Motivating exercise through social media: Is a picture always worth a thousand words?☆

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ABSTRACT

Objectives: In the present study, we examined how the influence of exercise-related social media content on exercise motivation might differ across content type (with images vs. without images) and account type (individual vs. corporate).
Design: Using a 2×2 within-subjects experimental design, 229 participants viewed a series of 40 actual social media posts across the four conditions (individual posts with images, corporate posts with images, individual posts without images, and corporate posts without images) in a randomized order.
Method: Participants rated the extent to which they felt each social media post motivated them to exercise, would motivate others to exercise, and was posted for extrinsic reasons. Participants also completed other measures of individual differences including their own exercise motivation.
Results: Posts with images from individuals were more motivating than posts with images from corporations; however, corporate posts without images were more motivating than posts without images from individuals. Participants expected others to be similarly motivated by the stimuli, and perceived corporate posts as having been posted for more extrinsic reasons than individuals' posts.
Conclusions: These findings enhance our understanding of how social media may be used to promote positive health behaviors.

Social media has quickly become a popular way of connecting with people and sharing information. Approximately 70% of the American public today uses social media – a substantial increase from the 5% who used social media in 2005 (Pew Research Center, 2016). The unique features of social media have led to new ways of connecting and interacting with others that are not possible in face-to-face interactions or other forms of digital communication (McFarland & Ployhart, 2015). As a highly accessible and popular source of information, social media also has the potential to strongly influence individuals' thoughts, feelings, and behaviors (Vogel, Rose, Roberts, & Eckles, 2014). The present research contributes to the growing literature on the influence of social media on health and well-being outcomes (e.g., Fardouly & Vartanian, 2016; Vogel et al., 2014) by examining specific features of social media content that may enhance or suppress motivation to exercise.

Social influences can have a powerful effect on health behaviors and outcomes as people receive social support, follow social norms, and are exposed to health-relevant information through their social interactions (Smith & Christakis, 2008). Social media facilitates many of these processes

and is an important part of understanding modern social influences on health behaviors (Centola, 2013). Much of the existing literature in this area has focused on negative health outcomes associated with social media use including body image concerns, disordered eating, and compulsive exercise (Perloff, 2014; Holland & Tiggermann, 2017), but social media may also be a promising avenue for promoting public health (Korda & Itani, 2013). Research thus far has found limited support for the effectiveness of health behavior interventions using social media (Maher et al., 2014), but additional research is needed in this emerging field to determine how social media can be most effectively used to promote health behaviors.

The connections between social media and health behaviors are not only the subject of psychological research but are also recognized by social media users themselves. A recent qualitative study (Vaterlaus, Patten, Roche, & Young, 2015) identified three general themes associated with health behaviors reported by social media users: social media can be both a motivator and a barrier to exercise, the connection between social media and food, and perceptions of exercise pictures and posts online. Participants in another study reported that posting health-

related content on Twitter or simply observing the health-related posts of others helped them maintain motivation for their own health behaviors (Teodoro & Naaman, 2013). Despite broad interest in the influence of social media on health behavior, few studies have actually examined the relative effectiveness of different types of social media content for motivating health behaviors such as exercise. In the present study, we experimentally test the effectiveness of four types of exercise-related social media content in promoting exercise motivation.

1. The Integrated Behavioral Model

The Integrated Behavioral Model (IBM) provides a framework for understanding factors that influence behavioral intentions and subsequent behaviors that builds on the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB), among other theories (Montaño & Kasprzyk, 2008). According to the IBM, behavior is directly influenced by possession of the knowledge and skills needed to perform the behavior, the salience of the behavior, environmental constraints, and habit. However, the most important determinant of behavior is an individual's intention to perform the behavior which provides them with motivation. Intentions to perform the behavior are in turn influenced by three basic factors: attitudes toward the behavior, perceived norms regarding the behavior, and personal agency. Attitudes toward the behavior include positive or negative feelings toward the behavior and beliefs about the outcomes of the behavior. Perceived norms include beliefs about others' expectations (injunctive norms) as well as others' behaviors (descriptive norms). Perceived agency includes beliefs about one's ability to control their own behavior and confidence in one's ability to perform the behavior despite obstacles (i.e., self-efficacy).

Within the framework of IBM, social media content has the potential to influence health behaviors and behavioral intentions through a variety of mechanisms. In the present study's case of exercise behavior, exercise-related social media can, of course, increase the salience of exercise behavior through mere exposure, but it can also promote behavioral intentions by shaping attitudes, perceived norms, and personal agency. For example, social media portrayals of exercise as being enjoyable and rewarding may promote more positive attitudes toward exercise behavior. Exercise-related social media content may also provide information about descriptive and injunctive norms around exercise behavior and may provide encouragement that may enhance perceived agency. In the next section, we describe some of the ways in which social media content with and without images may differentially influence exercise behavior intentions or motivation to exercise.

