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Color, Caption and Emoji – Using Instagram as a Screening Tool for Depression in Teenagers and Adults

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ABSTRACT: Instagram, the largest growing social network site today, has grown exponentially since its launch in 2010. Mental health challenges, particularly anxiety and major depressive disorder in those aged 16 to 30 have been associated with Instagram's popularity. Depression is of particular interest to health care providers within the public health sector: it affects 264 million people globally; suicide is the second most common cause of death in 18 to 29-year-olds. This age group also constitutes the main demographic group of Instagram users. A narrative review was conducted on peer-reviewed articles between January 2019-July 2020 to analyze Instagram use and its association with depression, and using it as a tool to diagnose depression. PubMed, EBSCO, NCBI, NIH, and Google Scholar were used to source articles published between 2015-2020. The narrative review focused on four primary papers. The first study looked at the social comparison theory, while the second and third studies used screening questionnaires in conjunction with analyzing an individual's Instagram content into text-based scores. The fourth study analyzed the content of photos which were posted to give insight into an individual's status regarding depressive states. Accounting for 18 to 30 year olds' Instagram usage into how they engaged with content can accurately screen for, and diagnose depression.

KEY TERMS: Social network site (SNS), Instagram, mental health, social comparison theory, depression, teenagers and young adults

1. INTRODUCTION

Ten years ago, a social media platform was launched that would revolutionize how people engaged with one another on the Internet (Mackson & Brochu 2019). Today, there are over 500 million individuals who use Instagram daily (Omnicore, 2020). Instagram's primary users are 18 to 29-year-olds; in The United States, 64% of this age group have an Instagram account (Ricard et al., 2018). Smart phones have played a huge role in increased contact to social network sites (SNS).

30% of the time individuals spend on their phones are on social network sites in general (Lin et al, 2016). Instagram has allowed individuals to communicate and keep in touch with their followers by sharing pictures and videos, liking, commenting, and tagging others in their posts. People share various content from personal thoughts, accomplishments, travels, and relationships on their profiles. This communication has fostered a sense of community and the ability for individuals to fulfill specific social needs like self-expression, self-perception, and self-representation, which lead to positive outcomes like increased self-esteem; and a sense of belonging and connectedness (Hwang, 2019; Mackson & Brochu, 2019).

The majority of materials shared on Instagram is through a curated lens to embellish an individual's happiness to make them look favorable (Hwang, 2019). People post highlight reels of their lives: big smiles, milestone achievements, surrounded by lots of friends, in environments that seem exclusive, creating an illusion of an idealized lifestyle (Sherlock & Wagstaff, 2018). Instagram has fostered a mentality by which its users fear exposing their shortcomings or personal failures to avoid a perception of undesirability. Those who are going through difficult times feel isolated since no one is talking about these challenging moments (Fadus, 2018). Impression management is when individuals manipulate the truth about themselves to maintain selfpresentation of perceptions by others, and themselves (Mun & Kim, 2021). Individuals engage in lying behavior on SNS in order to seek approval of others. Engaging in this kind of behavior can lead to psychological consequences (Mun & Kim, 2021). Instagram was discovered to be a major trigger for

depression, chiefly due to the psychology behind how individuals interact with content they engage with, and how they compare themselves to it (Hwang, 2019; Nesi & Prinstein, 2015; Sherlock & Wagstaff, 2019). The 'duck syndrome,' illustrated by Fadus (2018), suggests that young adults in college, and those working in high-pressure environments, appear to be gliding through water (or life), appearing superficially calm. In reality, their feet under the water are paddling vigorously; attempting to suppress any feelings of distress, depression, or anxiety (Fadus, 2018).

Depression is the second leading cause of disease burden worldwide and is on track to becoming the greatest disease burden globally by 2030 (WHO, 2020). It often goes misdiagnosed in the teenage and young adult demographics. In addition, teenagers and young adults tend to minimize their feelings, believing that eventually, they will disappear and soon feel better (Fadus, 2018). It is crucial to screen for and diagnose depression promptly to prevent disease progression and adverse outcomes, especially since depression is the second leading cause of death in teenagers.

