

# What Does Viewing a Pro-Anorexia Website Do? An Experimental Examination of Website Exposure and Moderating Effects

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## ABSTRACT

**Objective:** This study experimentally examined the effects of viewing a pro-anorexia website.

**Method:** Following construction of a prototypic pro-anorexia website, 235 female undergraduates were randomly assigned to view either the pro-anorexia website or one of two comparison websites related to female fashion (using average-sized models) or home décor. Post-website affect, cognitions, and behavioral expectations were examined along with moderator effects.

**Results:** Study participants exposed to the pro-anorexia website had greater negative affect, lower social self-esteem, and lower appearance self-efficacy post-website than those who viewed a com-

parison website. Additionally, they perceived themselves as heavier, reported a greater likelihood of exercising and thinking about their weight in the near future, and engaged in more image comparison. Minimal support was found for moderator effects.

**Conclusion:** Results provide an empirical basis for concern (expressed by clinicians, researchers, the media) that pro-anorexia websites are a troubling new form of thin-ideal exposure that warrants further examination. © 2007 by Wiley Periodicals, Inc.

**Keywords:** pro-anorexia; Internet; affect; cognitions; behavioral expectations

(*Int J Eat Disord* 2007; 40:537–548)

## Introduction

The unrealistically thin-ideal body type promulgated in the traditional mass media of magazines and television has a negative impact on body image in women.<sup>1–6</sup> In the last decade, the Internet has arisen as a powerful form of mass media, and pro-anorexia websites have emerged as a new form of thin-ideal exposure.<sup>7</sup> Pro-anorexia websites are websites that take a positive and encouraging attitude towards eating disorders<sup>8</sup>; they explicitly encourage extreme thinness and advocate anorexia as a lifestyle choice rather than an illness. These websites have received a great deal of attention in the media and have been a cause for concern among clinicians.<sup>7–10</sup> Though a small group of researchers has explored the pro-anorexia culture through a

variety of creative ways including fieldwork in pro-anorexia Internet communities and content and linguistic analyses of pro-anorexia websites,<sup>11–16</sup> only one study has empirically examined the effects of viewing pro-anorexia websites.<sup>17</sup> This small pilot study found trends for exposure to a pro-anorexia website having negative affective and cognitive consequences for college women. As these websites remain highly visible and popular on the Internet,<sup>18</sup> and yet very little is known about this phenomenon, it is important to continue to explore their effects. The current study builds on the pilot study in evaluating the affective, cognitive, and behavioral consequences of exposure to a pro-anorexia website and in testing possible moderators of the relation between website viewing and these consequences.

## Relation Between the Media and Body Dissatisfaction and Disordered Eating

Naturalistic studies have found a relation between media exposure and levels of body dissatisfaction and disordered eating.<sup>19–22</sup> For example, in a study by Field et al.,<sup>20</sup> preadolescent and adolescent girls who were frequent readers of fashion magazines (e.g., *Seventeen*) were more likely to report wanting to lose weight and dieting because

Accepted 21 March 2007

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Published online 24 May 2007 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/eat.20396

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of magazine images and articles. Prospective work on the effects of thin-ideal media exposure have found that perceived pressure to be thin (such as pressure from the media) predicts increases in body dissatisfaction, which in turn predicts increases in eating pathology.<sup>23</sup> A meta-analysis of 25 experimental studies evaluating the immediate impact of images of thin-ideal beauty on females found a small, but consistent negative effect, with body image being significantly more negative after viewing thin-ideal images than after viewing any control condition.<sup>1</sup> Exposure to ultra-thin female images also appears to produce negative affect via feelings of depression, shame, and guilt.<sup>5</sup>

### **Pro-Anorexia Websites**

While the influence of traditional forms of thin-ideal media on body dissatisfaction, mood, and eating pathology is well established, pro-anorexia websites have emerged as a new form of mass media with potentially profoundly detrimental effects on women's body image and eating attitudes/behaviors. Pro-anorexia websites (commonly referred to as pro-ana websites) tend to be developed by girls and young women, with the viewing community also being predominantly female and mostly between the ages of 13 and 25.<sup>7,13,24</sup> Recent estimates put the number of operational pro-anorexia websites at ~500.<sup>25,26</sup> With names like *Ana's Underground Grotto* and *Proana Perfection*, these websites have created a controversial yet flourishing, underground community of individuals who advocate anorexia as a life style choice, rather than a psychological disorder. Much of their appeal derives from the fact that they are seen as safe havens in which to connect with similar others away from the judgmental eyes of the rest of the world.<sup>12,27</sup>