2. Social media content with images vs. without images

The present study compares the motivational characteristics of exercise-related social media posts across two dimensions: content type (with images or without images) and account type (individual or corporate). Previous research suggests that content with images may be more likely to influence exercise motivation than content without images on social media. In a recent study analyzing social media posts from the National Cancer Institute's Facebook page, social media posts with images were more engaging and received significantly more likes, comments, and shares than posts without images (Strekalova & Krieger, 2017). In the case of exercise-related social media posts, images featuring other people may be especially influential as they provide a highly accessible opportunity for the viewer to visually engage in social comparison (Festinger, 1954) – an opportunity that is not present in messages without an image. Images of physically fit individuals or people exercising can prompt upward social comparisons if viewers see those people as being better than themselves (e.g., more motivated or more physically fit), and this upward social comparison can motivate people to pursue self-improvement goals such as exercise behavior (Collins, 1996; Halliwell & Dittmar, 2005). Despite motivating self-improvement for some people, these upward social comparisons can also contribute to body dissatisfaction and negative self-

evaluations (Myers & Crowther, 2009; Tiggemann & Zaccardo, 2015). For example, women who view objectifying media images promoting a thin body ideal report greater self-objectification, body dissatisfaction, and negative mood (Harper & Tiggemann, 2008). Similarly, viewing pro-anorexia websites featuring ultra-thin women and messages intended to inspire disordered eating promotes negative affect, lower self-esteem, and body dissatisfaction (Bardone-Cone & Cass, 2007). Whether in pursuit of self-improvement or as a means of escaping body dissatisfaction and negative self-evaluations, these studies demonstrate that upward social comparisons enabled by exercise-related social media images have the potential to enhance exercise motivation. Downward social comparisons (those in which people see themselves as being better than others, e.g., more physically fit) also have the potential to promote exercise motivation. In this case, exercise would be seen as a behavior that enables and helps maintain one's perceived superiority.

Within the IBM framework, these social comparison processes are likely to increase the salience of exercise behavior and promote exercise motivation in several ways. Upward social comparisons may promote positive attitudes toward exercise as a means of achieving one's ideals, or as a means of maintaining one's perceived superiority in the case of downward social comparison. Social comparisons can also provide normative information, as individuals may draw conclusions about others' expectations and behaviors from social media content. In the present study, we anticipated that stimuli with images would provide a more accessible opportunity to engage in these social comparison processes and would subsequently promote greater exercise motivation compared to stimuli without images.

3. Individual vs. corporate social media content

Another important characteristic of social media content is who posted it, and by extension, *why* it was posted. In the present study, we draw a distinction between content posted by individuals and content posted by corporations. Individuals report using social media for a wide variety of reasons including social interaction, entertainment, relaxation, and expression of opinion (Whiting & Williams, 2013). In contrast, social media is used by corporations as a tool for marketing and customer relationship management (Kaplan & Haenlein, 2010; Ngai, Moon, Lam, Chin, & Tao, 2015) and corporations engage potential customers using a variety of social media strategies (Ashley & Tuten, 2015; Gensler, Völckner, Liu-Thompkins, & Wiertz, 2013). For example, an athletic apparel company can use their social media presence to promote positive attitudes toward their products or brand and promote behaviors that would increase their sales (e.g., exercise).

While social media content provides many beneficial opportunities for corporations, its effectiveness can be limited if social media users recognize corporate social media content as an attempt to influence, persuade, or manipulate them (e.g., to have positive attitudes toward the brand, to purchase a product). Research on sponsorship disclosures has demonstrated that when media content is identified as advertising prior to or during exposure, people process the information more critically and are more resistant to persuasion (Boerman, van Reijmersdal, & Neijens, 2012; 2014). Similarly, people find content to be less persuasive if they perceive it to be using manipulative tactics like deception (Campbell, 1995; Sagarin, Cialdini, Rice, & Serna, 2002). These factors may limit the influence of corporate social media content; however, corporate marketing and social media teams are aware of these possibilities and devote considerable resources to creating an effective social media presence. Indeed, brands use a variety of strategies to promote engagement and brand awareness including offering incentives for consumer engagement (Ashley & Tuten, 2015; Tsimonis & Dimitriadis, 2014), and these strategies do have demonstrable effects on consumer behavior (Goh, Heng, & Lin, 2013).

