

How does exposure to thinspiration and fitspiration relate to symptom severity among individuals with eating disorders? Evaluation of a proposed model

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ABSTRACT

Thinspiration and fitspiration are classes of social media content characterised by idealised depictions of excessively thin and overtly fit/lean bodies, respectively. It is currently unknown whether and how exposure to thinspiration and fitspiration relates to symptom severity within high-risk clinical populations. Thus, in a clinical sample of individuals with eating disorders, we evaluated a model explaining how exposure to thinspiration and fitspiration relates to eating disorder symptoms. Individuals with self-reported eating disorders ($N = 228$, 47% with anorexia, 93% female) completed measures of image-centric social media use, thinspiration and fitspiration exposure, physical appearance comparisons, and symptom severity. Results showed that more frequent use of image-centric social media was associated with more frequent exposures to both thinspiration and fitspiration. In turn, these exposures were associated with more frequent physical appearance comparisons, and through these, greater symptom severity. Physical appearance comparisons mediated the relationships of both thinspiration and fitspiration exposure with symptom severity. Exposure to fitspiration was more common than exposure to thinspiration. However, thinspiration exposure evidenced stronger associations with symptom severity than fitspiration exposure. In conclusion, our model provides a useful account of how eating disorder symptoms relate to thinspiration and fitspiration exposure, and to image-centric social media more generally.

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1. Introduction

Eating disorders are debilitating and chronic psychological disorders characterised by disturbances in body image and eating behaviours (American Psychiatric Association, 2013; Fairburn & Harrison, 2003). Relatively low rates of treatment success for eating disorders (Hay, 2013) continue to necessitate studies of factors that may facilitate and maintain eating disorder symptoms. Researchers have proposed that exposure to mass media portraying idealised human bodies may be one such factor (e.g., Keery, van den Berg, & Thompson, 2004; Levine & Murnen, 2015; Thompson, Heinberg,

Altabe, & Tantleff-Dunn, 1999; Tiggemann, 2011; van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002).

1.1. Traditional Media

Correlational and experimental research has shown that core aspects of eating disorder psychopathology, including body dissatisfaction, can result from exposure to various forms of traditional media (e.g., television, movies, and magazines) (Blond, 2008; Diedrichs & Lee, 2011; Ferguson, 2013; López-Guimerà, Levine, Sánchez-Carracedo, & Fauquet, 2010). A key mechanism in many of these studies is trait physical appearance comparisons; meaning, the tendency of an individual to compare their body to others' bodies (Arigo, Schumacher, & Martin, 2013; Fardouly & Vartanian, 2015; Schaefer & Thompson, 2014). To this end, the importance of physical appearance comparisons in the facilitation of eating

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disorder psychopathology has been demonstrated in both cross-sectional (Keery et al., 2004; Rodgers, Paxton, & McLean, 2013) and longitudinal (Rodgers, Lowy, Halperin, & Franko, 2015; Rodgers, McLean, & Paxton, 2015) studies of traditional media.

1.2. Social Media

By contrast, social media is a non-traditional form of media that is interactive and largely user-generated (Fuchs, 2017). Thus, social media is more reflective of users' values, desires, and anxieties than traditional media, which reflects a top-down creation process informed by the values, desires, and anxieties of a small pool of similar individuals (e.g., media executives) (Fuchs, 2017). Moreover, social media may be subject to "social filtering," an algorithmic process in which an individual's social media behaviour, including their search history, is used to predict future behaviour and to deliver customised social media content designed to appeal to that individual (Pariser, 2011). Therefore, if an individual is searching for, or otherwise engaging with, body-idealising social media content, then social filtering processes may make it more likely that body-idealising content is delivered to that individual in the future. Thus, any negative effects of engaging with body-idealising social media content may be compounded over time.

As with traditional media, social media has attracted considerable scrutiny from researchers in the fields of body image and eating disorders (Fardouly & Vartanian, 2015; Griffiths, Murray, Krug, & McLean, 2018; Holland & Tiggemann, 2016; Mabe, Forney, & Keel, 2014). In general, there appear to be positive, albeit weak, associations between social media use and body dissatisfaction (Fardouly & Vartanian, 2015; Griffiths et al., 2018; Holland & Tiggemann, 2016; Mabe et al., 2014). Moreover, it appears that physical appearance comparisons mediate the association of social media use with body dissatisfaction (Fardouly, Pinkus, & Vartanian, 2017; Fardouly, Willburger, & Vartanian, 2018; Holland & Tiggemann, 2016; Tiggemann & Zaccardo, 2015), suggesting this mechanism may generalise from traditional media to social media. However, as research on social media and body image has accumulated, it has become clear that certain classes of social media content are particularly important in the context of body dissatisfaction and eating disorders.

1.3. Thinspiration

Thinspiration – or 'thinspo' – was perhaps the first class of body-idealising content to naturally emerge on social media. The term is a portmanteau of 'thin' and 'inspiration' and is characterised by idealised depictions of excessively thin bodies, glorification of extreme caloric restriction and associated thinness-oriented dieting behaviours, and emotional support and validation for individuals struggling to maintain their thinness-oriented attitudes and behaviours (Boepple & Thompson, 2016; Ghaznavi & Taylor, 2015; Norris, Boydell, Pinhas, & Katzman, 2006; Talbot, Gavin, van Steen, & Morey, 2017; Tiggemann, Churches, Mitchell, & Brown, 2018; Wick & Harriger, 2018). Thinspiration content is popular: estimates obtained from popular search engines suggest that the aggregate number of thinspiration images can be counted in the millions, and peer-reviewed estimates suggest that thousands of instances of thinspiration are posted to social media each day (Harris et al., 2018). Content analyses of thinspiration and related social media phenomena (e.g., pro-eating disorder and pro-anorexia websites) have revealed the themes of this content to be consistent with the attitudes and beliefs that characterise eating disorder psychopathology (Boepple & Thompson, 2016; Ghaznavi & Taylor, 2015; Norris et al., 2006; Talbot et al., 2017; Tiggemann et al., 2018; Wick & Harriger, 2018). Moreover, adverse associations between thinspiration exposure and body dissatisfaction have been demon-

strated in experimental (Bardone-Cone & Cass, 2007; Jett, LaPorte, & Wanchisn, 2010) and cross-sectional studies (Rodgers, Lowy et al., 2015, 2015b); albeit, using non-clinical samples.

1.4. Fitspiration

Fitspiration – or 'fitspo' – is a newer class of social media content that has rapidly attained international popularity. Fitspiration (a portmanteau of 'fit' and 'inspiration') is characterised by idealised depictions of overtly fit and lean bodies with visible muscle tone (Boepple & Thompson, 2016; Holland & Tiggemann, 2017; Simpson & Mazzeo, 2016; Talbot et al., 2017; Tiggemann & Zaccardo, 2015; Tiggemann et al., 2018). Despite being a newer phenomenon, the popularity of fitspiration has eclipsed that of thinspiration. A comparative network analysis of thinspiration and fitspiration social media accounts found that fitspiration was approximately six times larger than thinspiration in terms of the number of account followers (Tiggemann et al., 2018). We speculate that the advent and widespread proliferation of fitspiration reflects, in part, two broader sociocultural trends. First, Western societies' valuation of overt muscularity in women has intensified in recent years, such that women with fit and lean bodies are increasingly perceived as attractive, desirable, and valuable (Bozsik, Whisenhunt, Hudson, Bennett, & Lundgren, 2018; Rodgers et al., 2017). Second, increasing numbers of men have become concerned about their bodies, and in particular, their level of muscularity, as reflected in rising rates of anabolic-androgenic steroid use in Western countries (Iversen & Maher, 2015; Sagoe, Molde, Andreassen, Torsheim, & Pallesen, 2014). Relatedly, a fitspiration content analysis by Carrotte, Prichard, and Lim, (2017) found that approximately 28% of fitspiration images exclusively portrayed males; by contrast, 36% exclusively portrayed females.

