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## MEDIA & COMMUNICATION STUDIES | RESEARCH ARTICLE

# Mobile exercising and tweeting the pounds away: The use of digital applications and microblogging and their association with disordered eating and compulsive exercise

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**Abstract:** In recent years, content featuring fitspiration messages on blogs and microblogs has increased. In addition, the use of mobile phone applications to monitor diet and exercise has also seen greater adoption. This study examined the association between consumption of various types of social media and reports of disordered eating and compulsive exercising. The sample consisted of 262 participants who completed an online questionnaire that included questions related to exercise and eating habits, as well as the frequency of use of traditional blogs, microblogs, and mobile phone applications featuring nutritional and exercise-related content. Results showed that the use of mobile phone applications and microblogs were significantly and positively associated with reports of disordered eating. Further, the use of mobile phone applications was also significantly and positively associated with compulsive exercise behaviors. However, the use of traditional blogs was not significantly associated with unhealthy eating or compulsive exercise. Findings and implications for future research are discussed.

**Subjects:** Behavioral Sciences; Communication Studies; Social Sciences

**Keywords:** social media; digital media; mobile technology; eating disorders; compulsive exercise; fitspiration; social cognitive theory

### ABOUT THE AUTHOR

Veronica Hefner researches the effects of traditional and new media on social cognitive outcomes of body issues and interpersonal relationships. This study, in particular, extends the body-related research to the online sphere and investigates how seemingly positive posts can turn negative among select individuals. The study extends the extant literature in two main ways; first, by further investigating the phenomenon of fitspiration and its association with compulsive exercise and disordered eating; and second, by exploring how this association plays out on social media platforms. Future projects will incorporate the role of others in this association; particularly, how social media may mediate the relationship between external pressure from family and friends and reports of disordered eating and compulsive exercise.

### PUBLIC INTEREST STATEMENT

The results of our study indicate that the use of mobile applications, such as Eating Thin, Lose It!, or Fasting Secret, is linked with reports of disordered eating and compulsive exercise. In other words, those young people who use these digital applications on their mobile devices are more likely than other individuals to engage in anorexia- or bulimia-related behaviors, as well as to reveal that they have to exercise in order to feel good about themselves.

Other results indicate that using microblogs like Twitter and Instagram was also associated with a greater likelihood to have eating disturbances.

The direction of causality is still unknown, yet due to the pervading fitspiration messages online and unattainable ideals of beauty within our culture, researchers, parents, educators, and practitioners should be aware of these associations and work to educate young people about the potential implications of certain social media use.

## 1. Introduction

People use social media for a variety of reasons; whether for personal distraction from everyday life, a way of forming a bond with a specialized online community, or simply as a means of obtaining information (Mano, 2014; Martínez-Alemán, 2014). However, another branch of social media, one that focuses individuals' attention on obtaining an ideal body type—sometimes through disordered eating or excessive exercise—has gained momentum on the Internet (Vaterlaus, Patten, Roche, & Young, 2014). Images, blogs, posts, and quotes on social media that inspire viewers to live a healthy lifestyle by emphasizing exercise and healthy food is a relatively new phenomenon known as “fitspiration” (Boepple & Thompson, 2016; Menza, 2015; Tiggemann & Zaccardo, 2015). Although the intent of the fitspiration trend is to encourage users to achieve and maintain a healthy lifestyle through smart nutritional choices and regular exercise regimens (e.g. eat well and exercise hard), the nature of social media provides a platform in which users could potentially participate in the fitspiration movement at an unhealthy and extreme degree; especially, given that a thin and toned (or muscular) figure is still potentially unattainable for the average woman (Flint, 2014; Tiggemann & Zaccardo, 2015). Indeed, recent research has shown that acute exposure to fitspiration images on Instagram (compared to a control set of travel images) was associated with increased negative mood and body dissatisfaction, as well as decreased appearance state self-esteem (Tiggemann & Zaccardo, 2015). Therefore, the purpose of this study is to examine the association between the type of fitspiration social media individuals use (e.g. mobile phone applications, traditional blogs, and microblogs) and negative health behaviors, specifically, disordered eating and compulsive exercise.