Social media content posted by individuals has its own potential advantages and disadvantages when it comes to influencing attitudes and behavior. Research suggests that user-generated content actually has a stronger influence on purchasing behavior than marketer-

generated (corporate) content in brand communities on social media (Goh et al., 2013). The persuasiveness of user-generated content may be explained in part by individuals recognizing marketer-generated content as advertising and evaluating it more critically (Boerman et al., 2012; 2014), as described earlier. However, this does not mean that content from individuals is always seen as more trustworthy than corporate content. Qualitative research suggests that attitudes toward individuals' exercise-related social media posts can vary widely depending on the context (Vaterlaus et al., 2015). For example, participants reported feeling inspired and motivated by pictures showing substantial weight loss, but also reported feeling annoyed by what they perceived as bragging. These impressions are consistent with recent research on the consequences of humblebragging. Humblebragging refers to bragging masked by a complaint or humility (e.g., "I lost so much weight that I need to get new clothes on top of all the other things I need to do," and "I don't understand why everyone compliments me on my looks."), is seen as insincere, reduces liking and perceived competence, and leads to lower compliance with requests (Sezer, Gino, & Norton, 2018).

Within the IBM framework, the processes described in this section would influence exercise motivation by shaping the information people use to form their attitudes toward exercise and perceived norms. Exercise-related social media content perceived as an advertisement, being manipulative, bragging, or humblebragging may make people less likely to use that information to inform their beliefs and intentions to exercise. In the present study, we predicted that there would be a difference in exercise motivation between corporate and individual social media posts, however this prediction was non-directional as we did not have strong prior beliefs about which type of social media content might more effectively promote exercise motivation.

4. Self-Determination Theory

A final consideration in characterizing the effects of exercise-related social media content on exercise motivation relates to the quality of motivation rather than its magnitude. Self-Determination Theory argues that motivation is characterized by the extent to which it is autonomous or self-determined versus controlled, and distinguishes between intrinsic and extrinsic motivation (Ryan & Deci, 2000). Intrinsically motivated behavior is pursued for the inherent satisfaction of the activity and represents the most autonomous form of behavioral regulation. In contrast, extrinsically motivated behavior is pursued in order to attain some separable outcome. Organismic Integration Theory, a mini-theory within Self-Determination Theory, identifies different forms of extrinsic motivation that vary in the extent to which they are internalized and self-determined versus external and not self-determined (Ryan & Deci, 2000). For example, external regulation is the least self-determined form of extrinsic motivation and describes behaviors performed in order to obtain external rewards or avoid punishments (Ryan & Deci, 2000). In contrast, integrated regulation, the most self-determined form of extrinsic motivation, describes extrinsic motivation that is fully internalized and congruent with one's self (Ryan & Deci, 2000).

With regard to exercise-related social media, an individual posting this content might do so for less self-determined reasons, such as receiving fame or praise, or they might do so for more self-determined reasons, such as contributing to a shared community they care about or simply for their own enjoyment. As such, we anticipate that people viewing an individual's social media content may perceive it as having been posted for either intrinsic or extrinsic reasons. In contrast, we propose that corporate social media content is more readily perceived as having been posted for extrinsic reasons since the inherently extrinsic reasons behind corporate social media (e.g., increasing brand recognition, selling products) are easily recognized. We expected that perceiving social media content as having been posted for extrinsic reasons would have similar effects as having perceived the media as an advertisement, potentially reducing its influence as individuals more carefully consider the information. However, if people did perceive

corporate social media content as having been posted for intrinsic reasons, research suggests that this could promote positive evaluations and trust in the brand (Moulard, Raggio, & Folse, 2016). In the current study, we assess these perceptions of why social media content was posted in order to characterize potential differences in how exercise-related social media content is perceived across content type (with images vs. without images) and account type (individual vs. corporate).

In addition to examining the perceived motivations of those posting exercise-related social media content, we can also consider how the effects of exercise-related social media content on exercise motivation may depend on an individual's own preexisting reasons for exercising. Some individuals are intrinsically motivated to exercise, simply choosing to exercise because it is enjoyable to them. Others are more extrinsically motivated to exercise; only exercising to receive the approval of others, exercising out of a sense of shame, or for other external reasons. Exercise-related social media content that conforms to an individuals' own reasons for exercising may more effectively increase exercise motivation than content that does not reflect an individual's own reasons for exercising. For example, an extrinsically motivated individual who exercises to improve their appearance and receive praise from others may find a corporate social media post with a famous professional athlete to be highly motivating. In contrast, an intrinsically motivated individual may be most motivated by posts from individuals expressing the enjoyment of exercising. We were interested in exploring any potential relationships between participants' own reasons for exercising and how motivating they found the different types of exercise-related social media, so we treated this as an exploratory research question and did not make specific predictions as to the direction of potential relationships.