It is vital that physicians and public health professionals are aware of social media activity in this patient population, mostly their Instagram use. The more time adolescents and young adults spend on Instagram engaging with the content that lowers their self-worth and self-esteem, the more likely they are to experience negative psychological consequences. Furthermore, visual content has lasting and longer effects than written content and creates a larger impression, especially in the developing minds of our youth (Andalibi et al, 2015). This narrative review will investigate if Instagram can contribute to symptoms of depression, and if it can be used to help screen for and diagnose depression in their patients.

METHODS

A narrative literature review was conducted between January 2019 – July 2020 to find peer- reviewed articles that showed a correlation between increased Instagram use and developing depression in teenagers and young adults. Studies that used Instagram as a predictive tool to screen for depression in teenagers and young adults were also selected. All articles came from primary research, and all study designs were included. Databases used to collect information were Ebscohost, PubMed, MedLine, NCBI, NIH, and Google Scholar, published between 2015-2020.

Search terms used were "Instagram" AND "mental health;" "Instagram" AND "depression;"
"Instagram" AND "photographs;" "Instagram" AND "young adults;" Instagram" AND
"teenagers," "social media," and "social network sites."

Articles published before 2015 which contained studies on individuals over 30 years old, not in English, were excluded. Studies that focused exclusively on other SNS were also excluded. This narrative review focuses on the findings from research articles which confirm the link between Instagram and depression; which use Instagram as a screening tool to identify depression in teenagers and young adults: those of whom have the highest prevalence of depression, and the highest use frequency of Instagram.

2. FINDINGS

In the global effort to decrease the stigmatization of mental health, disorders are still widely unidentified - up to 35% of adults in The United States go untreated (NIMH, 2019).

2.1 Social Comparison.

A primary research article published by Ha Sung Hwang was selected to demonstrate the link between increased Instagram use and depression in university students in South Korea. The study focused on the social comparison models. One hundered nineteen males and One hundred twenty-six females, with an average age of 22.5 years (the target demographic of Instagram and depression) were asked to answer questions based on their Instagram use, activity, and social comparisons (Hwang, 2019). Instagram use was evaluated based on how often students used it and how many minutes they spent on it. Responses were graded on five-point scale, one correlating with decreased use and lower minutes, and five correlating with higher use and increased minutes. Instagram activity was also graded on a five point scale with questions pertaining to how often students posted, how often they looked at other people's updates and how often they liked others posts. The comparison was asked based on how they preferred to compare themselves with others, whether it be to others whose lives or abilities are better than theirs, the same as theirs, or lower than theirs. These answers were also evaluated on a five point scale with 1 correlating to agree and 5 correlating to agree strongly.

The social comparison model uses three different types of comparison, horizontal, downward, and upward, which can help identify how Instagram can trigger depression (Hwang, 2019). Horizontal comparison is when individuals compare themselves to others who are in similar situations to them and are on the same socioeconomic level. Individuals regard others in horizontal

comparison as their equal. The second model is downward social comparison, where individuals compare themselves to someone that they perceive to be from a lower socioeconomic level than them, are worse off, or perform at a lower level than they do. Thirdly, upward social comparison is when individuals compare themselves to someone they perceive as better off than them, who are wealthier, happier, and higher achieving (Hwang, 2019).

2.2 'Fitspiration' and 'Thinspiration.'

Social comparison can trigger depression and influence how individuals perceive their bodies, especially in teenagers and young adults, who are psychologically vulnerable and often compare themselves to the bodies they see on Instagram (Gupta & Dhingra, 2018). Recently, celebrity and TV personality Khloé Kardashian attempted to remove an unfiltered image of her body from Instagram. The photo was a natural, unedited photo of Kardashian. While it is known to teenagers and young adults that she heavily alters the images she posts to Instagram, it is still something that they are exposed to and see daily. The unhealthy mentality of only posting airbrushed and highly enhanced images was originated and propelled by Khloé and her sisters. Kardashian ended up being a victim of her family's problematic behavior of maintaining a hyper glamorous appearance (Glynn, 2021). Before the years of the Kardashians, the media heavily influenced the perceptions of what an ideal body should be.