Despite the ostensible focus of fitspiration on fitness and health, experimental studies have shown that exposure to fitspiration can increase body dissatisfaction and negative affect, at least in the short term (Prichard, McLachlan, Lavis, & Tiggemann, 2018; Robinson et al., 2017; Tiggemann & Zaccardo, 2015). However, it remains unknown whether (and how) fitspiration exposure is associated with psychopathology in high-risk clinical samples. We also do not know whether, and to what extent, thinspiration and fitspiration are uniquely associated with psychopathology. Relatedly, one experimental study using a non-clinical sample has shown that exposure to fitspiration is more harmful than exposure to thin-ideal images, which are akin to, but not the same as, thinspiration (Robinson et al., 2017).

1.5. Thinspiration and Fitspiration in the Context of Eating Disorders

To date, we are unaware of any research that has attempted to concurrently examine the associations of thinspiration and fitspiration exposure with eating disorder symptoms amongst individuals with eating disorders. Research of this kind is important because there are multiple reasons to believe that exposure to thinspiration and fitspiration may be central to the maintenance of eating disordered behaviour. Body dissatisfaction, which, as aforementioned, can be induced by exposure to both thinspiration and fitspiration, is a key diagnostic criterion for several eating disorders (American Psychiatric Association, 2013) and is central to influential models of eating disorder psychopathology (Fairburn, Cooper, & Shafran, 2003). Furthermore, body dissatisfaction is understood to be one of the most potent risk factors for post-treatment relapse in individuals with eating disorders (Keel, Dorer, Franko, Jackson, & Herzog, 2005). In addition, individuals who post thinspiration and fitspiration to social media frequently report significant eating disorder behaviours (Holland & Tiggemann, 2017). Individuals with

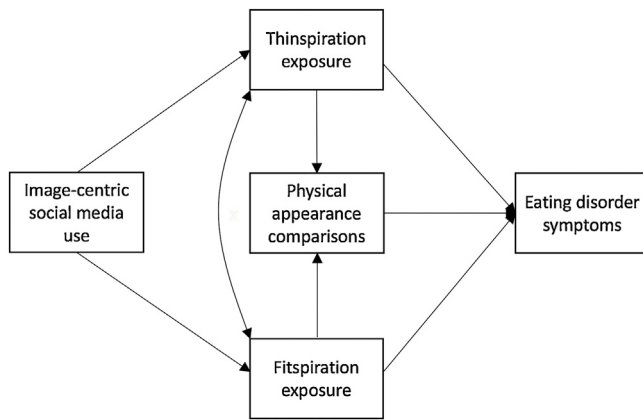


Fig. 1. Our proposed path model illustrating how image-centric social media use, thinspiration and fitspiration exposure, and physical appearance comparisons, relate to eating disorder symptoms. In the model, physical appearance comparisons mediate the associations of thinspiration and fitspiration exposure with eating disorder symptoms.

eating disorders also engage in considerably higher rates of physical appearance comparisons than non-clinical controls (Ferreira, Pinto-Gouveia, & Duarte, 2013). Finally, as stated earlier, content analyses of thinspiration and fitspiration have revealed themes that are consistent with the attitudes and beliefs that characterise eating disorder psychopathology. Thus, an empirical attempt to determine whether and how exposure to thinspiration and fitspiration is associated with eating disorder symptoms amongst individuals with eating disorders is important from both an empirical and clinical perspective. Moreover, an examination of thinspiration and fitspiration amongst individuals with eating disorders provides an opportunity to help distinguish maladaptive and adaptive social media use – a distinction that multiple groups of researchers in the fields of eating disorders and body image are striving to articulate (e.g., Holland & Tiggemann, 2016; Fardouly & Vartanian, 2016).

1.6. Our Proposed Model

As shown in Fig. 1, we propose that image-centric social media use – an individual's non-specific use of various social media platforms that centrally involve visual imagery (e.g., Instagram, Snapchat, Facebook, etc.) – increases the likelihood of exposure to thinspiration and fitspiration. In turn, we propose that exposure to thinspiration and fitspiration will be associated with greater eating disorder symptoms. Importantly, we propose that this association will be mediated by physical appearance comparisons, since an operative mechanism in mass media theories of eating disorders is that an individual compares herself/himself to the idealised body contained in the media. Elaborating further, an individual's attempts to bring one's appearance into line with the appearance of the comparator (i.e., the bodies shown in thinspiration and fitspiration) may manifest as eating disorder psychopathology, including, but not limited to, dietary restriction and preoccupied thoughts about one's shape, weight, and eating. Nevertheless, we note that the model also includes direct pathways from thinspiration and fitspiration exposure to eating disorder symptoms. Whilst we believe (and hypothesise) that physical appearance comparisons will mediate the associations of thinspiration and fitspiration with symptom severity, we also believe that exposure to this content will be directly and positively associated with symptom severity. For example, a thinspiration image that contains the text caption “did you count your calories today?” may directly prime dietary restriction without the need for physical appearance comparisons. Finally, we note that the model includes a covariance

(curved double-headed arrow) between thinspiration and fitspiration exposure. This reflects our understanding that thinspiration and fitspiration tend to co-exist on the same social media platforms and are designed to appeal to users with a shared set of concerns about their body shape and body weight. Furthermore, this feature of the model allows for an examination of the unique contributions of thinspiration and fitspiration exposure to eating disorder symptom severity.

1.7. Study Aims and Hypotheses

The aim of our study was to evaluate a model explaining how exposure to thinspiration and fitspiration relates to eating disorder symptom severity among individuals with eating disorders. We hypothesised that more frequent use of image-centric social media would be associated with more frequent exposures to both thinspiration and fitspiration. In turn, it was hypothesised that these exposures would be associated with more frequent physical appearance comparisons, and through these comparisons, more severe eating disorder symptoms.

2. Method

2.1. Procedure

Electronic advertisements soliciting individuals “currently diagnosed with an eating disorder” were disseminated via eating disorders-related charities, organisations, and social media groups located predominantly in Australia, the United States, and the United Kingdom. Participants completed a self-report online questionnaire that included measures of image-centric social media use, thinspiration and fitspiration exposure, physical appearance comparisons, and eating disorder symptoms. To control for order effects, the order of presentation of measures was counterbalanced. Participants were given the opportunity to donate 10 AUD to a pre-selected list of eating disorders charities upon successful completion of the survey. Donations were honoured and paid by the research team. The study procedure was approved by the University of Melbourne.

2.2. Participants

2.2.1. Data exclusions

Data were excluded from two individuals younger than 18 years of age due to ethics requirements. In addition, data were excluded based on participants' answers to two questions assessing knowledge of thinspiration and fitspiration. Specifically, we asked participants: “Do you know what [thinspiration/fitspiration] is?” The vast majority of the sample indicated that they knew what thinspiration (90%, $n = 234$) and fitspiration (89%, $n = 231$) were. Because our hypotheses presupposed participants' knowledge about thinspiration and fitspiration, data were excluded from the minority of individuals who indicated that they did not know what either thinspiration or fitspiration were (12%, $n = 32$). We note that these individuals could either be those unexposed to either media type, or individuals who have been exposed to either or both thinspiration and fitspiration, but who do not know what they are called. In the interest of thoroughness, we note that we conducted an additional model analysis with these individuals included; the results were unchanged. Results presented herein are from the model with these individuals excluded.