There are several important features that nearly every pro-anorexia website shares, including the "Ana Creed," the six central beliefs of those who ascribe to the pro-anorexia message (e.g., "I will be thin, at all costs, it is the most important thing; nothing else matters"), and the "Thin Commandments," a set of 10 rules to follow in order to achieve the anorexic lifestyle (e.g., "Thou shall not eat without feeling guilty"). Most websites also contain a disclaimer, warning that the images and text could be "triggering" to those with eating disorder issues. Among the more disturbing aspects of pro-anorexia websites are the "Thinspirations" photo galleries and the "Tips and Tricks." Thinspirations are photos of very thin models and celebrities (e.g., Kate Moss, Mary Kate Olsen, Nicole Richie), provided as images of goals to reach for

and as sources of inspiration. Pictures of both weight extremes ("bone pics," which are pictures of emaciated women and digitally manipulated pictures of models to make them look skeletal, and pictures of morbidly obese women) are also popular "thinspiration" images. The "Tips and Tricks" page offers suggestions for how to successfully engage in eating disordered behavior and how to protect the eating disorder from discovery. For example, many pro-anorexia websites address how to resist eating when hungry and how to self-induce vomiting for the purpose of weight loss (e.g., "Purge in the shower! It covers up the sound, smell, & washes out the evidence"). Most pro-anorexia websites have a page of quotations for inspiration to be thin and diet, as well as a page with links to other pro-anorexia websites. Finally, most websites contain a forum page or chat room that offers website viewers the opportunity to talk to each other, join group fasts, and seek advice and encouragement about extreme weight loss methods and purging. These key elements reflect those identified by researchers engaged in content analysis of pro-anorexia websites.<sup>11,15,16</sup>

### **Pilot Study on the Effects of Exposure to a Pro-Anorexia Website**

Given the growing awareness and concern over these websites, the pilot study by Bardone-Cone and Cass<sup>17</sup> sought to examine the effects of viewing pro-anorexia websites. We created a prototypic pro-anorexia website following intense research and viewing of over 300 pro-anorexia websites, and hypothesized that viewing the website would negatively influence the mood and cognitions of young women. In this pilot study, 24 female undergraduates were randomly assigned to view one of three websites: the pro-anorexia website or one of two control websites (one focused on the female image using average sized-models and one on home décor). While the small sample size precluded the informative use of inferential statistics, interesting trends emerged: negative affect increased and state self-esteem decreased only among women who viewed the pro-anorexia website. The results from this preliminary study suggest that viewing pro-anorexia websites has negative affective and cognitive effects on women, even when compared to viewing a website focused on the female figure.

### **The Current Study**

The current study builds on the pilot study and extends it in several ways. First, a larger sample size permits the meaningful use of tests of significance. Second, the current study assesses participants'

reports of possible behavioral changes elicited by viewing the website, in addition to pre/post measures of affect and cognitions. Third, additional variables of interest were assessed as potential moderators of the effects of exposure to the pro-anorexia website.

Regarding moderators, studies of the effects of brief exposure to thin female images have shown that certain individuals are more adversely affected than others. On the basis of meta-analytic work, the presence of an eating disorder interacts with thin-ideal media exposure to produce body dissatisfaction.<sup>1</sup> Yamamiya et al.<sup>28</sup> found that thin-ideal internalization (the degree to which an individual cognitively “buys into” societal norms of size and appearance<sup>29</sup>) interacted with thin-ideal media exposure to increase body dissatisfaction.

Potential moderators that have not been examined as extensively (or at all) in thin-ideal media research include actual body size [body mass index (BMI)], dieting, and perfectionism. Theoretically, individuals with higher BMI (a risk factor for body dissatisfaction<sup>30</sup>) are further from the thin-ideal body espoused by the pro-anorexia website, which may especially increase negative affect and reduce self-esteem upon exposure to this website. Dieting may also act as a moderator. Theoretically, individuals who are dieting are dissatisfied with their body shape and may feel worse after viewing the pro-anorexia website, although there is some evidence that dieters may feel better about themselves after viewing thin-ideal media images.<sup>31</sup> Finally, perfectionism, a vulnerability factor for disordered eating,<sup>30</sup> may also interact with website viewing, increasing the negative impact of exposure. Socially prescribed perfectionism, a type of perfectionism involving feeling that others have high expectations for oneself,<sup>32</sup> may leave individuals particularly vulnerable to the effects of website viewing, as attaining perfection in what society deems important (e.g., an ultra-thin body shape) is likely of particular value to these individuals.

In summary, we investigated the affective, cognitive, and expected behavioral consequences of viewing a pro-anorexia website, hypothesizing that viewing the pro-anorexia website, but not either of the comparison websites, would produce negative outcomes. Additionally, we tested potential moderators (presence of an eating disorder, thin-ideal internalization, BMI, dieting, and socially prescribed perfectionism) of the relation between exposure to the pro-anorexia website and the hypothesized negative outcomes. Given calls for research on the impact of pro-anorexia websites on

the health of adolescents and young adults,<sup>16,33</sup> the current study contributes to a body of research that is in its infancy.

## Method

### Participants

The study sample included 236 female undergraduates in an introductory psychology course who randomly signed up for this study. Because of technical difficulties, one female could not view the website, so data presented reflect 235 participants. Participants had a mean age of 18.37 years (range 18–23; SD = 0.62 years). The majority of female participants (88%) self-reported as Caucasian, 5% as African-American, 1% as Hispanic, 2% as Asian, and 3% as biracial.

### Procedure

Participants were told they would be participating in a study examining perceptions of Internet websites. They completed a set of (pre-website) questionnaires, then viewed a website for 25 minutes, and then completed a second set of (post-website) questionnaires. Participants were randomly assigned to website condition; 84 females viewed the pro-anorexia website, 76 viewed a comparison website focused on the female image, and 75 viewed a neutral comparison website. At the end of the study, those who viewed the pro-anorexia website received an extensive psychoeducational debriefing as well as local and national contact numbers in case they had eating disorder concerns. This study was approved by a human subjects protection review committee.