On Instagram, hashtags can be created in order to group and identify photos into specific themes. In order to create a hashtag, a user types in the hash sign and a specific theme of their choosing with which their photo will be associated. As long as the account is public, anyone can see the image or have access if they search the hashtag. In a study conducted by Alberga et al. (2018), a variation of hashtags was studied that centered on two ideas, 'thinspiration', inspiring users to be slim, and 'fitspiration,' inspiring individuals to be athletic. Of the two, 'fitspiration' has the intention of encouraging individuals to engage in healthy eating habits and to lead active lifestyles. Albegra et al. (2018) obtained 360 images over a two-week period searching for hashtags using "fitspiration," "thinspiration," "bonespiration," "TransformationTuesday," and "FitnessFriday" on SNS that included Instagram, Twitter and Facebook. Images were coded into categories that were divided into weight ideal, shape ideal, thin-ideal, muscularity, eating related messages and descriptive words. A category was also created for photos that mentioned mental illness, anorexia, depression, or suicidality (Alberga et al., 2018).

2.3 Depression and PHQ8 Questionnaires associated with Instagram Use.

In addition to determining whether Instagram causes depression, Ricard et al. 2018 and Reece and Danforth (2017) conducted studies that were able to assess whether a user had major depression disorder (MDD) by analyzing the way users interacted with accounts and the content of the photos they posted (Reece & Danforth, 2017; Ricard et al., 2018). In order to do this, Ricard et al (2018) obtained a study of 749 participants from Clickworker, a crowdsourcing platform. They administered a PHQ8 (Appendix A) to study participants and asked them to grant permission to their Instagram accounts (Ricard et al., 2018). Each PHQ8 question was scored between 0-3 for a total score of 0-24. They asked participants how they experienced each symptom in the last two weeks with 0 being not at all, one being several times during the last two weeks, two being more than half of the 14 days, three being almost every day. Words and emojis (a cartoon used to express an idea or emotion) were also studied and given a score based on their association to happiness, excitement, or dominance (Ricard et al., 2018).

2.4 Hue, Saturation and Value of Images posted on Instagram in Depressed vs. NonDepressed Individuals.

Reece and Danforth (2017) conducted a study to analyze the psychological data of photographs via machine learning and image processing. Reece and Danforth (2017) also recruited participants via a crowdsourcing application from Amazon's Mechanical Turk (MTurk). Participants who had been diagnosed with depression were compared to a control group of healthy individuals. The depressed individuals were given a set of questions related to their history of depression. The Center for Epidemiologic Studies Depression Scale (CES-D) was used to evaluate their answers. Healthy participants were asked a series of questions to confirm that they had no previous history of depression. Both groups were asked to provide access to their Instagram accounts. One hundred sixty-six individuals participated in the study, and 43 950 photographs were obtained from them. Seventy-one of the participants had a previous diagnosis of depression. Photos obtained from the depressed sample were selected from posts made within a year before and after their first diagnosis of depression. Of the photos collected, a random of 13 184 images were selected to be rated by crowd-workers from MTurk. Each photo was judged by three crowd workers on a 0-5 scale based on how interesting, likable, happy, or sad, each photo made them feel (Reece & Danforth, 2017).

From the control sample, the most recent 100 photos posted were selected. The activity was assessed by looking at how many per day the user posted, and the number of likes and comments on each photo. A software to detect faces was also implemented to detect whether a photo contained a face or not. A second software was used to assess the pixel quality in each photo and to analyze

the hue, saturation, and value (HSV). Hue refers to the color quality of the light spectrum, which ranges from red to blue. Red is indicative of a lower hue, while blue is considered a higher hue. The vividness of a photo is linked to its saturation. Photos with lower saturation appear more faded and grayer, while photos with a higher saturation appear sharper. Value is used to assess the brightness of an image. The use of filters applied to photos was also evaluated by the software (Appendix B). Exclusion criteria included individuals who scored 22 and over on CESD, and those who had posted less than five total Instagram photos (Reece & Danforth, 2017).