2.2.2. Final sample – psychiatric characteristics

Participants were 228 individuals with self-reported eating disorders, including anorexia nervosa (46.9%), Other Specified Feeding or Eating Disorder (OSFED) or Eating Disorder Not Otherwise Specified (EDNOS) (24.6%), bulimia nervosa (18.9%), and binge eating

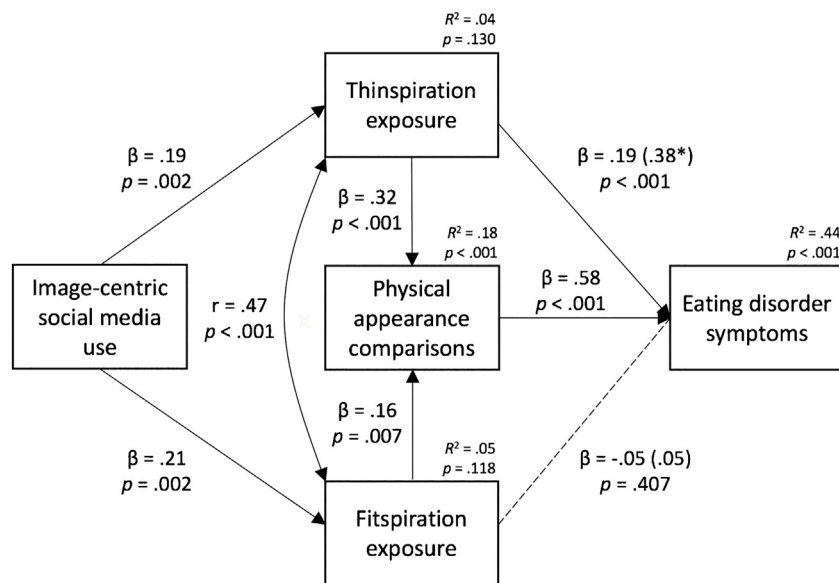


Fig. 2. Summary statistics for the path model. All regression coefficients are standardized. The total indirect pathway from image-centric social media use to eating disorder symptoms was significant, $\beta = .08$, 95% confidence interval = $.03, .15$. The parenthesized regression coefficients (.38 and .05) correspond to the total pathways from thinspiration and fitspiration to eating disorder symptoms, respectively. The asterisk indicates $p < .001$ for the total pathway from thinspiration to eating disorder symptoms. All other p-values correspond to direct pathways. Summary statistics for specific indirect pathways are provided in Table 2.

disorder (5.7%). All participants confirmed that their eating disorder diagnosis had been given to them by a healthcare professional. Approximately half of our participants (58.8%) reported that they were currently receiving treatment for their eating disorder.

We examined the concordance between our participants' self-reported eating disorder diagnoses and their self-reported eating disorder symptoms (as measured by the Eating Disorders Examination – Questionnaire; EDE-Q; Fairburn & Beglin, 1994). Participants' symptom data, provided in Supplementary Table A, were consistent with their self-reported eating disorder diagnoses. Further, we note that our participants' mean scores on the EDE-Q, including the global score and subscale scores, were consistent with published clinical norms based on individuals with clinically confirmed eating disorders (Brewin, Baggott, Dugard, & Arcelus, 2014; Smith et al., 2017; Welch, Birgegård, Parling, & Ghaderi, 2011).

2.2.3. Final sample – demographic characteristics

Participants were predominantly female (93.4%) and residing in Australia (47.5%), followed by the United States (21.4%), the United Kingdom (12.0%), and Canada (8.0%). Most participants belonged to the majority ethnicity of their respective countries (White/Caucasian, 93.4%). Participants' sexual orientations, measured using a Kinsey-like scale ranging from exclusively heterosexual/straight to exclusively homosexual/gay (Kinsey, Pomeroy, & Martin, 1948), were varied. Over half of participants were exclusively heterosexual/straight (52.2%) and a quarter were mostly heterosexual/straight (24.1%), with fewer numbers of bisexual (13.2%), mostly homosexual/gay (1.8%), and exclusively homosexual/gay (5.7%) individuals. Participants' relationship statuses included single (46.5%), "in a casual relationship" (3.9%), "in a serious relationship" (32.0%), and married (13.6%). Participants' highest level of educational attainment included 4-year University/college degrees (33.6%), "some University/college" (28.3%), professional or Masters degrees (11.9%), and high school diplomas/certificates (8.8%). Employment statuses included full-time employment (32.0%), student/studying (27.6%), and part-time employment (21.1%). The abovementioned proportions may not sum to 100% due to a small number of "other" responses. Participants' ages ranged from 18 to 51 years, but young adults were

over-represented in the sample (in years; $M = 25.98$, $SD = 6.64$, $Mdn = 24$).

2.3. Measures

2.3.1. Image-centric social media use

We created a set of 11 items to measure participants' general use of social media. Specifically, we asked participants about their frequency of use of 11 different social media platforms: Facebook, Instagram, Tumblr, Snapchat, Pinterest, Twitter, LinkedIn, Youtube, WordPress, Blogspot, and Flickr. We chose these platforms based on recently published social media research (Griffiths et al., 2018) and on recent general population surveys of social media use (Smith & Anderson, 2018). Moreover, the chosen platforms are notably popular in the countries from which we anticipated substantial recruitment: Australia, the US, and the UK. Response options were anchored at *never* (1) and *all the time* (6). Responses to the 11 items were averaged to form a single variable representing general frequency of use of social media use.

Subsequent to data collection, we re-calculated our general social media use variable such that it was composed only of those social media platforms that previous research has identified as "image-centric" (Griffiths et al., 2018); that is, social media platforms that centrally involve visual images and/or videos. As per Griffiths et al. (2018), the following platforms were identified as image-centric: Facebook, Instagram, Tumblr, Snapchat, Pinterest, Youtube, and Flickr. We confirm that we conducted sensitivity analyses using our original social media variable inclusive of all social media platforms. These analyses yielded no substantive differences in model fit or in the pattern of direct and indirect model pathways.

2.3.2. Thinspiration and fitspiration exposure

Research examining individuals' self-reported exposure to thinspiration and fitspiration is limited. Therefore, we created four items to assess exposure to thinspiration and fitspiration. First, we provided participants with the following clarifying text: "The following questions are about different types of content posted to social media. Specifically, we are interested in two types of image-based content: thinspiration and fitspiration." Second, as

Table 1

Descriptive statistics and Pearson correlation coefficients for the variables included in the path model.

Variable	<i>M</i>	<i>SD</i>	<i>Mdn</i>	α	1.	2.	3.	4.	5.
1. Image-centric social media use	2.96	0.80	3.00	–	–	.19*	.19*	.11	.07
2. Thinspiration exposure	2.64	1.43	2.00	–		–	.40**	.40**	.40**
3. Fitspiration exposure	2.82	1.40	3.00	–			–	.36**	.29**
4. Physical appearance comparisons	4.30	0.85	4.64	.97				–	.64**
5. Eating disorder symptoms	4.42	1.19	4.77	.93					–

Note. *M* = mean, *SD* = standard deviation, *Mdn* = median, α : Cronbach's alpha. * $p < .01$. ** $p < .001$.

aforementioned, participants were asked two questions: “Do you know what [thinspiration/fitspiration] is?” Response options were *yes*, *no*, and *not sure*. The final two questions asked participants “How often do you view [thinspiration/fitspiration]?” Response options were anchored at *never* (1) and *all the time* (6). We note that these final questions were similarly worded to those employed by Fardouly et al. (2018).

