

**Annual Review of CyberTherapy and Telemedicine, Volume 17**

Annual Review of CyberTherapy and Telemedicine

Copyright © 2019      Interactive Media Institute  
6540 Lusk Boulevard, Suite C115  
San Diego, CA 92121

ISBN: 1554-8716

All rights reserved.  
Printed in the United States of America

Journal Web site: <http://www.arctt.info>  
Interactive media Institute Website: <http://www.interactivemediainstitute.com>

**LEGAL NOTICE**

The publisher is not responsible for the use which might be made of the following information

# #Eating disorders and Instagram: What emotions do you express?

Clelia MALIGHETTI<sup>a,1</sup>, Alice CHIRICO<sup>a</sup>, Simona SCIARA<sup>a,b</sup> and Giuseppe RIVA<sup>a,c</sup>

<sup>a</sup> *Department of Psychology, Università Cattolica del Sacro Cuore, Milan, Italy*

<sup>b</sup> *UniSR-Social.Lab, Faculty of Psychology, Vita-Salute San Raffaele University of Milan*

<sup>c</sup> *Applied Technology for Neuro-Psychology Lab, Istituto Auxologico Italiano, Milan, Italy*

**Abstract.** Instagram is an image-based social media platform for mobile devices that promotes a new form of communication and self-expression based on images and photos. Although this image-based communication has become a wide form of online self-presentation, it is still less investigated if compared to social media text content analysis of written posts. Crucially, most Instagram images that circulate on a daily base show thin, muscular, and unrealistic body ideal, creating a breeding ground for disordered eating. Far less investigated is the emotional profile of pictures with hashtags related to eating disorders. The aim of the study was to examine the emotional expression of hashtags related to eating disorders of images posted by users on Instagram. Two hundred and fifty Instagram photos of females were considered. The hashtags were selected accordingly to a web-ranking on the most popular hashtags for eating disorders on Instagram: #anorexia, #thininspiration, #eatingdisorder, #fitinspiration and #body. The emotions expressed in each photo were measured using the Emotion API from Microsoft Azure Cognitive Service. The results showed that happiness intensity was significantly higher in images with #eatingdisorder and #fitinspiration compared to #body, and higher levels of neutral emotion were found in images tagged with #body and #thininspiration. This exploratory study was one of the few studies focusing on discrete emotional expression of eating disorder photos using artificial intelligence technology.

**Keywords.** Instagram; Eating Disorder; Emotions; Hashtags

## 1. Introduction

Instagram is an image-based social media platform for mobile devices that offers the possibility to upload, edit, share pictures and very short videos with other users. This increasingly used social media platform promotes a new form of communication and self-expression based on images and photos. Most Instagram images that circulate on a daily basis show thin, muscular, and unrealistic body ideal. Exposure to these thin ideals can result in decreased body satisfaction [1-4] that has been associated with unhealthy weight control behaviors and binge eating [5], eating disorder (ED) symptomatology [6, 7], depressive symptoms and low self-esteem [8]. In accordance with these findings, recent studies have shown that social media generally, and Instagram specifically, represent a breeding ground for the development of EDs [9, 10]. There is a large amount of literature [11,12] showing the relevance of body appearance on social media communities and the alarming implications that social media exposure has on body acceptance [13,14]. Furthermore, to contribute to the virality and the exposure of images, Instagram provides hashtags, tags or words prepended with ‘#’ used to indicate the content of the picture or the tone of the message. To date, there are many hashtags related to body satisfaction and eating disorders posted on Instagram.

---

<sup>1</sup> Corresponding author: Clelia.malighetti@unicatt.it

Most of this content is classified as “thinspiration” or “thinspo” [15].

These hashtags have fueled the proliferation of the idealized body therefore increasing media exposure to viewers [16]. ‘Inspirational’ imagery is often shared on social media with the aim of inspiring to achieve a certain, often unachievable, body type. This inspiration refers to content posted on social media that inspires a user to be thin, and this is typically achieved through the presentation of images that contain thin bodies, as well as tips for lose weight or manage the hunger [17]. Traditionally, thininspiration has been associated with the pro ED community that considered eating disorder as a lifestyle choice instead of an illness condition [18]. More recently, thininspiration content has moved away from this association with the ED community and has been shared by everyday Instagram users. However, thinspiration or inspirational messages promoting thinness, has received criticism for its detrimental effects on body image [19] and has been accused to be a contributor towards the onset of eating disorders.