3. ANALYSIS

3.1 Social Comparison.

Hwang's regression model demonstrates a direct association between depression, Instagram use and social comparison. Instagram does not directly cause depression, but the more time a user spends on Instagram, the more likely they are to engage in an upward social comparison, and thus, lead to depression. These results are significant because the social comparison model is vital in understanding how individuals gain insight about themselves and how they measure themselves to others, question their image, and abilities to live up to beauty standards (Sherlock & Wagstaff, 2019). On the other hand, a horizontal social comparison was found to have no correlation to depression. A downward comparison was linked to increased Instagram use, increased self-esteem, decreased anxiety, and overall lead to a negative correlation to depression (Hwang, 2019). In a study conducted by Donnelly and Kuss (2016), their research concluded that addiction to social media impacts developing symptoms of depression. The more addicted an individual became, the more time they spent on Instagram, which ultimately resulted in increased feelings of depression.

Limitations of Hwang's study include reporting bias which may not have accurately reflected an individual's actual Instagram use (Hwang, 2019). Another challenge for this study is to understand how individuals use their time on Instagram. Are they passively scrolling through their timeline? Are they liking posts? Or is the majority of their time used to post comments? It will be beneficial to understand and further explore these questions in future studies (Lin et al, 2016). Lastly, Hwang's research was conducted in South Korea, which may not be generalizable to other cultures or other parts of the world (Hwang, 2019).

3.2 'Fitspiration' and 'Thinspiration.'

Hwang's findings are significant and parallel research conducted by Sherlock and
Wagstaff. Individuals are continuously engaging in upward and downward comparisons on Instagram, as there is never a shortage of content. The more people an individual follows, the more content that they are inclined to be exposed to in the virtual world (Sherlock & Wagstaff, 2019). This reality constantly predisposes individuals to re-evaluate how their self-perceptions, their attractiveness, and their bodies, with every refresh of their Instagram feed. Upwards comparison can influence unhealthy eating habits and the desire to be thin (Sherlock & Wagstaff, 2019). Instead of pursuing healthy eating habits or active lifestyles for one's well-being, individuals might engage in these behaviors solely for the pursuit of being perceived as physically attractive (Sherlock & Wagstaff, 2019). This situation can be especially dangerous for teenagers and young adults, who are often the target demographic of these 'fitspiration' or 'thinspiration' images.

'Fitspiration' images were found to focus on thin bodies that sexually objectify women, which were disguised under the premise of being 'fit,' a consequence that could be detrimental to mental health (Alberga et al, 2018). Users who post 'fitspiration' content are more likely to have problems with self-esteem and body dissatisfaction, as well as unhealthy eating behaviors and compulsive exercise practices that are harmful to the body (Alberga et al, 2018); Mackson & Brochu, 2019). Alberga et al., (2018) also emphasized that those with an intention on improving fitness with the sole motive of changing their physical appearance or to lose weight were less likely to benefit from the positive effects of exercise, body appreciation, or body satisfaction (Alberga et al, 2018). Perhaps this is the real root of the issues regarding Khloé Kardashian, and her motivation to remove an unedited photograph of her body where she looked healthy, toned, and fit. Her focus appears to be centered on changing her physical appearance instead of the positive benefits of her athletic activity (Glynn, 2021).

Alberga et al (2018) concluded that both 'fitspiration' and 'thinspiration' posts promoted decreased food consumption (Alberga et al, 2018). 'Fitspiration' images had variables that involved seeing the entire body or, alternatively, focusing on specific muscular poses, muscle groups, or physical activity (Alberga et al., 2018). They were more likely to show photos of men and the 'ideal' male physique, which could create body image issues for men (Alberga et al., 2018). 'Thinspiration' variables were centered on thin poses, thin praise, mental illness, and the ability to visualize bones, as seen in Appendix E. Bone emphasis was only found in 'thinspiration' content, which further promoted thinness and encouraged weight loss through diet restriction (Alberga et al, 2018).

In a comparable study carried out by Deighton-Smith and Bell (2017), men were more likely to be displayed topless featuring their arms and chest, and more likely to show their faces, as seen in Appendix F. This is an significant finding because bodies without faces are considered to be objectified. Both studies found that women were more likely to be faceless, featuring a specific body part, further proving that they are more likely to be sexually objectified (DeightonSmith & Bell, 2017). The overarching theme was that both hashtags focused on physical appearance with sexually suggestive images that encouraged restrictive eating (Appendix D). Instagram displays content that is likely to create pathological ideologies with regards to body image and leads to depression and eating disorders.