### 1.1. Rationale

According to the National Association of Anorexia Nervosa and Associated Disorders (ANAD), an eating disorder is defined as an unhealthy relationship with food and weight, in which an individual's main thoughts relate to food, weight, or exercise. People who struggle with an eating disorder typically have unrealistic and self-critical thoughts about their body image, which begins to consume and affect daily activities (ANAD, 2015). There are various forms of eating disorders, including: anorexia nervosa, bulimia nervosa, binge eating disorder, and other specified feeding or eating disorder; and overall, eating disorders are considered to be the deadliest of all mental illnesses (ANAD, 2015).

Websites that encourage disordered eating (i.e. pro-anorexia websites) have been linked with disordered eating behaviors (Mulveen & Hepwoth, 2006), and people who suffer from eating disorders have formed online communities to support each other with tips and tricks on how to restrict calorie intake and other binging/purging techniques. Previous research indicates that people have been willing to jeopardize their health because they wanted to feel as though they belonged on these online communities (Smith & Stewart, 2012); thus, exacerbating these negative health behaviors. Thus, the degree to which social media use might be linked with demonstrations of disordered eating is a major aim of the current project.

Another way individuals with body dissatisfaction is through compulsive exercise (Homan, 2010). Indeed, compulsive exercise is a common symptom in patients with clinical eating disorders (Lipsey, Barton, Hulley, & Hill, 2006). Even without a clinical diagnosis of an eating disorder, the motivation to eat healthy or low calorie foods can turn into an obsession; meaning that disordered eating can affect the average person (Schildhouse, 2012). This warrants further investigation because if the types of social media featuring nutritional and exercise-related content that people routinely use are connected with eating disorders and compulsive exercising, more research is necessary to understand how that relationship is formed and maintained. Regardless of whether social media use is causing these unhealthy activities, or if individuals with certain proclivities are seeking out these sites, more work is needed to determine what that association looks like and what the risks might be for using certain digital platforms.

### 1.2. Media- and body-related concerns

According to Clark and Tiggemann (2006), mass media can be great transmitters of societal ideals for both children and adults. Although media do not necessarily drive an individual's actions, they

can exert an influence on a person's values and beliefs. Hayes and Tantleff-Dunn (2010) found that media contributed to the development of body dissatisfaction, body ideals, and biases even in very young age groups (5.5–7.5 years old). In addition, media emphasize a thin or ideal body type through various channels. A recent survey of over 500 adolescent girls found that 70% of these girls stated that magazine images determined their ideas of ideal beauty, and 47% wanted to lose weight as a result (Hayes & Tantleff-Dunn, 2010). Furthermore, body dissatisfaction has been found to increase through adolescence concurrently with an awareness of the sociocultural attitudes and social comparison with media models (Grabe, Ward, & Hyde, 2008).

Media in general permeate adolescents' lives, and social media contribute largely to that. Young people are consuming social media—defined as messages sent and received in the digital world—at a faster rate than they consume traditional media (Martínez-Alemán, 2014). Kaplan and Haenlein (2009) define social media, in part, as a group of Internet-based applications that allow for the exchange of user-generated content. The user-generated messages transmitted via social media are short and concise, which attracts the younger generations who tend to have a proclivity for a faster speed of communication (Ogden, Smith, Nolan, Moroney, & Lynch, 2011). Online health messages come in the form of: (1) traditional blogs, which are discussion or informational websites that consist of topical entries, and (2) microblogs, which differ from traditional blogs due to their smaller content size (Mano, 2014); and (3) mobile phone applications, which are computer programs designed to work on smartphones, tablets, and other mobile devices (Hsu & Ching, 2013).

Indeed, the use of social media featuring nutritional and exercise-related content has been linked to unhealthy behaviors such as extreme dieting or over-exercising in past research (Vaterlaus et al., 2014). For example, Sofia Castro and José Osório (2013) examined Brazilian and Portuguese youth and the association that blog writing had with their dangerous health behaviors. They conducted a qualitative content analysis of 11 eating-related blogs written by boys and girls between the ages of 13–19 years over several months. In analyzing this community of youths, the researchers aimed to “better understand how social and cultural pressures may influence their disruptive behaviors” and how blog writing serves as a possible coping mechanism for them (Sofia Castro & José Osório, 2013, p. 321). Results indicated a relationship between the need for social acceptance and adolescents' idolization of unrealistically thin ideals, particularly among those youths who blog about their behaviors associated with eating and a drive for thinness. Thus, our study extends these past studies by incorporating a quantitative approach to the study of social media use and its relationship with unhealthy behaviors, such as the drive for excessive thinness.