5. The present study

The present study tested if exercise-related social media posts are perceived differently as a function of content type (with images or without images) and account type (individual or corporate) using a within-subjects experimental design. We adapted actual publicly available exercise-related social media posts from Instagram to use as our stimuli with images and publicly available posts from Twitter to use as our stimuli without images in this study. Participants rated the extent to which they perceived each post as motivating them to exercise, motivating others to exercise, and having been posted for extrinsic reasons. Participant ratings of how much the stimuli motivated them to exercise was our primary dependent variable and served as an indicator of how participants believed each stimulus influenced their behavioral intention to exercise. We assessed how much participants believed others would be motivated by the stimuli as an exploratory item. We were interested in testing whether participants believed other people would be similarly motivated by the exercise-related stimuli, or whether they drew a distinction between what motivated themselves and what they believed motivated others. Based on decades of research on the self-consensus effect (Marks & Miller, 1987; Ross, Greene, & House, 1977) and related cognitive biases demonstrating that people tend to overestimate the extent to which other people share their opinions and beliefs, we anticipated that ratings for others' motivation would be similar to participants' ratings for their own motivation.[1] Finally, ratings of stimuli as having been posted for extrinsic reasons were assessed to better characterize perceptions of the stimuli relevant to our theoretical framework. As outlined in the previous section on Self-Determination Theory, we predicted that participants would rate corporate stimuli as having been posted for more extrinsic reasons than individual stimuli. Participants also completed measures of their own reasons for exercising, as well as general

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[1] We conducted supplementary analyses to verify that ratings of self-reported motivation to exercise and ratings of others' motivation to exercise were distinguishable from one another and not more parsimoniously explained by a single latent variable. These analyses supported the distinction between these measures and are reported in Appendix A.

Table 1
Means, standard errors, and Cronbach's alpha for stimuli ratings across content type (with images or without images) and account type (individual or corporate). Standard errors are normalized to reflect within-subjects variability (Cousineau, 2005; Morey, 2008).

Content type	Motivates Self to Exercise						Motivates Others to Exercise						Posted for Extrinsic Reasons					
	Individual			Corporate			Individual			Corporate			Individual			Corporate		
	M	SE	α	M	SE	α	M	SE	A	M	SE	α	M	SE	α	M	SE	α
With Images	3.45	.03	.86	3.31	.03	.85	4.02	.03	.86	3.89	.02	.86	3.87	.06	.91	4.44	.05	.90
Without Images	3.17	.03	.87	3.31	.04	.87	3.71	.03	.86	3.81	.03	.87	3.85	.05	.88	4.27	.06	.92

assessments of exercise activity, exercise self-efficacy, and social media use to characterize the sample.

We established several hypotheses prior to data collection. Our first primary hypothesis was that self-reported motivation to exercise in response to the stimuli would be higher for stimuli with images (Instagram) compared to stimuli without images (Twitter). Our second primary hypothesis was a non-directional prediction that self-reported motivation to exercise in response to the stimuli would differ between corporate stimuli and individual stimuli. Our third primary hypothesis was that the effects of content type and account type on self-reported motivation to exercise would be moderated by participants' own reasons for exercising (i.e., intrinsic/extrinsic motivation). These hypotheses and planned analyses were preregistered prior to data collection at https://osf.io/gahmw/.

6. Method

6.1. Participants

A minimum sample size of 200 participants was established prior to data collection based on a power analysis that indicated that a sample size of 176 would provide 80% power to detect an effect size of Cohen's $f = 0.25$, which is equivalent to eta-squared = 0.059 and Cohen's $d = 0.50$. Two hundred and twenty-nine people (99 male, 130 female) recruited from a liberal arts college, large public university, and surrounding community in New England completed the study. Students participated in the study through a psychology department subject pool, and invitations to participate were shared via email and social media with individuals and organizations at the large public university. Potential participants were invited to share the invitation to participate with others, including non-student community members. Participant ages ranged from 18 to 63 ($M = 25.31$, $SD = 10.66$), and 65.1% of participants identified as White/Caucasian, 18.3% as Asian/Pacific Islander, 6.1% as Hispanic, 5.7% as Black or African American, and 4.8% as Multiple Ethnicity/Other. Participants provided their informed consent and completed an online questionnaire at a time and place of their choosing.

6.2. Materials

All study materials, stimuli, and the final dataset as analyzed are available on the OSF page for this study (https://osf.io/7e6k3/).

