	Low critical thinking	61.49 (20.11)	59.65 (21.79)
		High critical thinking	74.80 (15.06)	74.84 (16.26)
		Total	66.40 (19.32)	65.24 (21.05)
	High upward comparison	Low critical thinking	38.73 (22.33)	31.10 (23.32)
		High critical thinking	46.97 (23.72)	43.18 (27.56)
		Total	42.37 (23.05)	36.44 (25.69)
	Total	Low critical thinking	50.11 (23.96)	45.38 (26.58)
		High critical thinking	58.78 (24.57)	56.61 (28.05)
Peer Norms	Low upward comparison	Low critical thinking	71.19 (21.57)	71.87 (21.86)
		High critical thinking	65.17 (24.33)	62.58 (23.20)
		Total	67.86 (23.03)	66.74 (22.79)
	High upward comparison	Low critical thinking	46.32 (30.34)	44.07 (34.24)
		High critical thinking	38.67 (25.26)	41.65 (26.66)
		Total	41.84 (27.38)	42.65 (29.65)
	Total	Low critical thinking	58.76 (28.83)	57.97 (31.61)
		High critical thinking	51.03 (27.95)	51.42 (26.98)
Total	Low upward comparison	Low critical thinking	68.87 (22.01)	68.50 (23.29)
		High critical thinking	71.50 (20.99)	71.03 (21.97)
		Total	70.11 (21.49)	69.69 (22.62)
	High upward comparison	Low critical thinking	40.35 (25.91)	35.56 (28.04)
		High critical thinking	43.37 (24.21)	44.17 (25.95)
		Total	41.91 (24.99)	40.00 (27.21)
	Total	Low critical thinking	55.19 (27.82)	52.70 (30.45)
		High critical thinking	55.95 (27.22)	56.93 (27.55)

Appendix C

Table C1

Pre- and post-exposure body satisfaction means and standard deviations for experimental condition, baseline thin-ideal internalization and baseline realism scepticism

Experimental condition			Body satisfaction means (*SD*)	
			Pre-exposure	Post-exposure
Control	Low internalization	Low realism scepticism	75.71 (26.51)	77.63 (25.74)
		High realism scepticism	78.02 (17.92)	79.70 (18.67)
		Total	77.16 (21.16)	78.81 (21.65)
	High internalization	Low realism scepticism	49.85 (26.23)	44.94 (30.48)
		High realism scepticism	42.62 (27.08)	47.97 (24.90)
		Total	46.99 (26.52)	46.33 (27.81)
	Total	Low realism scepticism	57.86 (28.67)	57.40 (30.83)
		High realism scepticism	61.62 (28.60)	62.72 (29.20)
Appearance comparison	Low internalization	Low realism scepticism	62.76 (19.98)	61.03 (25.17)
		High realism scepticism	66.22 (21.34)	63.19 (21.19)
		Total	64.88 (20.66)	62.35 (22.55)
	High internalization	Low realism scepticism	36.85 (22.04)	31.73 (24.78)
		High realism scepticism	48.86 (21.85)	43.75 (27.81)
		Total	41.28 (22.45)	36.16 (26.23)
	Total	Low realism scepticism	47.60 (24.62)	43.88 (28.63)
		High realism scepticism	60.29 (22.82)	56.55 (25.11)
Peer Norms	Low internalization	Low realism scepticism	53.34 (23.86)	56.23 (25.16)
		High realism scepticism	65.20 (26.06)	64.10 (26.08)
		Total	61.51 (25.73)	61.66 (25.78)
	High internalization	Low realism scepticism	43.68 (28.25)	40.78 (30.77)
		High realism scepticism	49.57 (30.60)	53.63 (29.16)
		Total	45.97 (28.90)	45.78 (30.40)
	Total	Low realism scepticism	47.44 (26.71)	46.79 (29.35)
		High realism scepticism	60.34 (28.17)	60.84 (27.19)
Total	Low internalization	Low realism scepticism	63.59 (24.41)	63.80 (26.43)
		High realism scepticism	69.07 (22.89)	68.37 (23.47)
		Total	67.13 (23.49)	66.75 (24.55)
	High internalization	Low realism scepticism	43.88 (25.84)	41.16 (28.91)
		High realism scepticism	46.55 (26.41)	45.93 (27.29)
		Total	44.91 (25.98)	43.00 (28.28)
	Total	Low realism scepticism	51.17 (26.97)	49.53 (29.99)
		High realism scepticism	56.11 (27.10)	60.06 (27.12)

