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PHYSICAL ACTIVITY

The Influence of Posting Physical Activity Posts to Social Networking Sites on Young Adults' Physical Activity Engagement and Motivational Profiles

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Abstract

This study examined the physical activity and motivational effects of young adults posting physical activity posts to a social networking site. It used a repeated-measures, between-group design. Fifty-eight young adults from an introductory fitness course chose to participate in this study. Participants were divided into two groups: (a) posting physical activities to social networking sites and (b) not posting physical activities to social networking sites. Participants' physical activity and motivation were tracked throughout the intervention. The social networking group was less physically active at the beginning of the intervention but did not differ significantly from the control group at the end of the intervention. A t test revealed a significant increase in physical activity from baseline for the social networking group ($p = 0.001$) but not for the non–social networking group ($p = 0.44$). There were no significant differences relative to motivational indices between the two groups, although extrinsic regulation ($p = 0.06$) and amotivation

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(p = 0.06) displayed marginal significance. Social networking has become a part of life. This platform may hold promise for increasing physical activity levels among young adults. More research is needed on how social media may influence various motivational subconstructs.

Declining rates of physical activity (PA) among children and young adults (Strong et al., 2005; Troiano et al., 2008) is problematic given the link between physical inactivity and adverse health concerns such as diabetes, hypertension, stroke, and cardiovascular disease (U.S. Department of Health and Human Services, 2018). Conversely, research has suggested that regular PA engagement can reduce the risk of cardiovascular disease and other chronic diseases for individuals of all ages (Chakravarthy & Booth, 2004; McGavock et al., 2006). As a response to health concerns, the *Physical Activity Guidelines for Americans* (U.S. Department of Health and Human Services, 2018) recommends adults participate weekly in 150 min of moderate PA, 75 min of vigorous PA, or a combination of the two. Muscle-strengthening activities of a moderate to vigorous (MVPA) nature involving all major muscle groups should be performed at least 2 days/week. Yet, notwithstanding the known benefits of regular PA engagement (e.g., increased aerobic fitness, healthier body composition, skeletal health), fewer than 20% of adults meet the current PA recommendations (Centers for Disease Control and Prevention, 2013).

Self-Determination Theory and Physical Activity

Given the low percentage of individuals choosing to engage in healthful levels of PA, self-determination theory (SDT; Deci & Ryan, 1985) has been used as a theoretical framework in exploring why some individuals are more physically active than others (e.g., Sun & Chen, 2010). Within the SDT framework, motivation lies on a continuum ranging from amotivation to intrinsic motivation. Amotivation is characterized by an absence of value toward an activity, which generally results in the lack of identification to the task. Extrinsic motivation consists of behavior that is driven by external factors such as feeling compelled to accomplish a task for tangible rewards or to avoid punishment. Specifically, extrinsic motivation comprises four subconstructs: (a) external regulation, (b) introjected regulation, (c) identified regulation, and (d) integrated regulation. External regulation implies an individual is involved in an activity for