**Pro-Anorexia Website.** A prototypic pro-anorexia website (used in the Bardone-Cone and Cass pilot study) was developed by the authors after an extensive search of existing pro-anorexia websites. The prototype reflected the most commonly seen parts of pro-anorexia websites: a disclaimer (see Appendix); autobiographical information about the website designer; the “Ana Creed” and the “Thin Commandments” (see Appendix); information related to anorexia, bulimia, and exercise; a “Tips and Tricks” section (including tips for restricting, purging, making excuses for not eating, and hiding an eating disorder from others); a “Thinspirations” photo gallery including photos of thin models and celebrities, severely emaciated women, and morbidly obese women; quotations; a forum including posts about binge eating, vomiting, and signing-up to have a “fasting buddy;” and links to other pro-anorexia websites. Pilot feedback from undergraduate students who viewed both the prototype and existing pro-anorexia websites suggested that the

prototype well represented the common themes in pro-anorexia websites. An existing pro-anorexia website was not used in this study due to potential intellectual property issues and the need to have a website under the experimenters' control so that all participants would see the same content and so that there was no danger of the website shutting down.

**Comparison Websites.** Once the pro-anorexia website had been fully developed, a similar format was used to create two comparison websites (used in the Bardone-Cone and Cass pilot study): one on female fashion (to test if viewing the pro-anorexia website would have effects beyond those from viewing a website focused on the female figure) and one on home décor (an appearance-neutral website). Topics covered on the female fashion website included dressing for job interviews and dressing for seasons; images in this website were chosen to represent average-sized women rather than typical models. Topics covered in the home décor website included setting up a dorm room and decorating different types of rooms. The visual layout of the comparison websites was identical to the layout of the pro-anorexia website; all websites had the same number of links and about the same amount of text and images. Also, the components were kept as similar as possible (e.g., both comparison websites had photo galleries and forums). When an exact parallel was not possible, similar sections appeared in the comparison websites. For example, instead of the Thin Commandments, the comparison websites had content-appropriate "Do's and Don'ts."

### **Measures: Outcomes Assessed**

**Positive and Negative Affect Schedule<sup>34</sup>.** The Positive and Negative Affect Schedule (PANAS) (20 items, five-point response format) was used to assess positive and negative affect pre- and post-website. The PANAS is a widely used instrument with adequate psychometrics that is sensitive to changes in affect across brief periods of time; it is often used to assess the impact of experimental manipulations.<sup>34</sup> In the current study, coefficient alpha ranged from 0.87 to 0.89 for positive affect (pre- and post-website) and from 0.82 to 0.84 for negative affect.

**State Self-Esteem Scale<sup>35</sup>.** The State Self-Esteem Scale (SSES) (20 items, five-point response format) was used to assess state self-esteem pre- and post-website and to provide three factor scores: academic performance, social evaluation, and appearance self-esteem. SSES is sensitive to fluctuations in self-esteem and is often used to measure self-esteem changes in laboratory manipulations<sup>36</sup>; psychometrics are adequate.<sup>35</sup> In the current study, alpha for the academic performance subscale was 0.86 both

pre-website and post-website, alpha for the social evaluation subscale ranged from 0.86 to 0.89, and alpha for the appearance subscale ranged from 0.87 to 0.89.

**Appearance-Modified General Self-Efficacy Scale<sup>37,38</sup>.** Appearance self-efficacy (17 items; five-point response format) was assessed pre- and post-website using a modified version of the general subscale of the Self-Efficacy Scale developed by Sherer et al.<sup>38</sup> The phrasing of the original items was modified to reflect self-efficacy related to appearance (i.e., confidence related to being able to attain one's desired weight/shape). The general self-efficacy subscale has demonstrated good reliability, with an alpha of 0.86,<sup>38</sup> as well as good construct validity and criterion validity.<sup>38,39</sup> Prior use of this appearance self-efficacy scale yielded a coefficient alpha of 0.93.<sup>37</sup> In the current study, alpha for the Appearance-Modified General Self-Efficacy Scale (ApSE) was 0.89 pre-website and 0.92 post-website.

**Perceived Weight Status.** Participants were asked pre- and post-website to describe their current weight using one of five categories: very underweight, underweight, average, overweight, and very overweight.

**Behavioral Expectations.** Participants were asked, post-website only, to rate the likelihood of their engaging in specific behaviors and cognitions (food restriction via cutting back on the amount of food eaten, overeating, exercise, purging via vomiting, and thinking about weight) "today or tomorrow, compared to as if you had not seen this website." Response options were on a five-point scale with 1, less likely; 3, about as likely (i.e., website viewing had no influence); and 5, more likely.

**Process Variables.** Post-website, participants in all conditions were asked to what degree they thought about their appearance while viewing the website, using a five-point scale. Participants in the pro-anorexia or female fashion website conditions were additionally asked, post-website, to what degree they compared themselves with the images in the website while viewing the website, also using a five-point scale. Asking these questions permitted the investigation of comparison processes potentially occurring during the website viewing.

### **Measures: Potential Moderators**

**Eating Attitudes Test<sup>40</sup>.** The Eating Attitudes Test (EAT-26) (26 items; six-point response format) was administered pre-website to assess attitudes and behaviors associated with eating disorders (in particular, anorexic attitudes and behaviors). The EAT-26 is well-established with good psychometrics.<sup>41</sup> In the current study, alpha is 0.88.