### **1.3. Social cognitive theory**

According to social cognitive theory (SCT), human connection is made up of two types of pathways, namely those that are direct on the one hand and socially mediated on the other hand (Bandura, 2002). A socially mediated pathway causes individuals to be affected by a type of exposure other than that of direct consumption of a behavior (Bandura, 2002). For example, one individual may learn how to cook a certain dish by taking a cooking lesson (direct pathway), whereas another person may learn how to cook a certain dish by working alongside his/her mother who took the cooking class (socially mediated pathway). Socially mediated pathways frequently occur via media consumption. For this reason, SCT has been used throughout various studies to observe the relationship between media use and individuals' behavior (LaRose & Eastin, 2004; Pedersen, Gronhøj, & Thøgersen, 2015).

Despite the plethora of studies investigating SCT and media effects, the relationship between social media use and college students' compulsive exercising has not received significant attention. Instead, SCT and health behaviors have been studied absent of media. For example, Linde, Wall, Haines, and Neumark-Sztainer (2009) used SCT to investigate weight control behaviors among adolescent girls. Participants completed questionnaires that assessed dietary habits, including acts of purging by vomiting or use of medications in order to determine how social cognitive factors relate to young girls' behavioral decisions. Results indicated that reinforcement from

socioenvironmental factors was associated with the young girls' risky dietary habits (Linde et al., 2009). Another example is a study of South Asian college students, in which the researchers used SCT theory to examine the students' exercise behaviors and determine what factors contributed to their level of exercise (Haider, Manoj, & Bernard, 2012). The researchers determined that the self-efficacy construct of Bandura's (1965) SCT was associated with students' exercise habits. That is, the level to which young people felt they could exercise was associated with how much the students chose to actually exercise. Therefore, previous research has contributed to this topic by examining the presence of SCT factors and behavioral decisions in terms of eating disorders and exercise behaviors, but these studies have not investigated the role social media may play in these associations.

SCT is especially important within the context of the current study because the action of reporting one's exercise habits and receiving feedback on his/her progress can be viewed as rewarding. As previously mentioned, Bandura's (1965) SCT postulates that connections gained from social networks determine behavioral actions. However, Bandura's original theory has since been modified to include the influence of Internet media (LaRose & Eastin, 2004). This modified theory identifies the gratifications that come with Internet media usage (LaRose & Eastin, 2004). For example, when individuals witness someone who compulsively exercises, posts images looking fit and receives positive feedback from others, this reinforces pre-existing attitudes and behaviors both for the poster and the viewer of that post. Therefore, the modified version of SCT will provide the theoretical framework for this study because it includes online media. The current investigation hence aims to contribute to the relatively small amount of research on the relationship between social media use and unhealthy behaviors (i.e. eating disorders and compulsive exercising).

#### **1.4. Eating disorders**

Eating disorders (e.g. anorexia, bulimia, and binge eating) affect up to 30 million people of all ages and genders in the US (ANAD, 2015). Much research has investigated the association between disordered eating and pro-anorexia websites (e.g. Bardone-Cone & Cass, 2007; Mulveen & Hepwoth, 2006), but less research has looked at how the fitspiration trend online is associated with extreme behaviors offline. Typically, pro-anorexia and thinspiration websites contain more content that support weight loss, praise thinness, and promote eating disorders by providing images of extremely skinny young women coupled with food guilt messages, whereas fitspiration websites advocate a healthy and fit lifestyle and a lean/thin but strong physique (Boepple & Thompson, 2016). However, a recent content analysis revealed that thinspiration and fitspiration websites did not differ in injurious thematic content related to women's body weight, thinness, guilt-inducing messages, dieting and restriction messages, fat/weight stigmatization, and objectification (Boepple & Thompson, 2016). Given the overwhelming similarity and overlap in potentially harmful content when comparing thinspiration to fitspiration websites, it is reasonable to presume that exposure to fitspiration messages would most likely have similar effects in prompting disordered eating.

Further, although past research has primarily focused on the content of pro-anorexia websites (or thinspiration images) and their association with eating disorders, the current investigation seeks to expand these findings by examining specific types of fitspiration social media use, such as traditional blogs, microblogs, and mobile phone applications and their association with disordered eating behaviors.