2.3.3. Physical appearance comparisons

We used the 11-item Physical Appearance Comparisons Scale – Revised (PACS-R; Schaefer & Thompson, 2014) to measure participants' trait tendency to compare their physical appearance to the appearance of others. Example items include “When I'm at a party, I compare my body shape to the body shape of others” and “When I'm out in public, I compare my physical appearance to the appearance of others.” Response options were anchored at *never* (0) and *always* (4), such that higher scores represent a stronger tendency to compare one's physical appearance to others. The PACS-R demonstrates robust psychometric properties (Schaefer & Thompson, 2014).

2.3.4. Eating disorder symptoms

Eating disorder symptoms were measured using all four subscales from the 22-item EDE-Q. Specifically, we averaged participants' scores on the Dietary Restraint, Eating Concerns, Shape Concerns, and Weight Concerns subscales to create a composite Global EDE-Q score. Global EDE-Q scores represent a holistic and highly clinically relevant measure of global eating disorder symptoms (Fairburn & Beglin, 1994). Example items include “Have you had a definite fear that you might gain weight?” and “Has your weight influenced how you think about (judge) yourself as a person?” Response options were anchored at 0 (*no days / not at all*) and 6 (*every day / markedly*), such that higher scores indicate more severe eating disorder symptoms. Psychometric properties of the EDE-Q are satisfactory (Peterson et al., 2007).

2.4. Data Analyses

Data analyses were conducted in two stages. First, using SPSS version 24, we calculated descriptive statistics, conducted Pearson correlational analyses for the variables included in the proposed model, and conducted a Wilcoxon signed-rank test to examine participants' relative frequency of exposure to thinspiration and fitspiration. Second, using MPlus version 8, we evaluated our proposed model using a maximum likelihood (ML) estimator. Estimates of indirect pathways were evaluated using bootstrapped confidence intervals based on 10,000 resamples. We made an a-priori decision to report five key model fit indices; specifically, the chi-square test of model fit, the root mean squared error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis Index (TLI), and the standardized root mean squared residual (SRMR). Further, we used the fit indices cut-offs published by Hu and Bentler (1999) to gauge the quality of fit; specifically, a non-significant ($p > .05$) χ^2 test, RMSEA $< .08$, CFI $> .95$, TLI $> .95$, and SRMR $< .08$. Because our sample size was relatively modest at $N = 228$ (reflecting the inherent difficulty of recruiting clinical sam-

ples), we followed published recommendations to preferentially focus on the χ^2 test, SRMR and CFI as indices of model fit (Hu & Bentler, 1999). Missing data were missing completely at random and were estimated in our models using full information maximum likelihood. Relatedly, very little data were missing. The average amount of missing item-level data across our study variables was 0.22% and no individual participant was missing more than 4% of their item-level data.

We have chosen to focus and report on our model excluding potentially relevant covariates (including age, gender and duration of disorder) for two reasons. First, we sought to propose and evaluate a maximally parsimonious model; and second, we sought to conduct a maximally robust test of our model by demonstrating restraint with respect to our researcher degrees-of-freedom (Simmons, Nelson, & Simonsohn, 2011; Wicherts et al., 2016). However, we confirm that we conducted sensitivity analyses of our model including these covariates and found that their inclusion had a negligible effect on model performance and did not substantively affect the direction or significance of any tested path. In addition, we note that we examined a reversed model in which the prediction pathways flowed from eating disorder symptoms to image-centric social media use. Finally, we note that our sample size offered insufficient power for examining the model amongst those with particular eating disorder subtypes (e.g., only those with anorexia nervosa); therefore, such models were not evaluated.

3. Results

Descriptive data and inter-correlations amongst the variables included in the model are shown in Table 1. More frequent use of image-centric social media was associated with more frequent exposures to both thinspiration and fitspiration, but was not associated with physical appearance comparisons or eating disorder symptoms. By contrast, more frequent exposures to both thinspiration and fitspiration were associated with more frequent physical appearance comparisons and greater eating disorder symptoms. Finally, more frequent physical appearance comparisons were associated with greater eating disorder symptoms. Exposure to fitspiration was more common than exposure to thinspiration, $Z = 2.20$, $p = .028$.

Fit indices for our model indicated excellent fit. Notably, we observed a nonsignificant χ^2 test ($\chi^2[2] = 0.255$, $p = .880$) and favourable RMSEA (.000), CFI (1.000), TLI (1.036), and SRMR (.004) statistics. Moreover, the RMSEA statistic indicated a high probability of close fit (p RMSEA $< .05 = .930$). The model explained 44% of the variance in eating disorder symptoms ($p < .001$). As shown in Fig. 2, image-centric social media use was positively associated with thinspiration and fitspiration exposure. Thinspiration and fitspiration exposure were positively associated with each other. Both thinspiration and fitspiration were positively associated with physical appearance comparisons. In turn, physical appearance comparisons were positively associated with eating disorder symptoms. Eating disorder symptoms were positively associated with thinspiration, but not fitspiration.

We observed a significant total indirect pathway from image-centric social media use to eating disorder symptoms, $\beta = .08$, 95% confidence interval (CI) = .03, .15. Summary statistics for specific indirect pathways are provided in Table 2. Relatedly, we observed significant indirect pathways from thinspiration and fitspiration exposure to eating disorder symptoms via physical appearance comparisons. Moreover, we observed significant indirect pathways from image-centric social media use to eating disorder symptoms via thinspiration exposure (alone) and via thinspiration exposure in combination with physical appearance comparisons. By contrast, we observed significant indirect pathways from image-centric social media use to eating disorder symptoms via fitspiration through physical appearance comparisons only.

Finally, we note that our reversed model fit the data reasonably well. The reversed model, however, did not explain a significant proportion of variance in image-centric social media use ($R^2 = .06$, $p = .092$), and some pathways that were significant in the initial model were nonsignificant in the reversed model (e.g., the pathway between thinspiration and image-centric social media use: $p = .085$).

4. Discussion

The aim of our study was to evaluate a model explaining how exposure to thinspiration and fitspiration relates to symptom severity among individuals with eating disorders. Our results were consistent with our model. More frequent use of image-centric social media was associated with more frequent exposures to both thinspiration and fitspiration. In turn, these exposures were associated with more frequent physical appearance comparisons, and through these comparisons, more severe eating disorder symptoms. Thus, our results support the assertions made by multiple groups of researchers that thinspiration and fitspiration are harmful (e.g., Bardone-Cone & Cass, 2007; Boeppel & Thompson, 2016; Ghaznavi & Taylor, 2015; Holland & Tiggemann, 2017; Jett et al., 2010; Norris et al., 2006; Robinson et al., 2017; Rodgers, Lowy et al., 2015, 2015b; Talbot et al., 2017; Tiggemann et al., 2018; Tiggemann & Zaccardo, 2015; Wick & Harriger, 2018). Our results are also consistent with past research suggesting that physical appearance comparisons mediate the impact of social media use on body dissatisfaction (Fardouly et al., 2017; Holland & Tiggemann, 2016; Tiggemann & Zaccardo, 2015).