**TABLE 1. Descriptive data for the post-manipulation variables for each of the website conditions and significant group differences**

	Pro-Anorexia ( <i>n</i> = 84)	Female Fashion ( <i>n</i> = 76)	Home Décor ( <i>n</i> = 75)	Significant Group Differences
Negative affect	20.04 (6.26)	12.71 (3.17)	12.96 (4.31)	PA > FF, HD
Positive affect	24.58 (7.39)	23.62 (9.46)	25.08 (8.27)	—
Academic self-esteem	27.27 (5.16)	28.12 (4.63)	28.29 (4.11)	—
Social self-esteem	23.98 (6.06)	25.95 (6.00)	26.67 (4.82)	PA < HD
Appearance self-esteem	18.88 (5.59)	20.39 (4.81)	19.91 (3.99)	—
Appearance self-efficacy	52.87 (12.29)	57.82 (11.56)	56.59 (12.40)	PA < FF
Perceived weight status	3.39 (0.64)	3.21 (0.62)	3.15 (0.53)	PA > HD
Likelihood to diet	2.99 (1.37)	2.79 (0.82)	2.76 (0.63)	—
Likelihood to overeat	1.83 (0.95)	2.54 (0.74)	2.65 (0.76)	PA < FF, HD
Likelihood to exercise	3.51 (1.00)	3.12 (0.67)	2.91 (0.66)	PA > FF, HD
Likelihood to vomit	1.67 (1.03)	2.42 (0.91)	2.56 (0.81)	PA < FF, HD
Likelihood to think about weight	3.92 (1.20)	3.11 (0.78)	2.88 (0.66)	PA > FF, HD
Thought about appearance during website	3.95 (1.14)	3.03 (1.36)	1.60 (0.94)	PA > FF, HD; FF > HD
Compared self to images during website	3.21 (1.39)	2.55 (1.41)	n/a	PA > FF

For the likelihood variables, participants were asked how likely they were to do/think something “today or tomorrow, compared to as if you had not seen this website,” with 1, less likely; 3, about as likely (i.e., website viewing had no influence); and 5, more likely. For all other variables, higher scores reflect higher levels of the construct. PA, Pro-Anorexia website; FF, Female Fashion website; HD, Home Décor website. Significant group differences are based on Tukey HSD tests for pair-wise comparisons.

**Sociocultural Attitudes Towards Appearance Scale-3<sup>29</sup>.** The general thin-ideal internalization subscale (nine items; five-point response format) of the Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3) was administered pre-website. The SATAQ-3 as a whole has shown adequate reliability (Cronbach alpha value greater than 0.88 on the subscales) and validity.<sup>29</sup> In the current study, alpha for the general thin-ideal internalization subscale is 0.94.

**Eating Disorder Examination-Questionnaire<sup>42</sup>.** The Restraint subscale of the Eating Disorder Examination-Questionnaire (EDEQ) (five items; seven-point response format) was administered pre-website to assess dieting levels over the past 4 weeks via items about various dieting attempts (e.g., tried to limit food intake, tried to avoid certain foods). The subscales of the EDEQ have adequate psychometrics.<sup>43,44</sup> In the current study, alpha for the Restraint subscale is 0.86.

**Body Mass Index.** Body mass index (BMI) was derived from participants’ height and weight provided by self-report pre-website. BMI is calculated by dividing weight in kilograms by height in meters squared ( $\text{kg}/\text{m}^2$ ), which controls for variations in weight due to height and yields a measure of relative weight.

**Multidimensional Perfectionism Scale<sup>32</sup>.** The socially prescribed perfectionism subscale (15 items; seven-point response format) of the Multidimensional Perfectionism Scale (MPS) was administered pre-website to assess interpersonal perfectionism, which reflects feeling that others have high expectations of oneself. The MPS is one of the most commonly used measures of perfectionism

dimensions and it has adequate psychometrics.<sup>45</sup> In the current study, alpha is 0.86.

## Results

### Overview of Data Analytic Strategy

To test the hypothesis that viewing the pro-anorexia website would have negative effects on the outcomes of affect, cognitions related to the self, appearance-related variables, and behavioral expectations, one-way ANOVA was employed, with Tukey HSD tests used for pair-wise comparisons. For predictions involving moderation of the relationship between website viewed and outcomes (e.g., post-website affect), 3 (website condition)  $\times$  2 (e.g., high/low on hypothesized moderator) ANOVA was employed with Tukey HSD tests used for pair-wise comparisons.

### Descriptive Analyses

**Table 1** contains the means and standard deviations of the affective, cognitive, appearance-related, behavioral expectation, and process variables post-manipulation for each of the website conditions. ANOVAs run on the pre-manipulation versions of these variables (all but the behavioral expectation variables and the process variables had pre-manipulation values) indicated that website condition groups did not differ on any of these variables pre-manipulation, with omnibus  $F$ ’s ranging in significance from  $p = .35$  to  $p = .96$ . Additionally, there were no website condition differences on the moderators assessed pre-website.