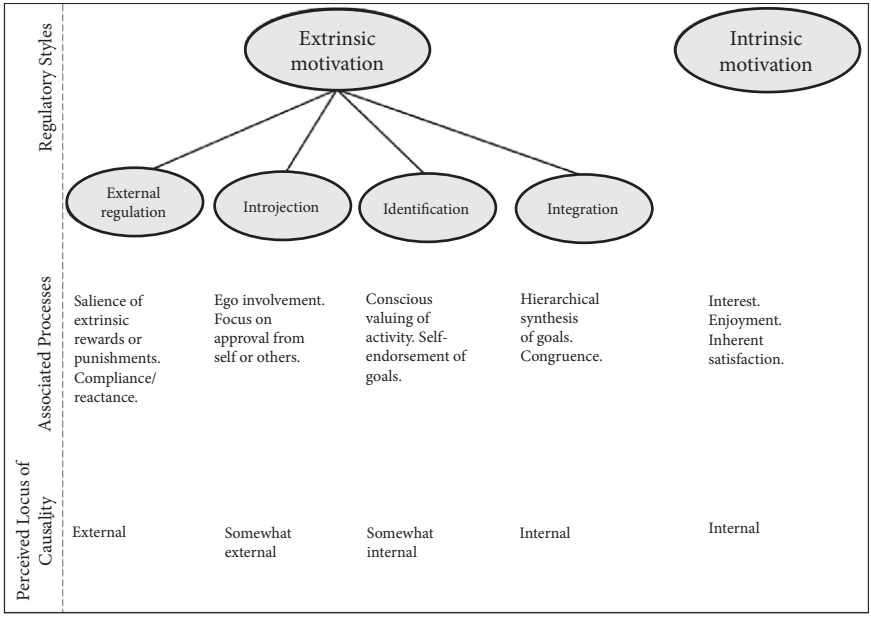
a reward or to avoid punishment (Barkoukis et al., 2008) and is the most representative type of extrinsic motivation. Introjection suggests an individual is beginning to internalize the reasons for their actions but is not fully self-determined in a given task. Identified regulation represents behaviors that are valued and considered important. Within this subconstruct, behavior is perceived as a choice. Integrated regulation refers to the most self-determined type of extrinsic motivation. Integrated regulation is goal directed but not fully internalized (Barkoukis et al., 2008).

Intrinsic motivation denotes engagement in an activity for enjoyment. Figure 1 demonstrates the nature of adjacent subscales along the motivational continuum. Movement along the continuum occurs as a person becomes more or less self-determined toward a given task. The concept of internalization describes how a person's motivation to engage in a behavior can range from amotivation, to passive compliance, to active personal commitment (Ryan & Deci, 2000a). Ryan and Deci (2000a) suggested that increased internalization is accompanied by greater persistence, heightened self-perception, and enhanced quality of engagement.

SDT postulates that basic psychological needs of autonomy, competence, and relatedness are universal and essential for ongoing psychological growth, internalization, and well-being (Van den Broeck et al., 2016). Applied to the educational setting, SDT proposes that a student must perceive sufficient autonomy ("I have choices"), competence ("I can"), and relatedness ("I feel encouraged by my teacher and peers") support to be self-determined in a task.

Vallerand (1997) expanded SDT to include three levels of generality: situational motivation, contextual motivation, and global motivation (see Figure 2). Situational motivation is the most malleable and refers to an individual's motivational profile for a specific activity. This includes how a person feels while engaging in the activity (e.g., a throwing and catching lesson or a kicking lesson in soccer). Contextual motivation is how a person feels about a life context (e.g., sports, physical education, running). Contextual motivation is a derivative of a multitude of experiences at the situational level. The most generalized level of motivation is the global level because it is the least malleable of the three levels and reflects a person's life traits and dispositions (e.g., how a person feels about engaging in an active lifestyle).