4.1. Thinspiration

Although we observed that physical appearance comparisons were a significant mediator of the association of thinspiration with eating disorder symptom severity, only half of the total pathway of thinspiration with eating disorder symptoms was explained by physical appearance comparisons – a marked residual direct pathway remained. Therefore, the results suggest that additional mediators are needed to fully explain the association of thinspiration with eating disorder symptoms. For example, past work has shown that exposure to body-idealising images increases negative affect (e.g., Tiggemann & Zaccardo, 2015). Negative affect, in turn, is theorised to exacerbate eating disorder psychopathology (Fairburn et al., 2003). Alternatively, certain types of thinspiration may be capable of directly exacerbating eating disorder symptom severity. This may particularly be the case for thinspiration images containing text that directly encourages eating disorder behaviours, including, for example, dietary restriction, weighing, mirror-checking, and compulsive exercise.

4.2. Fitspiration

By contrast, fitspiration exposure evidenced no significant direct or total pathway with eating disorder symptoms – only an indirect pathway was observed. This may suggest that any harmful association of fitspiration exposure is fully explained by physical appearance comparisons. The absence of a total pathway, however, may also suggest that the association of fitspiration with eating disorder symptoms is characterised by opposing positive and negative associations (i.e., a suppression effect). Elaborating further, it may indeed be the case that, for some individuals with eating disorders, unique exposure to fitspiration (i.e., removing any shared variance with thinspiration) functions as (ostensibly) intended by encouraging more ‘healthful’ pursuits than those encouraged by thinspiration. Stated differently, fitspiration may encourage pursuits that are less categorically unhealthy than those encouraged by thinspiration. However, given the preponderance of existing experimental evidence suggesting fitspiration causes adverse psychological effects, and given our observed zero-order correlation of fitspiration exposure with eating disorder symptoms ($r = .29$), we stress that our speculation of a potential positive or neutral role of fitspiration is just that; speculation. There is a clear need for future empirical work to include a variety of potential mediators (e.g., internalisation of appearance ideals, self-objectification, exercise motivations, etc.) such that the distinction between non-healthful and (potentially) healthful/neutral use of fitspiration can be articulated. Nevertheless, our results suggest that physical appearance comparisons may be an important mechanism explaining how fitspiration relates to eating disorder psychopathology amongst individuals with eating disorders.

4.3. Thinspiration versus Fitspiration

Given the relative sizes of our observed concurrent associations of thinspiration and fitspiration exposure with symptom severity, we speculate that fitspiration exposure may be less uniquely harmful than thinspiration exposure amongst individuals with eating disorders. In brief, it may be the thinness-idealising components of thinspiration and fitspiration that are most damaging to those with eating disorders.

However, we note an important caveat to the above speculation. Research is accumulating on muscle dysmorphia – a psychological disorder colloquially called ‘reverse anorexia’ in which the cardinal symptom is pre-occupation with one’s level of muscularity. Researchers have argued that muscle dysmorphia is an eating disorder (e.g., Murray, Rieger, Touyz, De la Garza, & Lic, 2010; Murray, Griffiths, Mitchison, & Mond, 2017; Murray, Nagata et al., 2017; Tod, Edwards, & Cranswick, 2016) and multiple case-reports of diagnostic cross-over, reflecting transitions between anorexia nervosa and muscle dysmorphia, have been published (Murray, Griffiths et al., 2017, 2017b). We speculate, given the focus of fitspiration on fit/lean bodies and thinspiration on excessively thin bodies, that a replication of our study with individuals with muscle dysmorphia, and using muscularity-focused eating disorder symptom measures, would yield stronger estimates of the association of fitspiration with symptom severity. Indeed, our finding that thinspiration is more strongly associated with eating disorder symptoms may reflect the fact that our sample included a large proportion of individuals (47%) diagnosed with anorexia nervosa, for whom thinness-oriented concerns predominate. Thus, comments made by researchers about the relative harms of using thinspiration versus fitspiration ought to be considered with respect to the dominant body ideals of the population being studied. Relatedly, we consider it unlikely that the harms and dangers posed by a particular class of social media content – thinspiration, fitspiration, or otherwise – will be uniform across different populations.

Table 2

Summary statistics for the total, direct and indirect pathways from image-centric social media use, thinspiration and fitspiration exposure, and physical appearance comparisons, to eating disorder symptoms.

Pathway	Total pathway	<i>p</i>	Direct pathway	<i>p</i>	Indirect pathway	Bootstrapped ^a 95% CI
Image-centric social media use → thinspiration exposure → physical appearance comparisons → eating disorder symptoms	–	–	–	–	.04	.01, .07
Image-centric social media use → fitspiration exposure → physical appearance comparisons → eating disorder symptoms	–	–	–	–	.02	.01, .04
Image-centric social media use → thinspiration exposure → eating disorder symptoms	–	–	–	–	.04	.01, .07
Image-centric social media use → fitspiration exposure → eating disorder symptoms	–	–	–	–	–.01	–.03, .01
Thinspiration exposure → physical appearance comparisons → eating disorder symptoms	.38	< .001	.19	< .001	.19	.12, .26
Fitspiration exposure → physical appearance comparisons → eating disorder symptoms	.05	.476	–.05	.407	.10	.02, .17

Note. CI = confidence interval. The absence and presence of zero within the bounds of the 95% CI indicates a significant and nonsignificant indirect pathway, respectively. Estimates of indirect pathways and their respective confidence intervals have been standardized.

^a Bootstrapping was performed with 10,000 resamples.

In summary, our findings from our study of individuals with predominantly thinness-oriented eating disorders suggests that thinspiration may be more uniquely harmful than fitspiration.

4.4. Image-centric Social Media

Moving back a step to social media writ large, we observed significant indirect pathways from image-centric social media use to eating disorder symptoms via thinspiration, fitspiration, and physical appearance comparisons. Thus, our findings contribute nuance to a growing literature showing positive relationships between social media use and eating disorder-related psychopathology (Fardouly & Vartanian, 2015; Griffiths et al., 2018; Holland & Tiggemann, 2016; Mabe et al., 2014) by highlighting the intermediary roles played by specific classes of body-idealising social media content (i.e., thinspiration and fitspiration) and by physical appearance comparisons (Fardouly et al., 2017; Holland & Tiggemann, 2016; Tiggemann & Zaccardo, 2015). Our findings suggest that – in the context of eating disorders – the distinction between maladaptive and adaptive use of social media may be characterised, at least in part, by the propensity of an individual to seek out or otherwise be exposed to thinspiration and fitspiration social media content, and their propensity to subsequently compare their own appearance to the appearance of the bodies depicted in this content.

The lack of a significant zero-order correlation between image-centric social media and eating disorder symptoms ($r = .07$) may also hint that people with eating disorders are using image-centric social media in ways that are both positive and negative. Studies have indicated an adaptive role for image-centric social media use. For example, it has been suggested that increased use of image-based social media is capable of promoting social connectedness and reducing loneliness in a manner that non-image-centric (i.e., text-based) social media cannot emulate (Pittman & Reich, 2016). So, even though image-based social media platforms may contain a disproportionate amount of harmful body-idealising social media content (Griffiths et al., 2018), it is possible that they simultaneously offer notable potential for improving psychological well-being (Pittman & Reich, 2016). Given the ubiquity of social media, including amongst those at highest risk of body dissatisfaction and related psychopathology (i.e., adolescents and young adults), our findings highlight the importance of conducting additional research to distinguish maladaptive and adaptive image-centric social media use.