### Affect

For *negative affect*, results indicated a significant main effect of website condition,  $F(2,232) = 60.39$ ,  $p < .001$ , partial  $\eta^2 = 0.34$ . Follow-up Tukey HSD comparisons indicated that the pro-anorexia website viewers reported significantly higher negative affect than did viewers of the female fashion website ( $20.04 - 12.71 = 7.33$ ,  $p < .001$ ) or the home décor website ( $20.04 - 12.96 = 7.08$ ,  $p < .001$ ). Participants in the two control website conditions did not differ in their post-manipulation negative affect. For *positive affect*, there was no significant main effect of website condition,  $F(2, 232) = .60$ ,  $p = .552$ , partial  $\eta^2 = 0.01$ .

### Cognitions Related to the Self

For *social self-esteem*, results indicated a significant main effect of website condition,  $F(2, 231) = 4.82$ ,  $p = .009$ , partial  $\eta^2 = 0.04$ . Pro-anorexia website viewers reported significantly lower social self-esteem than did viewers of the home décor website ( $23.98 - 26.67 = -2.69$ ,  $p = .009$ ), but only marginally lower social self-esteem than viewers of the female fashion website ( $23.98 - 25.95 = -1.97$ ,  $p = .075$ ). Participants in the two control website conditions did not differ in their post-manipulation social self-esteem. For *academic self-esteem*, there was no significant main effect of website condition,  $F(2,232) = 1.10$ ,  $p = .335$ , partial  $\eta^2 = 0.01$ .

### Appearance-Related Variables

For *appearance self-esteem*, results indicated no significant main effect of website condition,  $F(2, 231) = 2.02$ ,  $p = .135$ , partial  $\eta^2 = 0.02$ , although there was a trend for women in the pro-anorexia website condition to have the lowest appearance self-esteem post-manipulation (**Table 1**). For *appearance self-efficacy*, results indicated a significant main effect of website condition,  $F(2, 232) = 3.66$ ,  $p = .027$ , partial  $\eta^2 = 0.03$ . Pro-anorexia website viewers reported significantly lower appearance self-efficacy than did viewers of the fashion website ( $52.87 - 57.82 = -4.95$ ,  $p = .028$ ), but not significantly lower appearance self-efficacy than viewers of the home décor website, although the means were in the expected direction (**Table 1**). Participants in the two control website conditions did not differ in their post-manipulation appearance self-efficacy. For *perceived weight status*, results indicated a significant main effect of website condition,  $F(2, 232) = 3.63$ ,  $p = .028$ , partial  $\eta^2 = 0.03$ . Pro-anorexia website viewers reported perceiving themselves as significantly heavier than did viewers of the home décor website ( $3.39 - 3.15 = 0.24$ ,  $p = .029$ ), but not significantly heavier than

viewers of the female fashion website, although the means were in the expected direction (**Table 1**). Participants in the two control website conditions did not differ in their post-manipulation weight perception.

### Behavioral Expectations

For expectations related to *food restriction*, there was no significant main effect of website condition,  $F(2, 232) = 1.23$ ,  $p = .295$ , partial  $\eta^2 = 0.01$ . For expectations related to *overeating*, results indicated a significant main effect of website condition,  $F(2, 232) = 23.19$ ,  $p < .001$ , partial  $\eta^2 = 0.17$ . Pro-anorexia website viewers reported significantly ( $p < .001$ ) lower likelihood to overeat ( $M = 1.83$ ) than did viewers of the female fashion website ( $M = 2.54$ ) or the home décor website ( $M = 2.65$ ). Participants in the two control website conditions did not differ in their post-manipulation overeating likelihood. For expectations related to *exercise*, results indicated a significant main effect of website condition,  $F(2, 232) = 11.75$ ,  $p < .001$ , partial  $\eta^2 = 0.09$ . Pro-anorexia website viewers reported significantly ( $p < .01$ ) greater likelihood to exercise ( $M = 3.51$ ) than did viewers of the female fashion website ( $M = 3.12$ ) or the home décor website ( $M = 2.91$ ). Participants in the two control website conditions did not differ in their post-manipulation exercise likelihood. For expectations related to *self-induced vomiting*, results indicated a significant main effect of website condition,  $F(2, 232) = 21.68$ ,  $p < .001$ , partial  $\eta^2 = 0.16$ . Pro-anorexia website viewers reported significantly ( $p < .001$ ) lower likelihood to self-induce vomiting ( $M = 1.67$ ) than did viewers of the female fashion website ( $M = 2.42$ ) or the home décor website ( $M = 2.56$ ). Participants in the two control website conditions did not differ in their post-manipulation self-induced vomiting likelihood. Finally, for expectations related to *thinking about weight*, results indicated a significant main effect of website condition,  $F(2, 232) = 28.15$ ,  $p < .001$ , partial  $\eta^2 = 0.20$ . Pro-anorexia website viewers reported significantly ( $p < .001$ ) greater likelihood to think about their weight ( $M = 3.92$ ) than did viewers of the female fashion website ( $M = 3.11$ ) or the home décor website ( $M = 2.88$ ). Participants in the two control website conditions did not differ in their post-manipulation likelihood of thinking about weight.