Exercise motivation. Participants first completed the Behavioral Regulation in Exercise Questionaire-3 (BREQ-3; Markland & Tobin, 2004; Wilson, Sabiston, Mack, & Blanchard, 2012). The BREQ-3 consists of twenty-four items answered on a 5-point scale (0 = *not true for me*; 4 = *very true of me*) assessing six types of exercise behavior regulation ranging from most self-determined to least self-determined: intrinsic, integrated, identified, introjected, external, and amotivation. For the purposes of this study, a relative autonomy index (RAI; $M = 9.98$, $SD = 7.03$) was computed as a general indicator of how autonomously motivated participants are to exercise (Ryan & Connell, 1989; Vallerand, Pelletier, & Koestner, 2008). A higher RAI indicates that an individual is more autonomously motivated and self-determined. An examination of correlations supported the theoretical assumption of a simplex pattern

among the subscales consistent with the scoring procedures of the RAI (Ryan & Connell, 1989; see Appendix B).

Social media stimuli. All participants then viewed a series of 40 social media stimuli presented in random order. 20 stimuli with images as part of their primary content and 20 stimuli without images as part of their primary content were included. All posts included a short text message. Within each stimuli set (with images and without images), 10 stimuli were from individual users and 10 stimuli were from corporate users. For each stimulus, participants indicated their agreement or disagreement with three statements using a 6-point scale (1 = *strongly disagree*; 6 = *strongly agree*): "This social media post makes me want to exercise," "This social media post would make other people want to exercise," and "This social media post was posted for extrinsic reasons." Participants read a brief passage describing extrinsic reasons for posting ("Examples of extrinsic reasons include external rewards such as money, fame, or praise. People may make a social media post for extrinsic reasons such as these, or for another reason external to the person making the post.") prior to rating any stimuli to provide context for their responses to the third question. Responses were averaged within each condition to produce scores for self-reported motivation to exercise, others' motivation to exercise, and extrinsic reasons for posting for each of the four stimuli sets as displayed in Table 1.

Stimuli development. The 40 stimuli were actual public posts on Instagram and Twitter, slightly modified for consistency and to reduce potential biases. After identifying public posts related to physical fitness and exercise, we removed extraneous parts of the post that might influence participant ratings, including posting location and the number of previous likes, shares, or comments. These posts were selected to be generally representative of the exercise-related content frequently posted on Instagram and Twitter. Half of the final stimuli were posts by corporations and the other half were posts by individuals. Corporate posts were selected from the social media accounts of well-known companies highly involved in fitness/exercise that provide services or products to consumers. Individual posts were selected from accounts of individuals who were not celebrities or public figures. Within the corporate and individual stimuli, half were obtained from Instagram and half from Twitter. Thus, the final stimuli set included 10 individual posts with images (Instagram), 10 corporate posts with images (Instagram), 10 individual posts without images (Twitter), and 10 corporate posts without images (Twitter). [2]

Exercise activity. After rating the stimuli, participants completed the Godin-Shephard Leisure-Time Physical Activity Questionnaire (Godin & Shephard, 1985), indicating how many times they engage in

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[2] Our categorization of stimuli as with images or without images refers specifically to the content of the social media posts themselves. The stimuli with images prominently feature an image as part of the primary content, whereas stimuli without images do not. All stimuli included a short text message as part of the post. Stimuli drawn from Twitter were not completely devoid of any images, as we sought to present the content in the same format as it would be seen by social media users. The stimuli from both Instagram and Twitter included small images outside of the actual post content, such as the profile image of the user posting the content and a button that one would click to follow the user on that social media platform.

strenuous, moderate, and mild activity for more than 15 min during their free time each week on average. A composite score (M = 42.72, SD = 26.21) was computed by weighting and adding the strenuous and moderate activity scores (9 * strenuous + 5 * moderate). Individuals with scores > 24 are classified as *active* and those with scores ≤ 23 are classified as *insufficiently active* (Amireault & Godin, 2015). In the present study, 24.6% of participants were classified as insufficiently active.

Exercise self-efficacy. Next, participants completed the Exercise Self-Efficacy Questionnaire (McAuley, 1993) to assess beliefs about their ability to carry out physical activity in the next 8 weeks. Participants indicated their confidence that they will be able to exercise 3 times per week for the next week, next two weeks, and so on, up to the next eight weeks. Responses range from 0% confidence to 100% confidence in 10% increments. Responses were averaged across all 8 ratings to produce an overall confidence score ranging from 0% to 100% (M = 65.52, SD = 32.20).

Social media usage. Participants then answered a series of questions about their social media usage followed by general demographic questions. Participants reported spending an average of 2.23 h per day (SD = 1.75) on social media and indicated that they used a variety of social media platforms including Facebook (93%), Snapchat (75%), Instagram (70%), YouTube (65%), LinkedIn (38%), Twitter (30%), Pinterest (23%), Tumblr (16%), Reddit (13%), and YikYak (11%).