Figure 1
A Taxonomy of Human Motivation

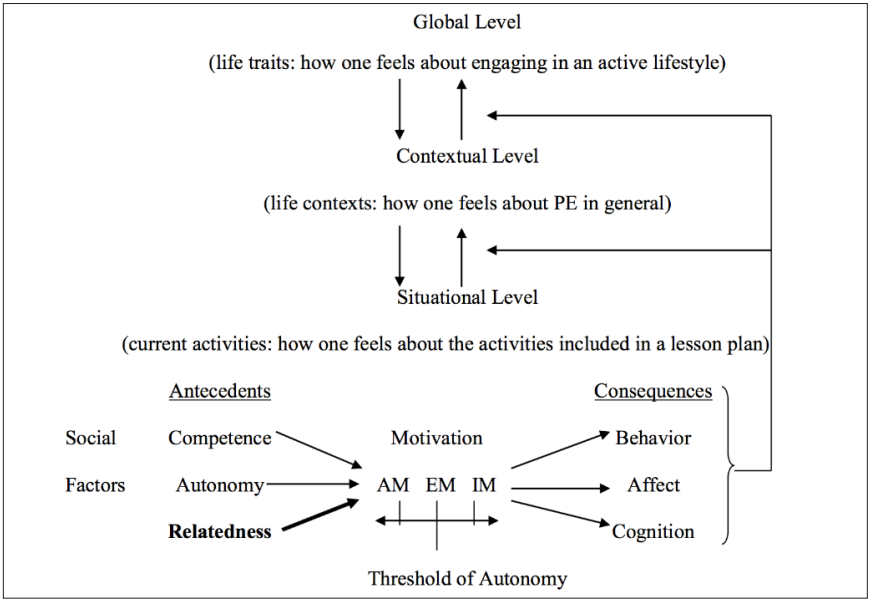


Note. From "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," by R. M. Ryan and E. L. Deci, 2000a, *Contemporary Educational Psychology*, *25*(1), p. 61 (https://doi.org/10.1006/ceps.1999.1020).

Social Media and Motivation

Usage of social networking sites (SNS) is among the most common activity of contemporary young adults (Schurgin O'Keeffe & Clarke-Pearson, 2011). Alt (2015) suggested that social networking engagement may be positively associated with extrinsic motivation and amotivation but mediated by fear of missing out (Alt, 2015). Fear of missing out indicates a pervasive apprehension that others might be involved in rewarding experiences apart from oneself—facilitating a desire to stay continually engaged in what others are doing (Przybylski et al., 2013). Accordingly, fear of missing out may enhance a person's engagement with SNS as a medium through which they maintain connectedness and relatedness with others (Alt, 2015).

Figure 2
Hierarchical Model of Self-Determination Theory



Note. AM = amotivation; EM = extrinsic motivation; IM = intrinsic motivation. Model adapted from Prusak et al. (2004) to illustrate the multidimensional nature of SDT and to represent its theoretical construct. Relatedness is **bolded** to suggest the particular nutriment isolated in the present study.

Some scholars advocate the need to embrace SNS as an educational tool (e.g., Ito et al., 2009; Jenkins, 2009). Young adults have reported utilizing SNS and generally preferring group-based approaches to study and communication with others (McMahon & Pospisil, 2005). Tarantino et al. (2013) observed that students may develop connections with peers, establish a virtual community of learners, and increase overall learning skills when engaging with SNS. However, the most effective method for incorporating SNS into the educational settings is unclear. A more recent study concluded that using SNS to post pictures of daily activities could increase self-awareness of PA levels and subsequently enhance PA engagement (Treadwell & Taylor, 2017). Teodoro and Naaman (2013) also reported that individuals who posted exercise posts to SNS were more likely to maintain adherence to an exercise program. Other studies

reported that posting physical activities or diet plans may be beneficial for accomplishing fitness goals (Consolvo et al., 2009).

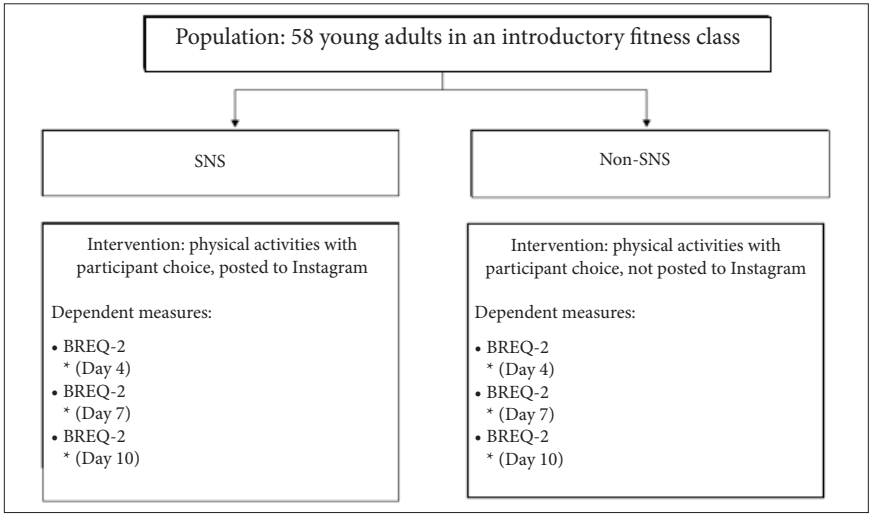
Because SNS may create a space to enhance social interaction, these outlets have the potential to enhance a young adult's perceived relatedness support and subsequent exercise patterns. To date, research examining the influence of posting to SNS on PA levels within an SDT framework is limited. Thus, this study examined PA levels and motivational profiles of young adults posting and not posting activities to an SNS. Specifically, the research questions included the following: (a) Does PA increase by a greater amount for young adults who post PA pictures to SNS compared to young adults who do not? (b) How does posting physical activities on an SNS influence a person's motivational profile toward PA?