Appendix D

Table D1

Pre- and post-exposure body satisfaction means and standard deviations for experimental condition, baseline upward appearance comparison and baseline realism scepticism

Experimental condition			Body satisfaction means (*SD*)	
			Pre-exposure	Post-exposure
Control	Low upward comparison	Low realism scepticism	71.58 (23.90)	77.63 (25.74)
		High realism scepticism	78.24 (18.88)	79.7 (18.67)
		Total	75.13 (21.38)	78.81 (21.65)
	High upward comparison	Low realism scepticism	44.13 (26.80)	44.94 (30.48)
		High realism scepticism	38.15 (23.10)	47.97 (24.90)
		Total	41.45 (25.06)	46.33 (27.81)
	Total	Low realism scepticism	57.86 (28.67)	57.40 (30.83)
		High realism scepticism	61.62 (28.60)	62.72 (29.20)
Appearance comparison	Low upward comparison	Low realism scepticism	64.03 (17.07)	66.86 (19.36)
		High realism scepticism	68.12 (21.03)	64.07 (22.58)
		Total	66.40 (19.32)	65.24 (21.05)
	High upward comparison	Low realism scepticism	37.08 (23.08)	29.17 (23.56)
		High realism scepticism	49.72 (21.50)	46.54 (25.72)
		Total	42.37 (23.05)	36.44 (25.69)
	Total	Low realism scepticism	47.60 (24.62)	43.88 (28.63)
		High realism scepticism	59.84 (22.92)	56.18 (25.31)
Peer Norms	Low upward comparison	Low realism scepticism	60.48 (23.01)	61.56 (22.89)
		High realism scepticism	71.27 (22.67)	69.13 (22.79)
		Total	67.86 (23.03)	66.74 (22.79)
	High upward comparison	Low realism scepticism	40.92 (26.44)	39.41 (29.83)
		High realism scepticism	43.15 (29.43)	47.24 (29.66)
		Total	41.84 (27.38)	42.65 (29.65)
	Total	Low realism scepticism	47.44 (26.71)	46.79 (29.35)
		High realism scepticism	60.15 (28.80)	60.47 (27.60)
Total	Low upward comparison	Low realism scepticism	66.40 (21.74)	67.64 (23.47)
		High realism scepticism	72.63 (21.09)	71.09 (22.07)
		Total	70.11 (21.49)	69.69 (22.62)
	High upward comparison	Low realism scepticism	40.51 (25.19)	36.85 (27.54)
		High realism scepticism	43.79 (24.82)	44.25 (26.44)
		Total	41.91 (24.99)	40.00 (27.21)
	Total	Low realism scepticism	51.17 (26.97)	49.53 (29.99)
		High realism scepticism	55.95 (27.22)	59.83 (27.35)

Fig 1 Mean change in body satisfaction and 95% confidence intervals for high and low levels of baseline internalization of the thin-ideal and baseline critical thinking
Negative body satisfaction change scores indicate worsening of body satisfaction from pre-to post-exposure. Positive change scores indicate improvement in body satisfaction
Internalization = baseline internalization of the thin-ideal

Fig 2 Mean change in body satisfaction and 95% confidence intervals for high and low levels of baseline upward appearance comparison and baseline realism scepticism
Negative body satisfaction change scores indicate worsening of body satisfaction from pre-to post-exposure. Positive change scores indicate improvement in body satisfaction
Comparison = baseline upward appearance comparison