7. Results

All analyses were conducted using version 0.9.5.8 of the jamovi project (2018) statistics software. Responses to the exercise activity and exercise self-efficacy measures indicated that participants tended to be physically active and felt confident in their ability to exercise in the future. Participants were also regular users of social media, with only 8.7% of participants reporting that they spend less than an hour per day on social media. Bivariate correlations indicated that social media usage was unrelated to exercise activity ($r = -0.03$, $p = .668$), but negatively predicted both exercise self-efficacy ($r = -0.19$, $p = .005$) and RAI ($r = -0.20$, $p = .003$). Exercise activity was positively associated with exercise self-efficacy ($r = 0.47$, $p < .001$) and RAI ($r = 0.44$, $p < .001$). Exercise self-efficacy was also positively associated with RAI ($r = 0.66$, $p < .001$).

A series of two-way repeated measures ANOVAs were conducted to compare participant ratings of self-reported motivation to exercise, others' motivation to exercise, and extrinsic reasons for posting in response to the stimuli across content type (with images or without images) and account type (individual or corporate). Means and standard errors for each stimulus category are provided in Table 1 and results are illustrated in Fig. 1. Gender was not a significant predictor when included in any of the reported analyses, nor were the interactions between gender and any other predictors significant.

7.1. Self-reported motivation to exercise

Stimuli with images were rated as significantly more motivating than stimuli without images $F(1, 228) = 21.80$, $p < .001$, partial $\eta^2 = 0.087$. Stimuli from individual accounts and corporate accounts did not differ in their motivation ratings, $F(1, 228) = 0.01$, $p = .941$, partial $\eta^2 < 0.001$. There was also a significant interaction between content type and account type predicting motivation, F (1, 228) $= 41.25$, $p < .001$, partial $\eta^2 = 0.153$. Simple effects for account type were examined to decompose the interaction. Stimuli with images from individual accounts were more motivating than stimuli with images from corporate accounts, $t(228) = 3.57$, $p < .001$, $d = 0.24$, and stimuli without images from corporate accounts were more motivating than stimuli without images from individual accounts, t (228) $= 3.05$, $p = .003$, $d = 0.20$.

When RAI was included as a covariate, the main effect of content type ($p = .007$) and the interaction between content type and account

type ($p = .002$) remained significant. RAI itself was a significant predictor in the model ($p = .005$), and RAI interacted with account type to predict ratings of motivation to exercise ($p = .002$). The interaction between RAI and content type was not significant ($p = .940$), nor was the three-way interaction between RAI, content type, and account type ($p = .561$). Correlation analyses revealed that RAI (an indicator of more autonomous and self-determined motivation to exercise) was generally a weak positive predictor of self-reported motivation to exercise in response to the stimuli, and that this relationship was slightly stronger for corporate stimuli ($r = 0.23$, $p < .001$ for corporate stimuli with images; $r = 0.23$, $p < .001$ for corporate stimuli without images) than individual stimuli ($r = 0.11$, $p = .090$ for individual stimuli with images; $r = 0.11$, $p = .112$ for individual stimuli without images).

7.2. Motivates others to exercise

Consistent with ratings for the self, participants reported that stimuli with images would be more motivating than stimuli without images for others $F(1, 228) = 48.54$, $p < .001$, partial $\eta^2 = 0.176$. Stimuli from individual accounts and corporate accounts did not differ in their motivation ratings, $F(1, 228) = 0.12$, $p = .729$, partial $\eta^2 = 0.001$. Once again, there was a significant interaction between content type and account type predicting motivation, F (1, 228) $= 31.74$, $p < .001$, partial $\eta^2 = 0.122$. Simple effects showed that stimuli with images from individual accounts were more motivating than stimuli with images from corporate accounts, $t(228) = 3.92$, $p < .001$, $d = 0.26$, and stimuli without images from corporate accounts were more motivating than stimuli without images from individual accounts, $t(228) = 2.52$, $p = .012$, $d = 0.17$.

7.3. Posted for extrinsic reasons

Participants clearly identified corporate posts as having been posted for more extrinsic reasons than individual posts, F (1, 228) $= 29.63$, $p < .001$, partial $\eta^2 = 0.115$. Stimuli with images were also rated as having been posted for more extrinsic reasons than stimuli without images, F (1, 228) $= 13.16$, $p < .001$, partial $\eta^2 = 0.055$. However, these main effects were qualified by a significant interaction between content type and account type, F (1, 228) $= 11.24$, $p = .001$, partial $\eta^2 = 0.047$. Ratings of stimuli with and without images did not differ for individual accounts, $t(228) = 0.52$, $p = .603$, $d = 0.03$, whereas stimuli with images were rated as having been posted for more extrinsic reasons than stimuli without images from corporate accounts, t (228) $= 4.82$, $p < .001$, $d = 0.32$.