### Appearance-Related Processes Occurring During Website Viewing

There was a significant main effect of website condition on the degree to which women *thought about their appearance* while viewing the website,

$F(2, 232) = 81.78, p < .001, \text{partial } \eta^2 = 0.41$ . Pro-anorexia website viewers were significantly more likely to think about their appearance while viewing the website than viewers of the female fashion website ( $3.95 - 3.03 = 0.92, p < .001$ ) or the home décor website ( $3.95 - 1.60 = 2.35, p < .001$ ). Women viewing the fashion website were also significantly more likely to think about their appearance during the manipulation than the viewers of the home décor website ( $3.03 - 1.60 = 1.43, p < .001$ ). Limiting the analyses to the viewers who saw websites with female images, there was a significant main effect of website condition on the degree to which women compared themselves to the images they were viewing in the website,  $F(1, 157) = 8.82, p = .003, \text{partial } \eta^2 = 0.05$ . Pro-anorexia website viewers were significantly more likely to compare themselves to the thin-ideal images of the pro-anorexia website ( $M = 3.21$ ) than viewers of the female fashion website were to compare themselves to the average-sized images of the female fashion website ( $M = 2.55$ ).

### Tests of Moderation

**Presence of an Eating Disorder.** A cut-off of 20 on the EAT-26 is recommended in screening for eating pathology and those at or above this cut-off are typically referred for further evaluation.<sup>46,47</sup> (In this sample, 14.0% [ $n = 33$ ] had EAT-26 scores reflecting a possible eating disorder.) Dichotomizing this hypothesized moderator using this cut-off, 3 (website condition)  $\times$  2 (likely presence/absence of an eating disorder) ANOVAs were run, yielding only one significant interaction: Website condition and possible presence of an eating disorder interacted to predict reported likelihood to self-induce vomiting,  $F(2,229) = 3.80, p = .024, \text{partial } \eta^2 = 0.03$ . Follow-up analyses showed that eating pathology was associated with expectations related to vomiting only in the pro-anorexia website condition ( $F(1,82) = 18.30, p < .001, \text{partial } \eta^2 = 0.18$ ); low eating pathology women who viewed the pro-anorexia website reported significantly lower likelihood of vomiting ( $M = 1.48$ ) as a result of viewing the website than did high eating pathology viewers of the pro-anorexia website ( $M = 2.69$ ).

**Thin-Ideal Internalization.** There was only one significant website  $\times$  thin-ideal internalization (dichotomized using a median split) interaction: Website condition and thin-ideal internalization interacted to predict appearance self-efficacy,  $F(2,229) = 3.17, p = .044, \text{partial } \eta^2 = 0.03$ . Follow-up analyses showed that thin-ideal internalization was associated with appearance self-efficacy only in the female fashion website condition ( $F(1,74) = 12.35,$

$p = .001, \text{partial } \eta^2 = 0.14$ ); high thin-ideal internalization women who viewed the female fashion website reported significantly lower appearance self-efficacy ( $M = 53.47$ ) as a result of viewing the website than did low thin-ideal internalization viewers of the female fashion website ( $M = 62.16$ ).

**Dieting.** There was only one significant website  $\times$  dieting (dichotomized using a median split) interaction: Website condition and dieting interacted to predict reported likelihood to restrict dietary intake,  $F(2,229) = 3.93, p = .021, \text{partial } \eta^2 = 0.03$ . Follow-up analyses showed that dieting was associated with expectations related to food restriction in the pro-anorexia website condition ( $F(1,82) = 9.63, p = .003, \text{partial } \eta^2 = .11$ ), where high level dieters reported significantly higher likelihood of cutting back on food ( $M = 3.44$ ) as a result of viewing the pro-anorexia website than did low level dieters who viewed the pro-anorexia website ( $M = 2.56$ ). Dieting was also associated with expectations related to food restriction in the female fashion website condition ( $F(1,74) = 4.23, p = .043, \text{partial } \eta^2 = 0.05$ ). While high level dieters reported expecting virtually no change in their food restriction ( $M = 2.97$ ) as a result of viewing the female fashion website, low level dieters who viewed the female fashion website indicated a somewhat decreased likelihood of cutting back on food ( $M = 2.59$ ).

**Body Mass Index.** Dichotomizing BMI into overweight and not overweight, using a cut-off of 25 kg/m<sup>2</sup> (which is consistent with standards for overweight classification<sup>48</sup>), yielded no significant moderator effects. That is, website condition and overweight status did not interact to predict any of the outcome measures. (In this sample, 17.4% [ $n = 41$ ] were overweight by BMI classifications.)

**Socially Prescribed Perfectionism.** There were two significant website  $\times$  socially-prescribed perfectionism (dichotomized using a median split) interactions. Website condition and socially prescribed perfectionism interacted to predict negative affect ( $F(2,228) = 3.35, p = .037, \text{partial } \eta^2 = 0.03$ ) and to predict perceived weight status ( $F(2,228) = 4.21, p = .016, \text{partial } \eta^2 = 0.04$ ). Follow-up analyses involving negative affect showed that perfectionism was associated with negative affect in the pro-anorexia website condition ( $F(1,81) = 7.61, p = .007, \text{partial } \eta^2 = 0.09$ ), where high perfectionism women reported significantly higher negative affect ( $M = 21.57$ ) as a result of viewing the pro-anorexia website than did low perfectionism viewers of the pro-anorexia website ( $M = 17.89$ ). Perfectionism was also associated with negative affect in the female fashion website condition ( $F(1,74) = 8.53, p = .005, \text{partial } \eta^2 = 0.10$ ), where high perfectionism

women reported significantly higher negative affect ( $M = 13.78$ ) as a result of viewing the female fashion website than did low perfectionism viewers of the female fashion website ( $M = 11.75$ ). Finally, follow-up analyses involving perceived weight status showed that perfectionism was associated with perceived weight status only in the pro-anorexia website condition ( $F(1,81) = 11.63, p = .001$ , partial  $\eta^2 = 0.13$ ), where high perfectionism women reported perceiving themselves as more overweight ( $M = 3.60$ ) as a result of viewing the pro-anorexia website than did low perfectionism viewers of the pro-anorexia website who self-reported as average weight ( $M = 3.14$ ).