Method

This study employed a repeated-measures, between-subjects design wherein each participant experienced one treatment (i.e., with or without posting to an SNS). Group A represented the treatment group and Group B the control group. Each group completed surveys on Days 4, 7, and 10 of the intervention (see Figure 3).

Figure 3

Procedures Map of BREQ-2 Survey Administration



Note. SNS = social networking site.

Participants

Approval for this study was obtained from the institutional review board prior to data collection. The sample of students who volunteered to participate in this study included 58 young adults (female, $n = 44$) ages 18 to 22 in an introductory fitness class. Baseline PA levels were tracked via Qualtrics, where participants reported general levels of engagement by selecting "daily," "2–3 times per week," "rarely," and "almost never." PA level percentages were calculated as follows: 43% exercised daily, 33% exercised 2 to 3 times/week, 0% rarely exercised, 1% almost never exercised, and 22% did not answer. Participants' PA included weight lifting, cardio, gymnastics, swimming, basketball, softball, and biking, among others. Students were also asked about SNS usage and the percentages were calculated as follows: 5% multiple posts/day, 5% once a day, 19% 2 to 3 times/week, 48% rarely, and 22% did not answer. Recording PA engagement and usage of SNS provided a richer description of the participants' daily practices and allowed us to draw more accurate conclusions from results.

Measures

We selected the instruments for this study with the aim of assessing PA levels and motivational profiles of participating students without involving extensive instrument familiarization.

Pedometers

The OMRON Walking Style pedometer, model HJ-720ITC, used in this study has two uniaxial piezoelectric acceleration sensors oriented at 90 degrees to each other to count steps, allowing it to accurately count steps when placed horizontally or vertically. This device was worn on the waistband and initial setup for the pedometer included setting the weight and stride length on the device for each student. The device tracked number of steps, distance, and caloric expenditure with a horizontal spring suspended lever arm moving up and down with acceleration of the hip joint during ambulation. Pedometers included the capability of being connected to a computer by a USB cable, allowing for data to be downloaded to a personal computer. A user account where up to 41 days of data could be uploaded was created for each participant. This instrument

has demonstrated high consistency and 3% absolute percent error whether worn at the waist or in the pocket under prescribed and self-paced walking conditions (Holbrook et al., 2009).

Behavioral Exercise Regulation Questionnaire (BREQ-2)

The Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2; Mullan et al., 1997) comprises four subscales assessing external (four items, e.g., "I exercise because other people say I should"), introjected (three items, e.g., "I feel guilty when I don't exercise"), identified (three items, e.g., "I value the benefits of exercise"), and intrinsic (four items, e.g., "I exercise because it's fun") regulations. In addition, four amotivation items from Mullan et al.'s (1997) initial item pool were included ("I don't see why I should have to exercise," "I can't see why I should bother exercising," "I don't see the point in exercising," and "I think that exercising is a waste of time"). Researchers have suggested that the BREQ-2 may prove useful in assessing amotivation for the development of a more complete understanding of motivation for PA (Markland & Tobin, 2004).