8. Discussion

The results supported our hypothesis that content type (with images or without images) and account type (individual or corporate) would influence ratings of exercise motivation in response to exercise-related social media posts. Corporate posts with images were less motivating than individual posts with images, whereas corporate posts without images were more motivating than individual posts without images. We also found partial support for our prediction that the effects of content type and account type on self-reported motivation to exercise would be moderated by participants' own reasons for exercising, as a moderation effect was only observed for account type. As expected, ratings for others' motivation to exercise in response to the stimuli were consistent with participants' own motivation to exercise, and corporate posts were consistently rated as having been posted for more extrinsic reasons. These findings provide a first look at some of the specific factors that may influence the effectiveness of social media content in promoting positive health behaviors.
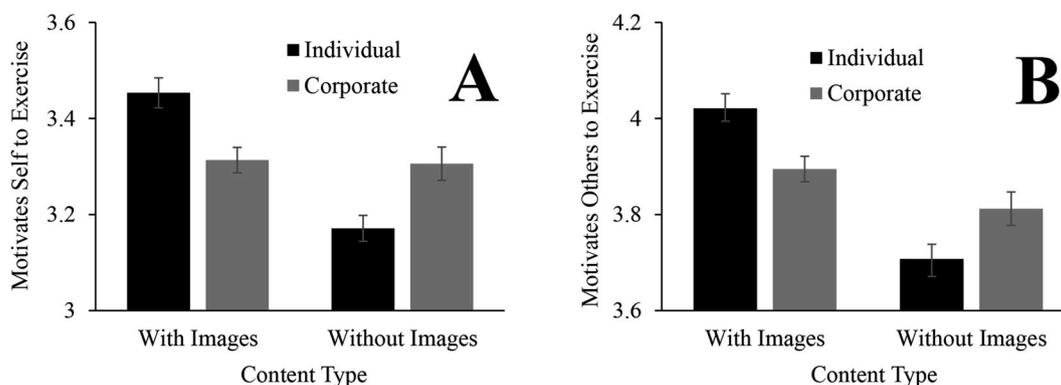
Fig. 1. Panel A: Self-reported motivation to exercise in response to stimuli across content type (with images or without images) and account type (individual or corporate). Panel B: Ratings of others' motivation to exercise in response to stimuli across content type and user account type. Error bars represent standard error of the mean normalized to show within-subjects variability (Cousineau, 2005; Morey, 2008). Vertical axes are truncated to better illustrate the pattern of interaction.

8.1. Qualities of social media content

Our study demonstrated that the effectiveness of social media content in promoting exercise motivation differed across the general categories of content type (with images or without images) and account type (individual or corporate). Of course, content type and account type are not the only important qualities in understanding how social media can be used to promote health behaviors. Future research would benefit from a careful consideration of other qualities of social media content and the potential psychological processes underlying their effectiveness. Our predictions were based in part on theories of social comparison (Collins, 1996; Festinger, 1954; Halliwell & Dittmar, 2005) which suggest several underlying processes that may help explain the present results. As mentioned in the introduction, content with images may simply be more accessible and offer more information relevant to making social comparisons than content without images, making it more likely that social comparisons will influence an individual's attitudes and motivation. While not directly comparing content with images to content without, previous research has shown that images provide an easily accessible target for social comparison that is highly relevant to both men's and women's body image (e.g., Hargreaves & Tiggemann, 2009; Tiggemann & Polivy, 2010). Research has also shown that social comparisons are more informative and influential when you are comparing yourself to similar others (Suls, Martin, & Wheeler, 2002). This suggests that a less fit individual may be more motivated by social media content featuring people they can easily recognize as being similar to themselves (more often posted by individuals), and less motivated by content featuring professional athletes and extremely fit individuals (more often posted by corporations). At an even more individualized level, images of people similar to the user in outwardly observable characteristics (e.g., height, weight, sex, skin color) may be especially powerful opportunities for social comparison. The relative similarity between users and people portrayed in the images may help explain why content with images from individuals more effectively promoted exercise motivation than content with images from corporations.

In the case of social media content without images, we observed that corporate content without images more effectively promoted exercise motivation than individual content without images. As previously mentioned, social comparison processes likely play a smaller role in content without images than in content with images, so other factors such as the message of the text itself may be more influential. The corporate posts without images in this study focused almost exclusively on motivating the individual reading the post, whereas the posts without images from individuals more often focused on the achievements of the person posting the message. By focusing on a motivational message without an image drawing attention to the brand or product, corporate posts without images may also be less likely to be seen as advertisements or as being

manipulative compared to corporate posts with images. Consistent with this possibility, ratings of "being posted for extrinsic reasons" were lower for corporate posts without images than corporate posts with images. In contrast, the individual posts may have been at greater risk for being dismissed as a form of bragging (Vaterlaus et al., 2015). While social comparison processes and the perceptions of social media content mentioned in this section were particularly relevant to the hypotheses in this study, there are many other qualities of social media content that are promising subjects for future research. In the next section, we consider the generalizability of the present findings and identify some of these opportunities for future research.