Research Question 1: What is the relationship between various types of social media use (i.e. mobile phone applications, traditional blogs, and microblogs) and reports of disordered eating?

Compulsive exercise is described as a routine-like pattern of exercise, often performed despite possible negative consequences, and includes intense feelings of guilt at any missed exercise session (Goodwin, Haycraft, & Meyer, 2014; Goodwin, Haycraft, Taranis, & Meyer, 2011). Past research has shown that people who exercised frequently were motivated by their eating, weight, and shape

concerns (Lipsey et al., 2006); and compulsive exercise was a common symptom in patients with clinical eating disorders (Davis, 1997; Shroff et al., 2006).

Recent studies suggest that compulsive exercise is a multidimensional and multifunctional phenomenon (Ackard, Brehm, & Steffen, 2002; Taranis, Touyz, & Meyer, 2002) that encompasses elements of weight and shape regulation (Hubbard, Gray, & Parker, 1998; Keski-Rahkonen, 2001; Mond, Hay, Rodgers, & Owen, 2006), affect regulation (Fairburn, Cooper, & Shafran, 2003; Long, Smith, Midgley, & Cassidy, 1993; Thome & Espelage, 2004), and compulsivity (Adkins & Keel, 2005; Davis & Kaptein, 2006; Wyatt, 1997). Taranis and Meyer (2011) used a relatively new multidimensional measure of compulsive exercise, encompassing the full range of factors relevant to compulsive exercise and specifically designed to be particularly relevant within the context of the eating disorders. Their findings revealed that even in a nonclinical sample, compulsive exercise is associated with an increased frequency of eating-disordered behaviors (Taranis & Meyer, 2011). In addition, their results showed that compulsive exercising was associated with higher levels of eating psychopathology and increased frequency of eating-disordered behaviors.

Fitspiration websites promote exercise for appearance rather than health-motivated reasons (e.g. get washboard abs and toned arms) which might normalize compulsive exercise (Boepple & Thompson, 2016; Flint, 2014). Homan (2010) conducted a short-term longitudinal study and found that an athletic-ideal internalization (e.g. a firm, athletic body ideal) predicted change in compulsive exercise over the seven-month study period; whereas a thin-ideal internalization predicted change in two additional outcomes: body dissatisfaction, and dieting. Although it stands to reason that an athletic-ideal internalization is not as harmful as a thin-ideal internalization, there are still negative outcomes associated with the former, specifically as it relates to compulsive exercise behaviors (Homan, 2010).

Goodwin et al. (2014) were the first to examine sociocultural risk factors of compulsive exercise in adolescents (age 13–15 years old) using a longitudinal design. They found that pressure to be thin from the media was a significant predictor of compulsive exercise in girls, whereas family and peer messages to be more muscular was a significant predictor of compulsive exercise in boys. Further, Smith and Stewart (2012) determined that members of an online forum for bodybuilders and fitness models were positively encouraged to gain unhealthy muscle mass through compulsive exercising. Therefore, social media can have an influence on the amount of exercise people engage in; however, research needs to determine which types of social media are implicated in these compulsive exercise behaviors.

Research Question 2: What is the association between various types of social media use (i.e. mobile phone applications, traditional blogs, and microblogs), featuring nutritional and exercise-related content, and reports of compulsive exercise?

## 2. Method

### 2.1. Participants

Participants were recruited to participate in the study via recruitment posts on a variety of social media platform such as Twitter, Facebook, and Instagram. In addition, participants were also recruited to participate through flyers posted in various public places including a private university in Southern California, and areas surrounding Orange County, California. In sum, a total of 262 participants completed the online survey questionnaire. Of these participants, 76% were female ( $n = 198$ ). Ages ranged from 18 to 27 years old ( $M = 20.48$ ,  $SD = 1.75$ ). Approximately 68% ( $n = 191$ ) of the participants were Caucasian, and the rest were Asian (11%), Latino/a (7%), black (2%), or other (6%). Finally, participants were also asked to report their body mass index (BMI) and new media use. Participants reported a mean BMI score of 22.63 ( $SD = 3.75$ ). For new media use, participants indicated how much they agreed with five statements on a seven-point Likert scale (sample item: “Using

social media is part of my everyday activities”), and mean scores ranged from 1.00 to 6.40 ( $M = 2.93$ ,  $SD = 1.11$ ).