## Conclusion

To our knowledge, this is only the second study to use experimental methodology to assess the impact of pro-anorexia websites, and the first to do so with a large sample size and to include potential moderators. The results of the current study provide strong evidence for exposure to pro-anorexia websites having negative immediate effects on young women. Minimal support was found for hypothesized moderators of the relation between website exposure and outcomes immediately assessed.

### *Relation Between Exposure to Thin-Ideal Media and Messages and Negative Outcomes*

Similar to the work using thin-ideal images from the traditional media of magazines and television (e.g.,<sup>5,49,50</sup>), we found that viewing a website with thin images and a strong, consistent message that being thin is important had negative consequences on viewers. Study participants exposed to the pro-anorexia website had greater negative affect, lower social self-esteem, and lower appearance self-efficacy post-website than those who viewed either of the comparison websites. Pro-anorexia website viewers also perceived themselves as heavier post-website than viewers of the other websites, even though there were no significant differences in BMI or pre-website weight perceptions across website conditions. Regarding behavioral expectations, pro-anorexia website viewers reported that viewing the website made them more likely to exercise and think about their weight in the near future (today or tomorrow) than if they had not seen the website—they also reported a lower likelihood of overeating or vomiting. In contrast, viewers of the other websites typically reported that viewing the website (female fashion or home décor) would not affect

their likelihood of engaging in the behaviors and cognitions assessed. Finally, while both pro-anorexia and female fashion website viewers were more likely to think about their appearance while viewing the websites than were the home décor website viewers, pro-anorexia viewers were more likely to do so than female fashion viewers. Furthermore, pro-anorexia viewers were more likely than female fashion viewers to report comparing themselves with the website images of women.

It is notable that these effects occurred after a single viewing of the pro-anorexia website. Whether repeated viewing of these websites (as experienced by the adolescent and young women who frequent pro-anorexia websites on the Internet) produces the same consequences is unclear. On the one hand, it seems reasonable that if a single exposure to this website produced such negative consequences, then repeated exposure would exacerbate these outcomes. However, it is also possible that repeated website viewing would be desensitizing and that some of the negative effects seen in this study would diminish. It is also notable that viewing the pro-anorexia website had a significantly more negative impact than viewing a website with images of average-sized women, suggesting that it is something about *how* the female image is depicted and discussed that is having the negative effects rather than merely a focus on the female image.

How might pro-anorexia websites and other media purveyors of the thin-ideal exert their influence? A social comparison theory<sup>51</sup> framework would suggest that people are driven to self-evaluate by comparing themselves with similar others, such as females depicted in the media. These sorts of social comparisons may lead to body dissatisfaction and negative feelings because thin models are the norm in the media<sup>52</sup> and represent a body ideal that is highly discrepant from the average woman's body.<sup>53</sup> In addition to images, pro-anorexia websites, including the prototype used in the current study, include chat rooms with discussions of progress toward weight goals and reported current weights. Comparing oneself on these metrics may also result in negative consequences. While it is hard to know exactly the demographics of the individuals who visit pro-anorexia websites, names and ages as recorded on forum pages of these websites and journalistic reports suggest that girls and young women are the most frequent visitors. Since childhood and adolescence is when initial self-conceptions are formed, the issue of social comparison is of special relevance to these developmental stages,<sup>54</sup> and thus social comparisons with pro-

anorexia images and messages may be especially detrimental to youth.

### **Moderator Findings**

It was surprising that so few moderator effects were found. For each of the five potential moderators, 14 interactions were tested. And yet, of these 70 total interactions, only five were significant (7%), which is about the number of effects that could be expected by chance. Thus, the moderator findings should be interpreted with caution. The finding that so few moderators qualified the website main effect suggests that pro-anorexia websites have a “broad” reach, and that their influence is felt not only by populations that would be expected to be vulnerable (i.e., those with eating disorders, those high on thin-ideal internalization).

Of note, the prior moderator findings involving presence of an eating disorder<sup>1</sup> and thin-ideal internalization<sup>28</sup> reported on body dissatisfaction as the outcome variable, whereas in the current study only proxies for body dissatisfaction were available (e.g., appearance self-esteem, perceived weight status). Future work on the impact of pro-anorexia websites will want to examine moderator models using well-established outcome measures specifically designed to measure body dissatisfaction. While we urge caution in the interpretation of the moderator findings, it is interesting that socially prescribed perfectionism interacted with website condition in a hypothesized manner in the prediction of negative affect and perceived weight status. These findings tentatively suggest that socially prescribed perfectionism is a moderator worth future study in thin-ideal media exposure research. Finally, a prospective look may be important in understanding moderation. It could be that moderator effects may come into play in predicting longer term effects, such as the effects of repeated viewing.