There is a noteworthy limitation to this research article: it is a snapshot of a broad topic that is continuously updated by the minute. Images were only collected on 4 days over a two-week time period. Images were excluded if they did not meet one of the hashtags listed above, or variations of the specific hashtags (Alberga et al, 2018). The over-representation of these body types showcasing toned and thin women have negative effects on psychological well-being
(Sherlock & Wagstaff, 2019). It is imperative to teach adolescents that a lot of what is seen on Instagram, and the internet in general, is manipulated. Users have learned to change their lighting and pose in specific ways that highlight their best angles (Alberga et al., 2018). Images can be further altered by using applications and filters to enhance special features and deter others in order to be more aesthetically pleasing (Sherlock & Wagstaff, 2019). Those with increased Instagram use, such as teenagers and young adults, were more likely to fall into upward social comparison of their bodies and create an unhealthy perception of their own body for not looking like the ones on Instagram (Sherlock & Wagstaff, 2019).

3.3 Depression and PHQ8 Questionnaires Associated with Instagram Use.

Ricard et al. (2018) study scored participants on their answers from a PHQ8 depression screen. Individuals who scored between 10 and 14 were in the gray zone of having depression. Those who scored 15 or above were considered to be strongly indicative of depression. Words that participants posted in captions, for their photos or comments on their followers, were scored out of three. One point was given to words relating to happiness, excitement, or dominance. Emojis were also scored on a happiness score. The scores were combined and regarded as text-based scores, and a mean and standard deviation was calculated for each participant. Using PHQ8 surveys and text-based scores were compiled into a linear regression model with an elastic net regularization and a corresponding area under the curve. The studies showed that community- generated data, such as comments posted on other profiles, correlated to a definite PHQ8 score and were predictive to moderate to severe levels of depression.

The content of these comments, when graded in a specific way and can be indicative of an individual's depression (Ricard et al., 2018). This information is vital because the model used by Ricard et al., (2018) could be brought to the clinical setting with the purpose of screening and identifying depression in patients. The model was also conducted to assess whether user-generated data, the content of photos; and captions posted by participants on their profiles could predict MDD. In the Ricard et al., (2018) study, it was shown that user generated data underperformed and was not predictive in determining MDD. For a long time, researchers believed that user generated data was more critical in uncovering depression in individuals. However, Ricard et al. (2018) model was among the first to determine that community generated data is predictive in diagnosing MDD. As discussed previously, this is important because Hwang's research shows that there is a correlation between increased time spent on Instagram with an increased likelihood of depression. Depressed individuals often are unaware of why they are feeling the way that they are, and their solution is to spend more time on Instagram and expressing their emotions through this outlet (Chiu et al., 2020). Limitations of this study included eliminating timestamps, using user- generated posts that might have been taken before the two-week timeline, and small sample size.

3.4 Hue, Saturation and Value of Images posted on Instagram in Depressed vs. NonDepressed Individuals.

While previous research suggested that maybe user-generated data, specifically captions, could be used to predict MDD, it is more pertinent to study the actual content of the photos being posted by an individual to their profile. Reece and Danforth (2017) took their study to analyze photos. Participants from the depressed group were more likely to post photographs with increased hue and decreased brightness and saturation (bluer, darker, and grayer photos). They were less likely to use a filter on the photographs they posted. If a filter was used, the most used filter amongst depressed participants was the "Inkwell" filter, which changes photos to black and white (Appendix C). Depressed participants were also more likely to have a higher posting frequency of photographs and comments and less likely to receive likes (Reece & Danforth, 2017). Depressed parties were also more likely to post photographs with faces but had less face count per photograph than healthy participants (Reece & Danforth, 2017). From the four different description categories that were assigned at the beginning of the study between interesting, likable, happy or sad, happy and sad ratings were predictors of depression. Photographs posted from depressed participants were more likely to be sad and less likely to be happy.