## 2.2. Measures

### 2.2.1. Compulsive exercise

The compulsive exercise test (CET) (Goodwin, Haycraft, Taranis, & Meyer, 2011) was used to assess exercise behaviors. The CET contains 24 items designed to assess 5 types of core features of excessive exercise, such as: avoidance and rule-driven behavior, weight control exercise, mood improvement, lack of exercise enjoyment, and exercise rigidity. Sample items include: “If I cannot exercise I feel low or depressed,” (Avoidance and rule-driven behavior), “I exercise to improve my appearance” (Weight control exercise), “I feel happier and/ or more positive after I exercise,” (Mood improvement), and “I find exercise a chore” (Lack of exercise enjoyment), “My weekly exercise routine is repetitive” (Rigidity). Higher scores indicate more compulsivity toward exercise. The scale was internally consistent ( $\alpha = .91$ ), and mean scores for the six-point Likert scale (0 = *never true*, 1 = *rarely true*, 2 = *sometimes true*, 3 = *often true*, 4 = *usually true*, 5 = *always true*) ranged from 1.42 to 5.79 ( $M = 3.80$ ,  $SD = .80$ ).

### 2.2.2. Disordered eating

The eating attitude test was used to measure symptoms, concerns, and characteristics of eating disorders (Garner & Garfinkel, 1979). The 21 item measure contains 3 subscales related to (1) dieting, (2) bulimia and food preoccupation, and (3) oral control. Examples items include: “I am preoccupied with a desire to be thinner” (dieting), “I find myself preoccupied with food” (bulimia and food preoccupation), and “I avoid eating when I’m hungry” (oral control). Participants rated their responses on a six-point Likert-type scale (1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, 5 = *usually*, 6 = *always*). Individuals who score 20 or higher should consider being interviewed by a qualified professional to determine if they meet the criteria of an eating disorder (Dotti & Lazzari, 1998). Low scores might still indicate an eating problem and should possibly consider getting help. The scale was internally consistent ( $\alpha = .90$ ), and mean scores ranged from 1.10 to 5.0 ( $M = 2.56$ ,  $SD = .77$ ).

### 2.2.3. Social media use

Overall social media use (i.e. traditional, blogs, microblogs, and mobile applications) was assessed by creating three separate questionnaires. These questionnaires asked about fitspiration messages on each of these three platforms. We defined fitspiration messages to be content that gave dietary advice or allowed users to track their food intake, messages that contained workout routines or fitness plans, and content that motivated users to exercise and make healthy nutritious choices.

### 2.2.4. Traditional blog use

The first questionnaire assessed the participant’s use of traditional blogs on a weekly basis using a scale with the following options: *never*, *1–2 times*, *3–5 times*, *5–8 times*, *8–11 times*, *11–15 times* or *more than 15*. Some of the questions referring to traditional blog use included: “About how many times a week do you visit nutritional blog sites?” and “About how many times a week do you write or comment on blog entries on fitness-related blog sites?” Participants’ responses for weekly use of traditional blogs averaged  $M = 1.40$  ( $SD = .80$ ).

### 2.2.5. Microblog use

The second questionnaire assessed the participant’s use of microblogs, (i.e. Instagram and Twitter), on a weekly basis using a scale with the following options: *never*, *1–2 times*, *3–5 times*, *5–8 times*, *8–11 times*, *11–15 times* or *more than 15*. Some of the questions referring to microblogs included: “About how many times a week do you interact (retweet, like, favorite, etc.) with a nutritional entry on microblogging sites?” and “About how many times a week do you post exercise information on microblog sites?” Participants’ responses for weekly use of microblogs averaged  $M = 1.46$  ( $SD = .75$ ).

### 2.2.6. Mobile phone applications use

The third questionnaire assessed the participant’s use of mobile phone applications (i.e. mobile applications that keep track of meals or exercise routines), on a weekly basis using a scale with the following options: *never*, *1–2 times*, *3–5 times*, *5–8 times*, *8–11 times*, *11–15 times* or *more than 15*. Sample items included: “About how many times a week do you use nutritional apps?” and “About how many times a week do you use exercising apps?” Participants’ weekly use of mobile phone applications averaged  $M = 1.73$  ( $SD = 1.18$ ).