Several researchers have analyzed thinspiration content on social networks showing that these posts feature images of extremely thin or underweight women, often in sexually suggestive poses focused on the pelvis and abdomen, and the bony features of those parts, emphasizing appearance and attractiveness, rather than health, as motivation for engaging in fitness behaviors [20]. In this regard recent studies revealed that ‘Fitspiration’, a popular hashtag coined by the fitness community as a healthy alternative to thin inspiration, actually increased negative mood, body dissatisfaction and decreased self-esteem [21, 22] describing images that contained only thin and toned body type and objectifying elements. Whilst fitspiration presents itself as a healthy alternative it may, however, contain some negative elements typically found within thinspiration content. To date, psychological researches on social networks have focused mainly on the effect of exposure to content. Very few studies have investigated the emotional profile of pictures with hashtags related to EDs: researchers have focused less on the study of the emotional expression of images or photos on Instagram and the few existing studies relied on a positive/negative model of emotions.

In light of the proliferation of “inspirational” hashtags related to eating disorders and the lack of research regards the emotional implications, the present study aims to explore the emotional expression of hashtags related to EDs of self-produced images posted by users. Instagram provides a new opportunity to investigate the role of authoring figurative content and its emotional salience as it allows users to be simultaneously content-creators and consumers. Furthermore, this investigation focused on discrete emotions expressed by posted images to overlap the bipolar approach (positive vs negative) toward emotions on Instagram.

Despite the preliminary nature of this study, we assumed that, according to previous studies on the effect of the exposure to images showing certain body type [23,24] the images described by hashtags related to eating disorders will be significantly associated with negative emotions, while #body will be associated with neutral emotions.

## 2. Material and Methods

A total of 250 Instagram photos of female were considered. The sample size was calculated by using the G power software (version 3.1). An effect size of  $f = 0.25$  was fixed, and with a power effect of 0.89, we obtained a sample size of 245 photos. However, since this is largely an exploratory study, we chose to be conservative and included 250 pictures in our final sample. The hashtags included in the study were: #eating disorder, #anorexia, #fitinspiration, #thininspiration and #body. The hashtags #eatingdisorder and #anorexia, were selected as the most widespread hashtags for eating disorders active online [25]. The problematic emphasis on thinness and physical attraction on social media as the motivation and reward for exercise suggests that the female body ideal has shifted to emphasize both extreme thinness and fitness. This consideration led us to the investigation of #fitinspiration and #thininspiration. Finally, #body was selected as the most widespread hashtag related to body. Inclusion criteria for emotion recognition consisted in clean photos that showed female faces. Exclusion

criteria included photos that showed males faces, multiple faces and not clear images. To obtain a random sample of photos, each hashtag was entered on Instagram's public timeline, which displays a subset of Instagram media that was most recent at that moment. Fifty photos were randomly downloaded for each hashtag in order to select those that fulfilled the criteria. The emotions expressed in each photo were measured using Emotion API from Microsoft Azure Cognitive Service (Fig.1). Introduced in November 2015, this technology, relying on machine learning algorithms, can recognize eight emotions: anger, contempt, disgust, fear, happiness, neutral, sadness, and surprise. These emotions are understood to be cross-culturally and universally communicated with facial expressions. Developers allowed free use of the API of the service, which made it widespread. It is an artificial intelligence service that detects faces on a given photo and assigns a score to the emotional categories for each detected face so that the sum of the eight scores will be 1 [26].



Figure 1. An example of emotion detection with API.