In contrast, healthy individuals were more likely to post photos with higher brightness and saturation. If a filter was applied, it was most likely to be "Valencia," which brightens photos (Appendix C) (Reece & Danforth, 2017). Healthy participants were also more likely to post photographs with more faces than depressed participants, but they did not post shots with people as often as depressed individuals. Two models were used to group the results of the pictures, AllData and Pre-Diagnosis. All-Data used all the data from the participants, while Pre-Diagnosis used photos from all the healthy participants and only photos from the depressed participants before their depression diagnosis. The All-Data model had a lower specificity but was more successful to positively assess target class observations. The Pre-Diagnosis model had a higher specificity but was only able to identify one-third of the target observations and was correct when it did so (Reece
& Danforth, 2017).

The computational machine used to screen for depression in Instagram photographs supported the idea that depressive signals can be observed in Instagram photographs before the official diagnosis of depression. This is something that is very critical and could be brought to the clinical practice. The models used in this study were predictive of depression which is vital because more than half of general practitioners in The United States misdiagnose depression. The All-Data model could be specifically used by physicians to better screen in depression and improve quality of care if patients, predominantly in teenagers and young adults, if given consent to access their social media accounts, specifically their Instagram history during follow-up appointments (Reece & Danforth, 2017).

CONCLUSION

Teenagers and young adults are less likely to identify their symptoms of depression and seek help. It is essential to educate young adults on how to have a healthy relationship with social media and remind them that Instagram does not represent real life. We need to start normalizing that everyone experiences struggles, failures, and shortcomings and that they are crucial life lessons that are instrumental in shaping who we become. We need to foster an environment where people who are struggling should be encouraged to seek help. Instagram can be used as a valuable tool for health care providers. It has become so integrated into the lives of teenagers and adolescents that it is can be used to assess behavior and frequency use to their doctors. Granting access at follow up appointments to ensure there is no maladaptive or problematic use could be beneficial. Instagram use is important to public health as it can be used to screen for depression and promote educational messages regarding depression. Instagram may have fueled the prevalence of depression in teenagers and young adults. Still, healthcare providers can use Instagram as a tool to help screen and combat depression in a population that is so vulnerable to
both.

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APPENDICES

Appendix A

Table S1. PHQ8 questionnaire. For each question, responders are asked for the number of days they have been affected by each symptom. The numeric responses are summed for a response. In this study, a score at or above 15 is considered positive for MDD.

How often during the past 2 weeks were you bothered by…	Not at all (0)	Several days (1)	More than half the days (2)	Nearly every day (3)
Little interest or pleasure in doing things				
Feeling down, depressed, or hopeless				
Trouble falling or staying asleep, or sleeping too much				
Feeling tire or having little energy				
Poor appetite or overeating				
Feeling bad about yourself, or that you are a failure, or have let yourself or your family down				
Trouble concentrating on things, such as reading the newspaper or watching television				
Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual				

Table 1 – PHQ8 Questionnaire

Appendix B

Figure 1 Comparison of HSV values. Right photograph has higher Hue (bluer), lower Saturation (grayer), and lower Brightness (darker) than left photograph. Instagram photos posted by depressed individuals had HSV values shifted towards those in the right photograph, compared with photos posted by healthy individuals.