### **Strengths and Limitations**

This study is novel in the questions it sought to address related to pro-anorexia websites and in the way it sought to do so, using an experimental paradigm. Use of appearance-neutral and appearance-related comparison websites is a strength because this permitted both the conservative comparison with a neutral media source and a more stringent comparison with another website that calls attention to appearance. The large sample size, the random assignment, and the confirmation of no pre-website differences on key variables are other strengths of the study. While the experimental design was a strength since it provided tight con-

trols and permitted tests of causality, this design also has limited ecological validity—that is, the current findings may or may not represent young women’s reactions as they view a pro-anorexia website outside of a laboratory setting. Another limitation of this study is that only immediate effects were assessed, so the longer-term impact of viewing the pro-anorexia website on affect, cognitions, and behaviors is unknown. This is a limitation both from the scientific perspective of not yet understanding the longevity of these effects and from an ethical perspective of not knowing whether young women, despite the extensive debriefing, continued to experience negative effects. Relatedly, only participants’ expectations related to future behaviors were assessed, and these behavioral expectations may or may not translate into actual behavior. Finally, the use of single item measures for the behavioral expectation variables, the absence of a well-established body dissatisfaction measure, and the reliance on self-report are limitations.

### **Summary and Future Directions**

While many clinicians and, indeed, the Academy for Eating Disorders, consider pro-anorexia websites to be harmful, this study provides the first systematic evidence that viewing a pro-anorexia website has significant negative consequences. Women who viewed the pro-anorexia website experienced negative affective and cognitive consequences, and the website viewing also influenced their level of self-comparison with female images and their reported likelihood of engaging in various behaviors and cognitions related to food, exercise, and weight.

Future work involving pro-anorexia websites should assess the longer-term effects of exposure to this media, although ethical considerations may restrict the sorts of studies that can be done to address this. Also, given that pro-anorexia websites differ from the more traditional media sources of the thin-ideal by having the multiple components of photo images, interactive chat room conversations, tips and tricks, etc., it would be useful to know whether certain components have greater negative impact than others. For example, how does being exposed to very thin images compare to reading posts about group fasting or purging techniques in terms of how women are left feeling, thinking, and acting? This is a relevant question given the rapidly increasing number of “blogs” (containing text rather than images) and given recent evidence that increased body dissatisfaction can occur from exposure to “fat talk,”<sup>55</sup> which is

present in the message-board forums on pro-anorexia websites.

Future research into the impact of pro-anorexia websites would be well-served to use both nonclinical and clinical populations, since the audience for pro-anorexia websites is broad and not limited to those with eating disorders. Supporting the use of nonclinical samples, Mulveen and Hepworth<sup>15</sup> note that many who visit pro-anorexia websites do not present with an eating disorder and visit the websites to explore extreme methods of weight loss. Future work should also examine how viewing pro-anorexia websites affects those with eating disorders, in particular, whether visiting these websites serves to help maintain the disorder as has been hypothesized by clinicians.<sup>24</sup>

While pro-anorexia websites are unlikely to disappear, research demonstrating their negative consequences argues for actions that might minimize damage. For example, parents may consider using technology to block these websites from their children's access, and should be encouraged to keep any home computers in a common area so that online activity can be supervised. Clinicians may respond to the eating disordered client who visits pro-anorexia websites for support by discussing their negative impact and by engaging in media literacy, which encourages critical evaluation of the media and its messages and appears to help decrease the impact of thin-ideal images on body dissatisfied women.<sup>56</sup> Future research on the impact of pro-anorexia websites on vulnerable populations and the dissemination of such research should help guide parents', clinicians', and website viewers' responses to these websites.

We thank Jessica Secrist and Larissa Buchholz for their website creation expertise in developing the websites used in this study. Anna M. Bardone-Cone and Kamila M. Cass are co-first authors on this article.

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## Appendix

### Disclaimer

This is a pro-Ana site. If you are recovering from an eating disorder or hate the fact that pro-Anas exist, I suggest you leave! Now!!! This site is for those who feel that Anorexia is a life-style, and that we should have a choice to leave Ana or take comfort in that which defines us. WARNING!!! SOME MATERIAL MAY BE TRIGGERING.

### Ana Creed

1. Thin is beauty; therefore I must be thin, and remain thin, if I wish to be loved. Food is my ultimate enemy. I may look, and I may smell, but I may not touch!
2. I must think about food every second of every minute of every hour of every day...and ways to avoid eating it.
3. I must weigh myself, first thing, every morning, and keep that number in mind throughout the remainder of that day. Should that number be greater than it was the day before, I must fast the entire day.
4. I shall not be tempted by the enemy (food), and I shall not give into temptation should it arise. Should I be in such a weakened state and I should cave, I will feel guilty and punish myself accordingly, for I have failed her.
5. I will be thin, at all costs. It is the most important thing; nothing else matters.
6. I will devote myself to Ana. She will be with me where ever I go, keeping me in line. No one else matters; she is the only

one who cares about me and who understands me. I will honor Her and make Her proud.

***Thin Commandments***

1. If you aren't thin, you aren't attractive.
2. Being thin is more important than being healthy.
3. You must buy clothes, cut your hair, take laxatives, starve yourself, do anything to make yourself look thinner.
4. Thou shall not eat without feeling guilty.
5. Thou shall not eat fattening food without punishing oneself afterwards.
6. Thou shall count calories and restrict intake accordingly.
7. What the scale says is the most important thing.
8. Losing weight is good/gaining weight is bad.
9. You can never be too thin.
10. Being thin and not eating are signs of true will power and success.