### 3. Results

The means, standard deviations, and intercorrelations for all of the demographic and study variables are presented in Table 1.

**Table 1. Means, standard deviations, and intercorrelations of all study variables**

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Sex	1.76	.43	1								
2. Age	20.48	1.75	-.3***	1							
3. Body mass index	22.63	3.75	-.42***	.26***	1						
4. New social media	2.93	1.11	.17**	-.21**	-.03	1					
5. Compulsive exercise	3.8	.79	-.1^	.04	.26***	-.7	1				
6. Disordered eating	2.56	.77	.14*	-.08	-.07	.13*	.52***	1			
7. Traditional blog	1.4	.8	-.02	.03	.11^	.17**	.21**	.25***	1		
8. Microblog	1.46	.75	.04	.02	-.1	.29***	.2**	.38***	.58***	1	
9. Mobile apps	1.73	1.18	.08	.03	.02	.19***	.29***	.41***	.56***	.46***	1

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

**Table 2. Hierarchical regression analyses testing the association between type of social media use and reports of disordered eating and compulsive exercising**

	EAT			CET		
	B(SE)	$\beta$	$p$	B(SE)	$\beta$	$p$
<i>Block 1</i>						
Age	-.04(.03)	-.10	.11	-.03(.03)	-.07	.26
Sex	.21(.11)	.12	.06	-.05(.12)	-.03	.67
BMI	.03(.01)	.01	.06	.05(.01)	.24	.00***
Overall social media use	-.02(.04)	-.04	.60	-.11(.05)	-.16	.01**
<i>Block 2</i>						
Traditional blog use	-.10(.07)	-.10	.20	.01(.08)	.01	.95
Microblog use	.24(.08)	.24	.00***	.03(.08)	.03	.75
Mobile apps use	.22(.05)	.34	.00***	.20(.05)	.31	.00***
$R^2$	.22			.17		
$\Delta R^2$	.18***			.10***		
$F$	18.22			9.40		
$N$	241			241		

Note: All coefficients are from the full model.

\* $p \leq .05$ .

\*\* $p \leq .01$ .

\*\*\* $p \leq .001$ .

Research question one asked about the relationship between types of social and mobile media use and reports of disordered eating. To test this, we conducted a hierarchical regression analysis. Control variables (participants' age, sex, BMI, and social media use) were entered in the first block, and disordered eating symptomatology was entered into the second block. The analysis was significant,  $R^2 = .22$ ,  $\Delta R^2 = .18$ ,  $F(3, 241) = 18.22$ ,  $p = .000$ . In particular, the betas for microblog use ( $\beta = .24$ ,  $p = .00$ ) and mobile application use ( $\beta = .34$ ,  $p = .00$ ) were positive predictors of stronger disordered eating symptomatology, even after controlling for a number of variables (see Table 2).

Research question two asked about the relationship between types of social and mobile media use and reports of compulsive exercise. To test this, we conducted a second hierarchical regression analysis, using the same control variables and the predictor variables of social media in the first block, and compulsive exercise in the second block. This regression was also significant,  $R^2 = .17$ ,  $\Delta R^2 = .1$ ,  $F(3, 241) = 9.39$ ,  $p < .001$ . In particular, the beta for mobile application use ( $\beta = .31$ ,  $p = .000$ ) was a positive predictor of compulsive exercise behaviors, even after controlling for a number of variables (see Table 2).

#### 4. Discussion

The current investigation examined the impact of various types of social media on disordered eating and compulsive exercise. The first research question inquired about the relationship between social media use and disordered eating. Results showed a significant and positive association between individuals' use of mobile phone applications and microblogs and reports of disordered eating. The second research question examined the relationship between social media use and compulsive exercise behaviors. In this case, only individuals' use of mobile phone applications was significantly and positively related to compulsive exercise. Out of all the different types of social media examined in this study, mobile phone applications were implicated in both unhealthy eating and compulsive exercise behaviors, while microblogs were solely related to disordered eating symptomatology. Traditional blogs, conversely, were not found to have a significant association with either disordered eating or compulsive exercise.