Reece & Danforth, 2017

Appendix C

VIII. Results: Instagram filter examples

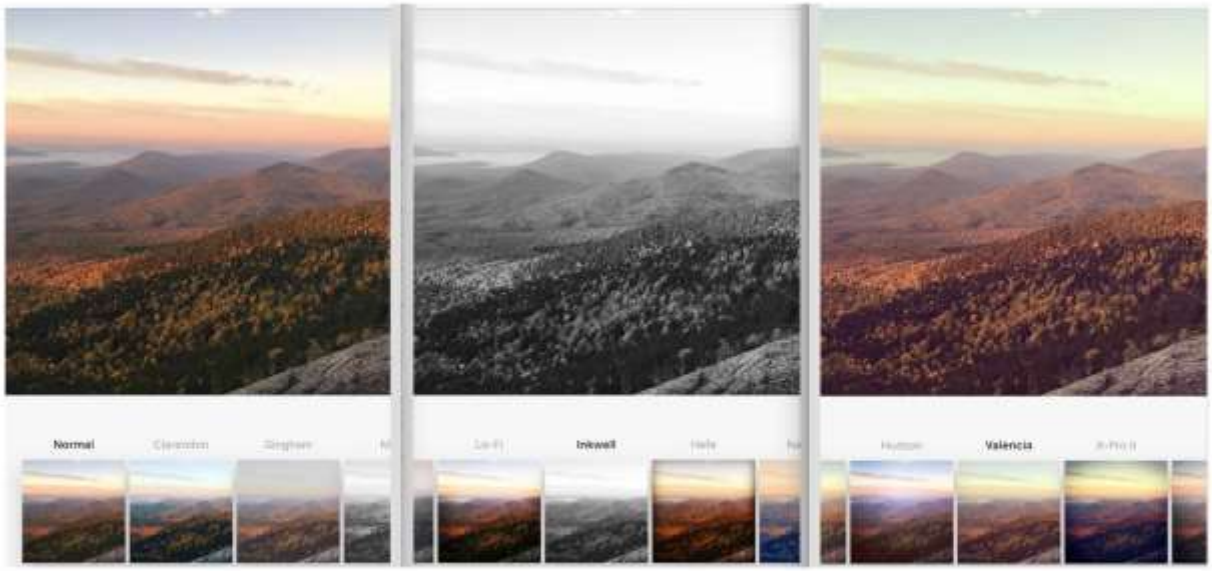

Fig. S8. Examples of Inkwell and Valencia Instagram filters. Inkwell converts color photos to black-and-white, Valencia lightens tint. Depressed participants most favored Inkwell compared to healthy participants, Healthy participants most favored Valencia compared to depressed participants.

Reece & Danforth, 2017 – Examples of three Instagram filters

Appendix D

Clarebrendon. (1970, January 1). *Thinspo and Fitspo. Skinny and Strong.* Thinspo and Fitspo. Skinny and Strong. ~. http://clarebrendon.blogspot.com/2012/04/thinspo-and-fitsposkinny-and-strong.html.

Appendix E

Clarebrendon. (1970, January 1). *Thinspo and Fitspo. Skinny and Strong.* Thinspo and Fitspo. Skinny and Strong. ~. http://clarebrendon.blogspot.com/2012/04/thinspo-and-fitsposkinny-and-strong.html.

Appendix F

Clarebrendon. (1970, January 1). *Thinspo and Fitspo. Skinny and Strong.* Thinspo and Fitspo. Skinny and Strong. ~. http://clarebrendon.blogspot.com/2012/04/thinspo-and-fitsposkinny-and-strong.html.

Appendix G

Table 2 Descriptions of Coded Variables and Inter-Rater Reliability

Variable	Description	Cohen's Kappa (κ)
Descriptors		
Quote	Presence of inspirational quote or message on the image	.84
Language	Text on or below image, or in hashtags contains all or partly English	.94
Image Description	Image contains women and/or men, an object or a graphic	.95
Weight/Shape		
Whole Body	Entire body is visible in the image	.86
Head	Head is visible and unobscured in image	.93
Eyes	Eyes are visible and unobscured in image	.97
Torso	Torso is visible in image	.98
Pelvis	Pelvis is visible in image	.95
Legs	Legs are visible in image	.98
Arms	Arms are visible in image	.95
Appearance Comparison	Comparing body pre- and post-weight loss	.96
Suggestive Pose	Pose emphasizing sex characteristics	.84
Revealing Clothing	Explicitness of attire worn in image	.72
Body Guilt	Expresses guilt for having gained weight, not meeting weight or fitness goals or ideal body type	.90
Weight Loss	Emphasizes losing fat or weight	.88
Body Positive	At least one element of image or text is body positive	.72
Muscularity		
Muscular Pose	Flexing, posing to appear more muscular	.89
Physical Activity	Person engaged in exercise or physical activity	.92
Muscle Emphasis	Prominent focus on muscular features	.75
Thin Ideal		
Thin Pose	Posing or positioning camera to appear thinner or smaller	.67
Thin Praise	Compliments for thin bodies, thinness as a marker of success	.76
Bone Emphasis	Prominent focus on bony features such as hip and collarbone protrusions with the absence of defined muscle	.86
Food		
Reducing Food	Messages encouraging reduction of eating	.95
Food Guilt	Guilt for eating certain foods	.96
Mental Illness	Mentions eating disorder, self-harm, anxiety, suicide or depression	.93