8.2. Generalizability and future directions

Our study benefits from a large sample size and a highly-powered within-subjects design (Schweizer & Furley, 2016). The study materials and planned analyses were also preregistered, enhancing the transparency and reproducibility of the reported research (van't Veer & Giner-Sorolla, 2016). Additionally, the stimuli were drawn from actual social media posts, contributing to the study's external validity. With these strengths in mind, it is also important to consider the limitations of this study and the extent to which the findings might generalize.

The participants in the present study appeared to be in good health with only one out of four people being classified as insufficiently active. Unfortunately, a relatively healthy and active sample is not ideal for examining the efficacy of exercise-related social media in promoting exercise motivation as part of an intervention strategy targeting insufficiently active individuals. An important task for future research is determining the extent to which social media content that effectively promotes health behaviors in healthy populations is also effective for less healthy populations who would most benefit from behavioral interventions. For example, participants in the present study who exercised less frequently also tended to have lower exercise self-efficacy and less intrinsic motivation to exercise. Social media content designed to promote exercise self-efficacy and highlight non-intrinsic reasons for exercising (e.g., appearance) may be more effective in these populations.

Participants in the present study were also more likely to be active users of Instagram (70%) than Twitter (30%) – the two social media platforms from which we acquired our stimuli. Given the relatively young sample, this disparity was unsurprising as Instagram is an especially popular platform among younger users (Pew Research Center, 2018). The stimuli in the present study were presented outside the context of their respective social media sites (Instagram and Twitter), and it was unnecessary for participants to be familiar with the originating social media site in order to provide their evaluations of the stimuli. Accordingly, we find it unlikely that participants' familiarity with the particular social media platforms had a large systematic

impact on their evaluations of the stimuli in the present study. However, future research could compare types of social media content within a single social media platform (e.g., Facebook) to more completely control for this possibility. Future research could also benefit from more thoroughly considering differences across social media platforms and their users. For example, social networks differ in the extent to which they tend to facilitate weak, distant relationships or strong, supportive relationships (Phua, Jin, & Kim, 2017b). Individuals' reasons for using social media and their interactions with brands also differ across social media platforms (Phua, Jin, & Kim, 2017a). Efforts to promote health behaviors that are tailored to these user- and platform-specific characteristics may be particularly effective, but additional research is needed to test these possibilities.

Continuing to examine the specific processes and factors that shape how exercise-related social media influences attitudes toward exercise behavior is another promising area for future research. For instance, researchers might directly test how attitudes toward exercise are influenced by social comparisons or by perceiving posts as bragging or advertisements. Another factor relevant to the present study is the preexisting relationship one has with the person or organization posting the content. The individual posts used in the present study were from strangers, but social media users may also be exposed to exercise-related posts from people they know and have existing attitudes toward such as close friends or acquaintances. Similarly, the corporate posts used in the present study were from recognizable companies for which users may have already formed positive or negative attitudes. Research suggests that the effect of these sort of characteristics (e.g., likability of the source) on attitudes often depends on other factors (e.g., high or low cognitive elaboration; Petty & Cacioppo, 1986). An extensive literature on attitude change identifies many other potentially relevant factors for consideration in future research (e.g., Gawronski & Bodenhausen, 2006).

Finally, it is essential to recognize that the present study provides a narrow look at only a few of the many processes influencing health behaviors. Perhaps most importantly, the present study focused on self-reported motivation to exercise as an indicator of behavioral intentions and did not assess actual exercise behavior. Given the within-subjects design of our study, measuring actual exercise behavior as a primary outcome variable was not feasible. An individual with strong behavioral intentions to exercise may still be prevented from carrying out the behavior if they lack the knowledge and skills required, if the behavior isn't salient, or if there are environmental constraints (Montaño & Kasprzyk, 2008). The potential consequences of exercise-related social media content are also not limited to only exercise motivation and exercise behavior, but may even include negative outcomes such as disordered eating and negative body image under certain circumstances (Boepple, Ata, Rum, & Thompson, 2016; Ghaznavi & Taylor, 2015). Conducting research that explicitly considers these processes and assesses actual behavioral outcomes is an essential step in learning how to most effectively promote positive health behaviors using social media.

9. Conclusion

The present study advances our understanding of how social media may be used to promote positive health behaviors, demonstrating that content type and account type influence the motivational qualities of exercise-related social media content. Realizing the greatest benefits from social media will require devoting careful attention to details such as these, and it is our hope that future research will continue to do just that.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.psychsport.2018.12.012.

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