4.5. Future Applications of the Model

Moving forward, researchers may wish to use the model outlined in Fig. 1 to examine the potential harmfulness of social media

content classes that have emerged after the advent of thinspiration and fitspiration. For example, researchers have recently identified “bonespiration” (Talbot et al., 2017) as a more extreme version of thinspiration, and “pro-muscularity content” as a more extreme version of fitspiration that often depicts or references anabolic steroids (Murray et al., 2016). A proposed model inclusive of additional social media content classes would require relatively few additions to the model shown in Fig. 1. Specifically, additional pathways from image-centric social media use, additional pathways to physical appearance comparisons and to eating disorder symptoms, and additional covariances (if appropriate) between the different types of social media content classes, could be added. The flexibility of the model to test the relative strength of the associations of different social media content classes is important because: (a) social media is user-generated, and thus reflects users’ values, desires and anxieties about their physical appearance (Fuchs, 2017), and (b) values, desires and anxieties about physical appearance have changed – and will continue changing – over time (Griffiths, Murray, & Touyz, 2013). Thus, it is highly likely that new social media content classes reflecting these changes will emerge in the future. These emergent content classes will warrant empirical investigations of whether, and to what extent, they are associated with psychopathology, including experimental studies of individuals’ responses to exposure to these content classes. Finally, we suggest that researchers aim to address and ameliorate some of the limitations of our proposed model, as described below.

4.6. Limitations

Limitations of the study are noted. First, the study design was cross-sectional; thus, firm conclusions about causality cannot be drawn. Relatedly, tests of mediation conducted using longitudinal data provide a more robust test of mediation than tests using cross-sectional data (Maxwell, Cole, & Mitchell, 2011). Moreover, our examination of a reversed model suggested favourable model fit (albeit, less favourable than our initial model). Thus, it ought to be regarded as a genuine possibility that the pathways specified in our model are directionally reversed or bi-directional. Second, owing to the unavailability of extant measures, we were forced to create measures of image-centric social media use and of thinspiration and fitspiration exposure. Although similar to published measures by Fardouly and colleagues (2018), future development and evaluation of validated scales assessing these behaviours would build confidence in our findings. Third, it would have been preferable if participants’ self-reported eating disorder diagnoses were confirmed via clinical interviews; however, we do note that our participants’ symptom data were consistent with published clinical

cal norms (Smith et al., 2017). Fourth, our sample size precluded an examination of the model for individuals with specific eating disorder subtypes.

Additional limitations are noted. Fifth, it would be useful to incorporate the distinction between upward physical comparisons (i.e., comparisons to those perceived as more beautiful) and downward physical appearance comparisons (i.e., comparisons to those perceived as less beautiful; Tiggemann & Polivy, 2010) into our model, since these may have differential outcomes with eating psychopathology (Arigo et al., 2013; O'Brien et al., 2009). Other types of social comparisons, including those motivated by self-evaluation or self-improvement motives, may also be worth examining (Halliwell & Dittmar, 2005). Sixth, the PACS-R measures an individual's tendency to make physical appearance comparisons across a variety of contexts (e.g., in public, at work, and at parties). Arguably, these generalised appearance comparisons are less relevant to our proposed model than physical appearance comparisons made to images on social media, and to thinpiration and fitspiration images in particular. Thus, future researchers may wish to adapt the PACS-R such that it explicitly assesses physical appearance comparisons made in the context of social media. Moreover, we note that our use of the PACS-R rather than an adapted social media-specific measure of physical appearance comparisons may have inflated the proportion of variance explained in the terminal dependent variable, namely, eating disorder symptoms. Seventh, our operationalisation of eating disorder symptoms (i.e., the EDE-Q global score) arguably does not provide an exhaustive measure of all eating disorder symptomatology. For example, the EDE-Q global score does not explicitly capture compulsive exercise. Following on, it may be the case that fitspiration exerts an outsized influence on this particular domain of eating disorder symptomatology. Future research ought to explore this possibility.

5. Conclusions

We propose that eating disorders may be conceptualised as moving targets; meaning, the manifestation of eating disorders changes over time as the social and cultural forces that shape body ideals also change over time. The advent and proliferation of fitspiration reflects ever-changing social and cultural trends in how women's and men's bodies are valued and evaluated. In a sample of individuals with eating disorders, for whom body image is a central clinical concern, we examined a model explaining how exposure to thinpiration and fitspiration relates to eating disorder symptom severity. Our results showed that more frequent exposures to thinpiration and fitspiration are associated with more severe eating disorder symptoms, and that physical appearance comparisons are a mediator of these associations. Moreover, thinpiration appears to be of greater concern than fitspiration, with the caveat that our sample was largely comprised of individuals with anorexia nervosa, for whom thinness-oriented concerns predominate. Finally, we propose that maladaptive social media use may be characterised, at least in part, by one's inadvertent or deliberate exposure to thinpiration and fitspiration, and by the subsequent comparison of oneself to the idealised bodies that characterise this content.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.bodyim.2018.10.002>.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th edition). Arlington, VA: American Psychiatric Publishing.
- Arigo, D., Schumacher, L., & Martin, L. M. (2013). Upward appearance comparison and the development of eating pathology in college women. *International Journal of Eating Disorders*, 47, 467–470. <http://dx.doi.org/10.1002/eat.22240>
- Bardone-Cone, A. M., & Cass, K. M. (2007). What does viewing a pro-anorexia website do? An experimental examination of website exposure and moderating effects. *International Journal of Eating Disorders*, 40, 537–548. <http://dx.doi.org/10.1002/eat.20396>
- Blond, A. (2008). Impacts of exposure to images of ideal bodies on male body dissatisfaction: A review. *Body Image*, 5, 244–250. <http://dx.doi.org/10.1016/j.bodyim.2008.02.003>
- Boepple, L., & Thompson, J. K. (2016). A content analytic comparison of fitspiration and thinpiration websites. *International Journal of Eating Disorders*, 49, 98–101. <http://dx.doi.org/10.1002/eat.22403>
- Bozsk, F., Whisenhunt, B. L., Hudson, D. L., Bennett, B., & Lundgren, J. D. (2018). Thin is in? Think again: The rising importance of muscularity in the thin ideal female body. *Sex Roles*. Advance online publication. <http://doi.org/10.1007/s11199-017-0886-0>
- Brewin, N., Baggott, J., Dugard, P., & Arcelus, J. (2014). Clinical normative data for Eating Disorder Examination Questionnaire and Eating Disorder Inventory for DSM-5 feeding and eating disorder classifications: A retrospective study of patients formerly diagnosed via DSM-IV. *European Eating Disorders Review*, 22, 299–305. <http://dx.doi.org/10.1002/erv.2301>
- Carrotte, E. R., Prichard, I., & Lim, M. S. C. (2017). "Fitspiration" on social media: A content analysis of gendered images. *Journal of Internet Medical Research*, 19, e95. <http://dx.doi.org/10.2196/jmir.6368>
- Diedrichs, P. C., & Lee, C. (2011). Waif goodbye! Average-size female models promote positive body image and appeal to consumers. *Psychology and Health*, 26, 1273–1291. <http://dx.doi.org/10.1080/08870446.2010.515308>
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363–370. [http://dx.doi.org/10.1002/1098-108X\(199412\)16:4<363::AID-EAT2260160405>3.0.CO;2](http://dx.doi.org/10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2)
- Fairburn, C. G., & Harrison, P. J. (2003). Eating disorders. *The Lancet*, 361(9355), 407–416.
- Fairburn, C. G., Cooper, Z., & Shafran, R. (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy*, 41, 509–528. [http://dx.doi.org/10.1016/S0005-7967\(02\)00088-8](http://dx.doi.org/10.1016/S0005-7967(02)00088-8)
- Fardouly, J., & Vartanian, L. R. (2015). Negative comparisons about one's appearance mediate the relationship between Facebook usage and body image concerns. *Body Image*, 12, 82–88. <http://dx.doi.org/10.1016/j.bodyim.2014.10.004>
- Fardouly, J., & Vartanian, L. R. (2016). Social media and body image concerns: Current research and future directions. *Current Opinion in Psychology*, 9, 1–5. <http://dx.doi.org/10.1016/j.copsyc.2015.09.005>
- Fardouly, J., Pinkus, R. T., & Vartanian, L. R. (2017). The impact of appearance comparisons made through social media, traditional media, and in person in women's everyday lives. *Body Image*, 20, 31–39. <http://dx.doi.org/10.1016/j.bodyim.2016.11.002>
- Fardouly, J., Willburger, B. K., & Vartanian, L. R. (2018). Instagram use and young women's body image concerns and self-objectification: Testing mediational pathways. *New Media & Society*, 20, 1380–1395. <http://dx.doi.org/10.1177/1461444817694499>
- 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. *Psychology of Popular Media Culture*, 2, 20–37. <http://dx.doi.org/10.1037/a0030766>
- Ferreira, C., Pinto-Gouveia, J., & Duarte, C. (2013). Physical appearance as a measure of social ranking: The role of a new scale to understand the relationship between weight and dieting. *Clinical Psychology and Psychotherapy*, 20, 55–66. <http://dx.doi.org/10.1002/cpp.769>
- Fuchs, C. (2017). *Social media: A critical introduction* (2nd ed.). London: United Kingdom: SAGE Publications Ltd. <http://dx.doi.org/10.4135/9781446270066>
- Ghaznavi, J., & Taylor, L. D. (2015). Bones, body parts, and sex appeal: An analysis of #thinspiration images on popular social media. *Body Image*, 14, 54–61. <http://dx.doi.org/10.1016/j.bodyim.2015.03.006>
- Griffiths, S., Murray, S. B., & Touyz, S. (2013). Disordered eating and the muscular ideal. *Journal of Eating Disorders*, 1(15) <http://dx.doi.org/10.1186/2050-2974-1-15>
- Griffiths, S., Murray, S. B., Krug, I., & McLean, S. A. (2018). The contribution of social media to body dissatisfaction, eating disorder symptoms, and anabolic steroid use among sexual minority men. *Cyberpsychology, Behavior, and Social Networking*, 21, 149–156. <http://dx.doi.org/10.1089/cyber.2017.0375>