Procedures

Walking Style pedometers were distributed following appropriate calibrations and familiarization. Directions for wearing the pedometers were given in person and by subsequent email communication. Students were required to keep a log of daily steps, distance traveled, and caloric expenditure from the time they woke up until they went to bed. Students were familiarized through email with the BREQ-2 two days prior to data collection. In alignment with previous research (Prusak et al., 2004), surveys were completed on Days 4, 7, and 10 immediately following the activity. Surveys were electronically distributed at 12:00 a.m. on the specified days via Qualtrics survey software.

Participants were randomly selected for each group. Group A was emailed instructions relative to creating an account on a private SNS. Each group member in Group A received a list of all participants in that group. The list included names and an assigned username including a six-digit number to conceal their identity to any outside account. Group A participants spent one weekend "following" the other participants in Group A and the principal investigator. After

the SNS familiarization, participants practiced uploading a picture and writing a brief caption.

Both groups were instructed to wear the pedometer from the moment they woke up until the moment they went to bed for 14 consecutive days. Participants submitted data logs via email to Celia DeVitis on Day 7 (to enhance participant accountability for their data) and again the day proceeding the intervention. Data logs were subsequently de-identified, keyed, and secured in an electronic document by DeVitis to ensure all identities were concealed.

Participants in Group A uploaded a picture daily to their SNS account. Participants posted pictures of themselves being physically active and t used self-monitoring captions of what they were doing, including the duration and nature of the activity. Group B was only responsible for completing the data logs. The self-monitoring captions were required and assisted in keeping participants accountable for PA levels. Each participant was encouraged to ask questions or post responses on their peers' pictures so long as the comments were appropriate for an educational setting.

Analysis

Statistical analyses were performed using SPSS 25. Normality was inspected via visual graph inspection and analysis of skewness and kurtosis statistics for each dependent variable. Non-normally-distributed data were transformed through log transformations. Calculation of descriptive statistics followed confirmation of normality and transformations. The unit of analysis was at the individual level. Mean scores were calculated for each subscale and subsequent analyses were conducted using subscale means. Correlation analyses were conducted across dependent variables, which confirmed the simplex pattern of the subscales. Cronbach's alphas were performed on each of the survey measures, which determined internal consistency.

To answer the first research question, "Does PA increase by a greater amount in young adults who post PA pictures to SNS as compared to young adults who do not?" we used an independent-samples *t* test to determine any between-group differences in PA change across the intervention. To answer the second research question, "How does posting physical activities on SNS effect one's motivational profile towards PA?" we conducted a 2 (Group) × 3 (Trials) repeated-measures

analysis of variance to ascertain between-group and within-trial differences for each dependent variable assessing motivational indices (i.e., amotivation, external regulation, introjected regulation, identified regulation, intrinsic regulation).

Results

Table 1 shows descriptive statistics by group for each dependent variable. Alpha coefficients ranged from .67 to .81 and met or approached acceptable reliability standards based on an alpha of .70. The SNS group began with significantly lower mean PA scores at Day 4 (M = 6264.52) than the non-SNS group (M = 9262.66) at $t(50) = -3.044$, $p = 0.004$. At the end of Week 2, the SNS group (M = 8198.00) did not significantly differ from the non-SNS group (M = 8329.54) at $t(50) = -.112$, $p = 0.911$, indicating a greater PA increase for the SNS group than the non-SNS group. Low mean scores ranged from 3.36 to 4.08 for extrinsic regulation, 7.45 to 8.72 for introjected regulation, 9.56 to 11.20 for identified regulation, 13.09 to 13.95 for intrinsic motivation, and 0.22 to 0.50 for amotivation, indicating that the students were not disinterested in their PA and felt more self-directed than externally controlled. Specifically, motivational indices indicated higher scores for constructs representing more intrinsically-driven behavior.

Table 1
Descriptive Statistics and Internal Consistency for Each Measure by Group

	Social networking (n = 30)		Non–social networking (n = 28)	
Variable	***M***	***SD***	***M***	***SD***
Physical activity				
Baseline	6264.53	(2457.95)	9262.66	(4489.12)
Time 1	9299.07	(4047.99)	11674.54	(4163.86)
Time 2	8198.00	(3806.82)	8329.54	(4668.47)
External regulation				
Baseline	3.36	(3.51)	4.08	(2.90)
Time 1	3.42	(2.69)	5.09	(3.25)
Time 2	4.00	(3.66)	4.59	(3.87)

Table 1 (cont.)