### 3. Results

Eight between subject one-way analysis of variance (ANOVA) were computed in SPSS 25.0 (IBM, Corp, NY) with alike number of emotional categories (i.e., Neutral; Happiness; Surprise; Fear; Disgust; Anger; Contempt; Sadness) as measures and hashtags (#eatingdisorder; #fitinspiration; #body; #thininspiration; #eatingdisorder) as independent variables, to determine whether there are any statistically significant differences between hashtags on emotional expression. The results did not show any statistical significance across the hashtags. However, to deepen our understanding of the phenomenon, we did a post hoc analysis. We ran the Levene test for equality of variances. When the variances were not equal, we considered the Tamhane test, which did not show any significant results. When the variances were equal, we considered LSD across the different conditions for every discrete emotion (Table 1): the results showed that happiness was significantly higher in images with #eatingdisorder compared to #body ( $p= 0.034$ ), and in images with #fitinspiration compared to #body ( $p= 0.038$ ). Neutral emotion was significantly higher in images with #thininspiration ( $p= 0.049$ ) and #body ( $p= 0.036$ ) both compared to #eatingdisorder.

**Table 1.** Descriptive Statistics of all the hashtags considered.

Measures	#body	#thininspiration	#fitinspiration	#eatingdisorder	#anorexia
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Neutral	0.560 (0.432)	0.548 (0.476)	0.395 (0.458)	0.370 (0.441)	0.466 (0.456)
Happiness	0.399 (0.45)	0.427 (0.485)	0.598 (0.470)	0.600 (0.461)	0.483 (0.482)
Surprise	0.218 (0.39)	0.002 (0.55)	0.004 (0.21)	0.003 (0.024)	0.013 (0.056)
Fear	0.000 (0.001)	0.000 (0.00)	0.000 (0.001)	0.000 (0.002)	0.000 (0.000)
Disgust	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Anger	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Contempt	0.003 (0.007)	0.014 (0.081)	0.019 (0.091)	0.015 (0.079)	0.005 (0.027)
Sadness	0.011 (0.343)	0.002 (0.008)	0.005 (0.013)	0.003 (0.017)	0.130 (0.593)

#### 4. Discussion

The aim of the present study was to explore the emotional expression of hashtags related to EDs of self-produced images posted by users on Instagram. Our results suggested that images posted by users with hashtags related to EDs express different discrete emotions. Contrary to our hypothesis, people that posted images with #eatingdisorder and #fitinspiration conveyed greater happiness emotions compared to the images posted with the #body. Inspirational imagery is often shared on Instagram with the aim of inspiring users to achieve a certain body type [17]. #Fitspiration has been coined by the fitness community as an allegedly healthy alternative to thininspiration hashtag. Happiness expressed by images posted with #fitinspiration and #eatingdisorder compared to images with #body might be read as the expression of the achievement of a certain body goal/ideal. Women who internalize the thinness-as-beauty ideal may engage in extreme and often pathological behaviors in order to achieve and maintain a slim figure [27]. Furthermore, fitinspiration has been largely used to encourage healthy bodies [17] and has been generally considered as a positively valanced content. The faces present in the images described with #fitinspiration and #eatingdisorder might be happy precisely for reaching the thin and fit body type to which we are constantly subjected and persuaded to reach.

In line with our second hypothesis, we found higher neutrality in #body. Furthermore, our results showed higher neutrality in #thininspiration. These results might be interpreted as a form of emotional flatness. Thininspiration refers to content posted on Instagram that inspires a user to be thin, and this is typically achieved through the presentation of images that contain thin bodies [20]. Nowadays, thin inspiration images are one of the most prominent photos posted on Instagram designed to motivate people to exercise, or to be skinnier. The neutrality found might be interpreted as lack of

expressions [28] or a type-approval [29] that match with some of the core symptoms of EDs [30,31,32], such as alexithymia [33]: users' tendency to present themselves mainly with neutral images could be consistent with the mitigation of emotional expression found in EDs [34,35,36].

In summary, the present study showed that people that posted images described with #eatingdisorder and #fitinspiration expressed themselves mainly through happiness, which might be explained as a form of satisfaction for the achievement of a desired body. The images posted with #thin expressed mainly neutrality, suggesting that the faces in those images prefer to transcend from emotional expression, freeing themselves from an emotional connotation. Most people that posted images with #body tended to express neutrality. Compared to all other EDs hashtags, #body seems to express less defined emotions. Further studies are necessary to deepen the valence of neutral emotions related to #body. Finally, interestingly, #anorexia did not show any significant differences in terms of emotional expression, compared to all other hashtags for all type of emotions, which would require further investigations. The limitations of the study concern mainly a more granular analysis of emotions as well as to include a higher number of photos. To our knowledge, this is one of the few existing studies that investigated the expression of discrete emotions on Instagram related to eating disorders. In conclusion, the emotional salience of the images posted should be further investigate so that effective interventions and preventative measures could be informed, developed, and implemented.