- Hallikwell, E., & Dittmar, H. (2005). The role of self-improvement and self-evaluation motives in social comparisons with idealized female bodies in the media. *Body Image*, 2, 249–261. <http://dx.doi.org/10.1016/j.bodyim.2005.05.001>
- Harris, J. K., Duncan, A., Men, V., Shevick, N., Krauss, M. J., & Cavazos-Rehg, P. (2018). Messengers and messages for tweets that used #thinspo and #fitspo hashtags in 2016. *Prevention and Chronic Disease*, 15, e01. <http://dx.doi.org/10.5888/pcd15.170309>
- Hay, P. (2013). A systematic review of evidence for psychological treatments in eating disorders: 2005–2012. *International Journal of Eating Disorders*, 46, 462–469. <http://dx.doi.org/10.1002/eat.22103>
- Holland, G., & Tiggemann, M. (2016). A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image*, 17, 100–110. <http://dx.doi.org/10.1016/j.bodyim.2016.02.008>
- Holland, G., & Tiggemann, M. (2017). "Strong beats skinny every time": Disordered eating and compulsive exercise in women who post fitspiration on Instagram. *International Journal of Eating Disorders*, 50, 76–79. <http://dx.doi.org/10.1002/eat.22559>
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1–55. <http://dx.doi.org/10.1080/10705519909540118>
- Iversen, J., & Maher, L. (2015). *Australian Needle and Syringe Program Survey 20 Year National Data Report 1995–Kirby Institute*. University of New South Wales. Retrieved from <https://kirby.unsw.edu.au/report/australian-nsp-survey-national-data-report-1995-201>
- Jett, S., LaPorte, D. J., & Wanchisn, J. (2010). Impact of exposure to pro-eating disorder websites on eating behaviour in college women. *European Eating Disorders Review*, 18, 410–416. <http://dx.doi.org/10.1002/erv.1009>
- Keel, P. K., Dorner, D. J., Franko, D. L., Jackson, S. C., & Herzog, D. B. (2005). Postremission predictors of relapse in women with eating disorders. *American Journal of Psychiatry*, 162, 2263–2268. <http://dx.doi.org/10.1176/appi.ajp.162.12.2263>
- Keery, H., van den Berg, P., & Thompson, J. K. (2004). An evaluation of the tripartite influence model of body dissatisfaction and eating disturbance with adolescent girls. *Body Image*, 1, 237–251. <http://dx.doi.org/10.1016/j.bodyim.2004.03.001>
- Kinsey, A. C., Pomeroy, W. B., & Martin, C. E. (1948). *Sexual behavior in the human male*. Indiana, USA: Indiana University Press.
- Levine, M. P., & Murnen, S. K. (2015). *Media and eating disorders*. pp. 379–393. *The Wiley Handbook of Eating Disorders* (Vol. 2) Chichester, UK: John Wiley & Sons, Ltd. <http://dx.doi.org/10.1002/9781118574089.ch29>
- López-Guimerà, G., Levine, M. P., Sánchez-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, 387–416. <http://dx.doi.org/10.1080/15213269.2010.525737>
- Mabe, A. G., Forney, K. J., & Keel, P. K. (2014). Do you "like" my photo? Facebook use maintains eating disorder risk. *International Journal of Eating Disorders*, 47, 516–523. <http://dx.doi.org/10.1002/eat.22254>
- Maxwell, S. E., Cole, D. A., & Mitchell, M. A. (2011). Bias in cross-sectional analyses of longitudinal mediation: Partial and complete mediation under an autoregressive model. *Multivariate Behavioral Research*, 46, 816–841. <http://dx.doi.org/10.1080/00273171.2011.606716>
- Murray, S. B., Griffiths, S., Hazery, L., Shen, T., Wooldridge, T., & Mond, J. M. (2016). Go big or go home: A thematic content analysis of pro-muscularity websites. *Body Image*, 16, 17–20. <http://dx.doi.org/10.1016/j.bodyim.2015.10.002>
- Murray, S. B., Rieger, E., Touyz, S. W., De la Garza, G., & Lic, Y. (2010). Muscle dysmorphia and the DSM-V conundrum: Where does it belong? A review paper. *International Journal of Eating Disorders*, 43, 483–491. <http://dx.doi.org/10.1002/eat.20828>
- Murray, S. B., Griffiths, S., Mitchison, D., & Mond, J. M. (2017). The transition from thinness-oriented to muscularity-oriented disordered eating in adolescent males: A clinical observation. *Journal of Adolescent Health*, 60, 353–355. <http://dx.doi.org/10.1016/j.jadohealth.2016.10.014>
- Murray, S. B., Nagata, J. M., Griffiths, S., Calzo, J. P., Brown, T. A., Mitchison, D., & Mond, J. M. (2017). The enigma of male eating disorders: A critical review and synthesis. *Clinical Psychology Review*, 57, 1–11. <http://dx.doi.org/10.1016/j.cpr.2017.08.001>
- Norris, M. L., Boydell, K. M., Pinhas, L., & Katzman, D. K. (2006). Ana and the Internet: A review of pro-anorexia websites. *International Journal of Eating Disorders*, 39, 443–447. <http://dx.doi.org/10.1002/eat.20305>
- O'Brien, K. S., Caputi, P., Minto, R., Peoples, G., Hooper, C., Kell, S., ... & Sawley, E. (2009). Upward and downward physical appearance comparisons: Development of scales and examination of predictive qualities. *Body Image*, 6, 201–206. <http://dx.doi.org/10.1016/j.bodyim.2009.03.003>
- Pariser, E. (2011). *The filter bubble: What the internet is hiding from you*. London, United Kingdom: Penguin Press.
- Peterson, C. B., Crosby, R. D., Wonderlich, S. A., Joiner, T., Crow, S. J., Mitchell, J. E., ... & le Grange, D. (2007). Psychometric properties of the eating disorder examination-questionnaire: Factor structure and internal consistency. *International Journal of Eating Disorders*, 40, 386–389. <http://dx.doi.org/10.1002/eat.20373>
- Pittman, M., & Reich, B. (2016). Social media and loneliness: Why an Instagram picture may be worth a thousand twitter words. *Computers in Human Behavior*, 62, 155–167. <http://dx.doi.org/10.1016/j.chb.2016.03.084>