According to our results, the more time individuals spend using mobile applications and microblogs with fitspiration content, the more likely they are to also report disordered eating symptomatology. This fitspiration finding extends work from other researchers who looked at thinspiration messages, such as motivational photos and inspirational quotes related to proanorexia (Ghaznavi & Taylor, 2015), and found that this content is associated with symptoms of disordered eating (Mulveen & Hepwoth, 2006). Microblogs in today's world, people want easily accessible content; and mobile applications, as well as microblogs, are the channels in which this content is distributed quickly and in a short and concise fashion (Mulveen & Hepwoth, 2006). Therefore, people consuming content from mobile applications and microblogs are retaining a lot of information in a short amount of time due to content being distributed at such a rapid pace (Smith & Stewart, 2012). In addition, mobile phone applications and microblogs are more interactive, allowing users to generate more extensive feedback from other users than traditional blogs. It makes sense that spending time on traditional blogs was not associated with disordered eating or compulsive exercise, given that traditional blogs consist of an online diary filled with emotional experiences with sporadic feedback from fellow users. Therefore, traditional blogs may be less relevant than mobile applications and microblogs, which get straight to the point with tips and suggestions on how to eat "right" and lose weight to look thin, and which also include frequent and greater amounts of feedback from other users online (Kaplan & Haenlein, 2009).

Our research findings additionally indicate that frequent use of mobile phone applications is significantly related to both compulsive exercise and disordered eating. Perhaps when individuals spend a lot of time on applications (such as recording how many calories they have eaten in the day), they can become obsessed with calorie counting and feel like they must reduce caloric intake by dieting or exercising. There are many different types of mobile phone applications that could be related to increased compulsive exercise and disordered eating behaviors. For example, "Eating

Thin,” claims to help users overcome cravings for sugary snacks by playing music. “Lose It!” helps users “lose weight in a healthy, sustainable way” by tracking calories and connecting users to peers for support. There are also applications that track BMI (e.g. “Teen BMI”), and calculate how long users have been fasting (e.g. “Fasting” and “Fasting Secret”). An important factor in the compulsive dimension of exercising is the detailed record keeping (Dalle Grave, Calugi, & Marchesini, 2008), which is the main feature of these mobile phone applications.

Further, our results indicated that microblogs and traditional blogs were not significant in an individual’s need to compulsively exercise, possibly because these types of social media are generally less interactive than the mobile applications. Some aspects of the compulsive dimension of exercising are the maintenance of a rigid exercise schedule, priority of exercising over other activities, and feeling distressed if unable to exercise (Dalle Grave et al., 2008). Although microblogs and traditional blogs may have workout tips or motivational quotes and photos, they are not as interactive as mobile phone apps and do not have a record-keeping function—thus, they may be less influential in this manner.

#### 4.1. Limitations and future directions

Although the sample size was substantially large, an inherent limitation of the study is that the majority of participants were Caucasian females. Whereas, eating disorders are typically associated with women, 1 in 10 cases of eating disorders involves a male, meaning that thousands of males are affected in the US (ANAD, 2015). Our results may look very different with a sample of equal representation of sex. For example, use of social media and exposure to images of fitspiration may be associated with compulsive exercise among males, but not disordered eating. Future research should include more male participants and aim for a more demographically and geographically representative sample. In addition, future research should incorporate a longitudinal study design in order to determine cause and effect of social media and negative health behaviors. Finally, other important personality variables like self-esteem should be examined. By further assessing the relationship between the type of social media use and unhealthy behaviors, this would add more depth to our understanding of the topic by taking into consideration other salient personality characteristics and individual difference factors.

#### 5. Conclusion

The majority of previous research has focused on the relationship between social media and eating disorders (Sofia Castro & José Osório, 2013) or body dissatisfaction (Vaterlaus et al., 2014). Our study extends past findings by including compulsive exercise as an additional health outcome, as well as comparing the effect of three different types of social media (traditional blogs, microblogs, and mobile applications). By doing so, we were able to determine the types of social media that are most closely associated with disordered eating and compulsive exercising (namely, mobile phone applications and microblogs). Now that we know which ones are implicated in negative health behaviors, special attention should be paid to these social media platforms so that parents and educators can be made aware of the potential negative effects, especially on vulnerable populations like adolescents. If an effort could be made to reduce the amount of time people spend using these types of social media, as well as the activities they perform on these platforms, we could potentially decrease the negative health effects due to these pervading fitspiration messages online, unattainable ideals of beauty, and the constant drive to create and maintain the perfect body.

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