## 5. References

- [1] B.T. Bell, R. Lawton, H. Dittmar, The impact of thin models in music videos on adolescent girls' body dissatisfaction, *Body Image* **4** (2007), 137–45.
- [2] L.M. Groesz, M.P. Levine, S.K. Murnen, The effect of experimental presentation of thin media images on body satisfaction: a meta-analytic review, *International Journal of Eating Disorder* **31** (2002), 1–16.
- [3] M. Tiggemann, B. McGill, The role of social comparison in the effect of magazine advertisements on women's mood and body dissatisfaction, *Journal of Social and Clinical Psychology* **23** (2004), 23–44.
- [4] M. Tiggemann, A. Slater, Thin ideals in music television: a source of social comparison and body dissatisfaction, *International Journal of Eating Disorder* **35**, (2004), 48–58.
- [5] D. Neumark-Sztainer, S.J. Paxton, P.J. Hannan, J. Haines, M. Story, Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males, *Journal of Adolescent Health* **39** (2006), 244–51.
- [6] D.M. Ackard, J.K. Croll, A. Kearney-Cooke, Dieting frequency among college females: association with disordered eating, body image, and related psychological problems, *Journal of Psychosomatic Research* **52** (2005), 129–36.
- [7] K.L. Allen, S.M. Byrne, R.D. Crosby, Distinguishing between risk factors for bulimia nervosa, binge eating disorder, and purging disorder, *Journal of Youth and Adolescence* **44** (2015), 1580–91.
- [8] S.J. Paxton, D. Neumark-Sztainer, P.J. Hannan, M.E. Eisenberg, Body dissatisfaction prospectively predicts depressive mood and low self-esteem in adolescent girls and boys and low self-esteem in adolescent girls and boys, *Journal of Clinical Child & Adolescent Psychology* **35** (2006), 539–49.
- [9] J. Sonne, I. Erickson, The Expression of Emotions on Instagram, *Proceedings of the 9th International Conference on Social Media and Society* (2018), 380-38.
- [10] H. Hyvärinen, R. Beck, Emotions Trump Facts: The Role of Emotions in on Social Media: A Literature Review, *Proceedings of the 51st Hawaii International Conference on System Sciences* (2018).
- [11] D.Ging, S. Garvey, 'Written in these scars are the stories I can't explain': a content analysis of pro-ana and thinspiration image sharing on Instagram, *New Media and Society* **20** (2017), 1181–200.
- [12] G. Holland, M. Tiggemann, "Strong beats skinny every time": disordered eating and compulsive exercise in women who post fitinspiration on Instagram, *International Journal of Eating Disorder* **50** (2017), 76–9.
- [13] R.F. Rodgers, A.S. Lowy, D.M. Halperin, D.L. Franko, A meta-analysis examining the influence of pro-eating disorder websites on body image and eating pathology, *European Eating Disorders Review* **24** (2016), 3–8.
- [14] L. Boepple, R.N. Ata, R. Rum, J.K. Thompson, Strong is the new skinny: a content analysis of fitinspiration websites, *Body Image* **17** (2016), 132–5.
- [15] S.T. Tong, D. Heinemann-Lafave, J. Jeon, R. Kolodziej-Smith, N. Warshay, The Use of Pro-Ana Blogs for Online Social Support, *Eating Disorders: The Journal of Treatment and Prevention* **21** (2013), 408-422.
- [16] M. Tiggemann, M. Zaccardo, "Exercise to be fit, not skinny": The effect of fitinspiration imagery on womens body image, *Body Image* **15**(2015), 61-67.