- Prichard, I., McLachlan, A. C., Lavis, T., & Tiggemann, M. (2018). The impact of different forms of #fitspiration imagery on body image, mood, and self-objectification among young women. *Sex Roles*, 78, 789–798. <http://dx.doi.org/10.1007/s11199-017-0830-3>
- Robinson, L., Prichard, I., Nikolaidis, A., Drummond, C., Drummond, M., & Tiggemann, M. (2017). Idealised media images: The effect of fitspiration imagery on body satisfaction and exercise behaviour. *Body Image*, 22, 65–71. <http://dx.doi.org/10.1016/j.bodyim.2017.06.001>
- Rodgers, R. F., Franko, D. L., Lovering, M. E., Luk, S., Pernal, W., & Matsumoto, A. (2017). Development and validation of the Female Muscularity Scale. *Sex Roles*, 78, 18–26. <http://dx.doi.org/10.1007/s11199-017-0775-6>
- Rodgers, R. F., Paxton, S. J., & McLean, S. A. (2013). A biopsychosocial model of body image concerns and disordered eating in early adolescent girls. *Journal of Youth and Adolescence*, 43, 814–823. <http://dx.doi.org/10.1007/s10964-013-0013-7>
- Rodgers, R. F., Lowy, A. S., Halperin, D. M., & Franko, D. L. (2015). A meta-analysis examining the influence of pro-eating disorder websites on body image and eating pathology. *European Eating Disorders Review*, 24, 3–8. <http://dx.doi.org/10.1002/erv.2390>
- Rodgers, R. F., McLean, S. A., & Paxton, S. J. (2015). Longitudinal relationships among internalization of the media ideal, peer social comparison, and body dissatisfaction: Implications for the tripartite influence model. *Developmental Psychology*, 51, 706–713. <http://dx.doi.org/10.1037/dev0000013>
- Sagoe, D., Molde, H., Andreassen, C. S., Torsheim, T., & Pallesen, S. (2014). The global epidemiology of anabolic-androgenic steroid use: A meta-analysis and meta-regression analysis. *Annals of Epidemiology*, 24, 383–398. <http://dx.doi.org/10.1016/j.annepidem.2014.01.009>
- Schaefer, L. M., & Thompson, J. K. (2014). The development and validation of the Physical Appearance Comparison Scale-Revised (PACS-R). *Eating Behaviors*, 15, 209–217. <http://dx.doi.org/10.1016/j.eatbeh.2014.01.001>
- Simmons, S., Nelson, L. D., & Simonsohn, U. (2011). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. *Psychological Science*, 22, 1359–1366. <http://dx.doi.org/10.1177/0956797611417632>
- Simpson, C. C., & Mazzeo, S. E. (2016). Skinny is not enough: A content analysis of fitspiration on Pinterest. *Health Communication*, 32, 560–567. <http://dx.doi.org/10.1080/10410236.2016.1140273>
- Smith, A., & Anderson, M. (2018). *Social media use in 2018*. Pew Research Center.
- Smith, K. E., Mason, T. B., Murray, S. B., Griffiths, S., Leonard, R. C., Wetterneck, C. T., ... & Lavender, J. M. (2017). Male clinical norms and sex differences on the Eating Disorder Inventory (EDI) and Eating Disorder Examination Questionnaire (EDE-Q). *International Journal of Eating Disorders*, 50, 769–775. <http://dx.doi.org/10.1002/eat.22716>
- Talbot, C. V., Gavin, J., van Steen, T., & Morey, Y. (2017). A content analysis of thinspiration, fitspiration, and bonespiration imagery on social media. *Journal of Eating Disorders*, 5(363) <http://dx.doi.org/10.1186/s40337-017-0170-2>
- Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty: Theory, assessment and treatment of body image disturbance*. Washington, DC: American Psychological Association.
- Tiggemann, M. (2011). Sociocultural perspectives on human appearance and body image. In T. F. Cash & L. Smolak (Eds.), *Body image: A handbook of science, practice, and prevention* (pp. 12–19). New York, NY: Guilford.
- Tiggemann, M., & Polivy, J. (2010). Upward and downward: Social comparison processing of thin idealized media images. *Psychology of Women Quarterly*, 34, 356–364. <http://dx.doi.org/10.1111/j.1471-6402.2010.01581.x>
- Tiggemann, M., Churches, O., Mitchell, L., & Brown, Z. (2018). Tweeting weight loss: A comparison of #thinspiration and #fitspiration communities on Twitter. *Body Image*, 25, 133–138. <http://dx.doi.org/10.1016/j.bodyim.2018.03.002>
- Tiggemann, M., & Zaccardo, M. (2015). "Exercise to be fit, not skinny": The effect of fitspiration imagery on women's body image. *Body Image*, 15, 61–67. <http://dx.doi.org/10.1016/j.bodyim.2015.06.003>
- Tod, D., Edwards, C., & Cranswick, I. (2016). Muscle dysmorphia: Current insights. *Psychology Research and Behavior Management*, 9, 179–188. <http://dx.doi.org/10.2147/PRBM.S97404>
- van den Berg, P., Thompson, J. K., Obremski-Brandon, K., & Coovert, M. (2002). The tripartite influence model of body image and eating disturbance. *Journal of Psychosomatic Research*, 53, 1007–1020. [http://dx.doi.org/10.1016/S0022-3999\(02\)00499-3](http://dx.doi.org/10.1016/S0022-3999(02)00499-3)
- Welch, E., Birgegård, A., Parling, T., & Ghaderi, A. (2011). Eating Disorder Examination Questionnaire and Clinical Impairment Assessment Questionnaire: General population and clinical norms for young adult women in Sweden. *Behaviour Research and Therapy*, 49, 85–91. <http://dx.doi.org/10.1016/j.brat.2010.10.010>
- Wicherts, J. M., Veldkamp, C. L. S., Augusteijn, H. E. M., Bakker, M., van Aert, R. C. M., & van Assen, M. A. L. (2016). Degrees of freedom in planning, running, analyzing, and reporting psychological studies: A checklist to avoid p-hacking. *Frontiers in Psychology*, 7, 1832. <http://dx.doi.org/10.3389/fpsyg.2016.01832>
- Wick, M. R., & Harriger, J. A. (2018). A content analysis of thinspiration images and text posts on Tumblr. *Body Image*, 24, 13–16. <http://dx.doi.org/10.1016/j.bodyim.2017.11.005>