Table 2 – Alberga et al, 2018

Appendix H

Table 3 Variable Characteristics Overall and in Each of Three Social Network Sites

Coded variable	N (%)			
	Total $N = 360$	Instagram $n = 120$	Tumblr $n = 120$	Twitter $n = 120$
Quote	82 (22.8%)	22 (18.3%)	32 (26.7%)	28 (23.3%)
Language	335 (93.1%)	109 (90.8%)	115 (95.8%)	111 (92.5%)
Image Description				
Graphic	36 (10.0%)	9 (7.5%)	20 (16.7%)	7 (5.8%)
Object	51 (14.2%)	22 (18.3%)	17 (14.2%)	12 (10.0%)
Female	235 (65.3%)	72 (60.0%)	72 (60.0%)	91 (75.8%)
Male	31 (8.6%)	15 (12.5%)	9 (7.5%)	7 (5.8%)
Male and Female	7 (1.9%)	2 (1.7%)	2 (1.7%)	3 (2.5%)
Appearance Comparison	15 (4.2%)	7 (5.8%)	6 (5.0%)	2 (1.7%)
Whole Body Visible	122 (33.9%)	41 (34.2%)	37 (30.8%)	44 (36.7%)
Head Visible	168 (46.7%)	61 (50.8%)	47 (39.2%)	60 (50.0%)
Eyes Visible	142 (39.4%)	53 (44.2%)	38 (31.7%)	51 (42.5%)
Torso Visible	249 (69.2%)	80 (66.7%)	75 (62.5%)	94 (78.3%)
Pelvis Visible	215 (59.7%)	65 (54.2%)	70 (58.3%)	80 (66.7%)
Legs Visible	201 (55.8%)	63 (52.5%)	66 (55.0%)	72 (60.0%)
Arms Visible	229 (63.6%)	72 (60.0%)	67 (55.8%)	90 (75.0%)
Body parts shown				
Partial (vs. whole) body shown	169 (62.4%)	52 (43.3%)	52 (43.3%)	65 (54.2%)
Suggestive Pose	59 (16.4%)	16 (13.3%)	22 (18.3%)	21 (17.5%)
Revealing Clothing				
Demure	90 (25.0%)	37 (30.8%)	20 (16.7%)	33 (27.5%)
Suggestive	80 (22.2%)	30 (25.0%)	26 (21.7%)	24 (20.0%)
Partially clad	92 (25.6%)	19 (15.8%)	34 (28.3%)	39 (32.5%)
Nude	10 (2.8%)	3 (2.5%)	2 (1.7%)	5 (4.2%)
Body Guilt	30 (8.3%)	16 (13.3%)	8 (6.7%)	6 (5.0%)
Weight Loss	63 (17.5%)	20 (16.7%)	23 (19.2%)	20 (16.7%)
Body Positive	6 (1.7%)	0 (0.0%)	6 (5.0%)	0 (0.0%)
Muscular Pose	23 (6.4%)	9 (7.5%)	9 (7.5%)	5 (4.2%)
Physical Activity	44 (12.2%)	12 (10.0%)	11 (9.2%)	21 (17.5%)
Muscle Emphasis	45 (12.5%)	14 (11.7%)	15 (12.5%)	16 (13.3%)
Thin Pose	91 (25.3%)	27 (22.5%)	33 (27.5%)	31 (25.8%)
Thin Praise	110 (30.6%)	30 (25.0%)	41 (34.2%)	39 (32.5%)
Bone Emphasis	84 (23.3%)	19 (15.8%)	26 (21.7%)	39 (32.5%)
Reducing Food	82 (22.8%)	40 (33.3%)	28 (23.3%)	14 (11.7%)
Mental Illness	76 (21.1%)	28 (23.3%)	35 (29.2%)	13 (10.8%)

Table 3 – Alberga et al, 2018