- [17] C.V. Talbot, J. Gavin, T. Van Steen, Y. Morey, A content analysis of thinspiration, fitspiration, and bonespiration imagery on social media, *Journal of Eating Disorders* **5** (2017), 40.
- [18] N. Boero, C.J. Pascoe, Pro-anorexia communities and online interaction: bringing the pro-ana body online, *Body & Society* **18** (2012), 27-57
- [19] R.F. Rodgers, A.S. Lowy, D.M. Halperin, D.L. Franko, A meta-analysis examining the influence of pro-eating disorder websites on body image and eating pathology, *European Eating Disorders Review* **24** (2016), 3–8.
- [20] A.S. Alberga, S.J. Withnell, K.M. Von Ranson, Fitspiration and thinspiration: a comparison across three social networking sites, *Journal of Eating Disorders* **6** (2018), 39.
- [21] K. Homan, E. McHugh, D. Wells, C. Watson, C. King, The effect of viewing ultra-fit images on college women's body dissatisfaction. *Body Image* **9** (2012), 50–6.
- [22]
- [23] K.J. Homan, T.L. Tylka, Appearance-based exercise motivation moderates the relationship between exercise frequency and positive body image, *Body Image* **11** (2014), 101–8
- [24] S.F. Waterloo, S.E. Baumgartner, J. Peter, P.M. Valkenburg, Norms of online expressions of emotion: Comparing Facebook, Twitter, Instagram, and WhatsApp, *New Media & Society* **20** (2018) 1813-1831.
- [25] L. Reinecke, S. Trepte, Authenticity and well-being on social network sites: A two-wave longitudinal study on the effects of online authenticity and the positivity bias in SNS communication, *Computers in Human Behavior* **30** (2014), 95-102.
- [26] <http://best-hashtags.com/hashtag/anorexia/>
- [27] Y. Kim, J.H. Kim, Using computer vision techniques on Instagram to link users' personalities and genders to the features of their photos: An exploratory study, *Information Processing & Management* **54** (2018), 1101-1114.
- [28] M. Tiggemann, M. Zaccardo, 'Strong is the new skinny': A content analysis of# fitspiration images on Instagram, *Journal of Health Psychology* **23** (2018), 1003-1011.
- [29] J.E. Wildes, R.M. Ringham, M.D. Marcus, Emotion avoidance in patients with anorexia nervosa: Initial test of a functional model. *International Journal of Eating Disorders* **43** (2010), 398-404.
- [30] M. Rowsell, D.E. MacDonald, J.C. Carter, Emotion regulation difficulties in anorexia nervosa: associations with improvements in eating psychopathology, *Journal of Eating Disorders* **4** (2016), 17.
- [31] P.G. Turner, C.E. Lefevre, Instagram use is linked to increased symptoms of orthorexia nervosa, *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity* **22** (2017) 277-284.
- [32] S. Cipolletta, C. Malighetti, S. Serino, G. Riva, D. Winter, Intrapersonal, interpersonal, and physical space in anorexia nervosa: a virtual reality and repertory grid investigation. *Psychiatry Research* **252** (2017), 87-93.
- [33] J. Geller, S.J. Cockell, E.M. Goldner EM, Inhibited expression of negative emotions and interpersonal orientation in anorexia nervosa, *International Journal of Eating Disorder* **28** (2000), 8–19.
- [34] R. Brewer, R. Cook, V. Cardi, J. Treasure, G. Bird, Emotion recognition deficits in eating disorders are explained by co-occurring alexithymia, *Royal Society Open Science* **2** (2015), 140382.
- [35] J.K. Thompson, L.J. Heinberg, The media's influence on body image disturbance and eating disorders: We've reviled them, now can we rehabilitate them? *Journal of Social Issues*, **55** (1999), 339-353.
- [36] C. Meyer, N. Leung, L. Barry, D. Feo, Emotion and eating psycho- pathology: Links with attitudes toward emotional expression among young women *International Journal of Eating Disorder* **43** (2010), 187–189.
- [37] C.P. McClean, D.A. Miller, Hope, Mediating social anxiety and disordered eating: The role of expressive suppression, *Eating Disorders* **15** (2007), 41–54.

## 6. Acknowledgments.

This article was supported by the Italian MIUR research project “Unlocking the memory of the body: Virtual Reality in Anorexia Nervosa” (201597WTTM) and by the Italian Ministry of Health research project “High-end and low-end virtual reality systems for the rehabilitation of frailty in theelderly” (PE-2013-0235594).