	Social networking (n = 30)		Non–social networking (n = 28)	
Variable	***M***	***SD***	***M***	***SD***
Introjection				
Baseline	7.45	(2.72)	8.72	(2.54)
Time 1	8.15	(2.98)	9.57	(2.46)
Time 2	8.54	(3.19)	9.59	(2.99)
Identification				
Baseline	11.17	(1.20)	11.28	(1.21)
Time 1	11.42	(1.36)	11.52	(0.95)
Time 2	11.21	(1.44)	11.55	(0.80)
Intrinsic				
Baseline	14.14	(2.17)	12.56	(2.22)
Time 1	13.96	(2.49)	13.22	(2.19)
Time 2	13.96	(2.80)	13.09	(2.14)
Amotivation				
Baseline	0.23	(0.75)	0.68	(1.11)
Time 1	0.43	(0.90)	0.87	(1.55)
Time 2	0.83	(1.71)	0.50	(1.26)

Table 2 displays correlations between PA and motivational indices. Extrinsic regulation and amotivation are negatively correlated with PA, whereas identified and intrinsic regulation display significant positive correlations, indicating the more disinterested or externally-controlled a student felt, the less physically active they were. The significant positive linear correlations between extrinsic motivation and amotivation and between intrinsic and identified regulation reveal the expected simplex pattern where adjacent subscales are positively correlated and distal subscales are negatively correlated.

A one-sample t test revealed a significant within-group change for the SNS group between baseline (M = 6264.53, SD = 2457.95) and Week 1 (M = 9299.07, SD = 4047.99), $t(27) = 3.93$, $p = 0.001$, and a significant increase in PA across the intervention baseline (M = 9299.07,

Table 2
Correlation Matrix for Each Measure by Group

Variable	Steps	Ex	Intro	Ide	IM	Am
Steps	1.00					
Ex	−0.529*	1.00				
Intro	0.255	−0.024	1.00			
Ide	0.518*	−0.224	0.563*	1.00		
IM	0.522*	−0.478*	0.310	.748**	1.00	
Am	−0.510*	0.194	−0.434	−0.908**	−0.684**	1.00

Note. Ex = external regulation; Intro = introjected regulation; Ide = identified regulation; IM = intrinsic motivation; Am = amotivation.

* $p < 0.05$. ** $p < 0.01$.

SD = 4047.99) and Week 2 (*M* = 8198.00, *SD* = 3806.82), $t(27) = 3.29$, $p = 0.003$, suggesting that the SNS group increased in PA. An additional one-sample *t* test revealed a significant within-group change for the non-SNS group between baseline (*M* = 9262.66, *SD* = 4489.12) and Week 1 (*M* = 11674.54, *SD* = 4163.86), $t(23) = 2.59$, $p = 0.016$, but not between baseline (*M* = 9262.66, *SD* = 4489.12) and Week 2 (*M* = 8329.54, *SD* = 4668.47), $t(23) = -.781$, $p = 0.44$, indicating that the non-SNS group initially increased in PA as the intervention began but regressed into similar PA patterns by the end of the intervention. An independent-samples *t* test revealed a significant between-group difference for change in PA across the intervention, $t(50) = 2.25$, $p = 0.02$, $d = 0.61$, with the SNS group increasing PA by a mean of 1933.46 (*SD* = 4081.76) and the non-SNS group decreasing in PA (*M* = −933.12, *SD* = 5850.41), indicating that the SNS group experienced significantly more increase in PA across the intervention than the non-SNS group. Posting PA on an SNS did not have a significant effect on any of the subscale means, although extrinsic regulation, $F(1, 37) = 3.499$, $p = 0.06$, and amotivation, $F(1, 37) = 3.55$, $p = 0.06$, trended toward significance.

Discussion

This study examined the influence of social networking on PA levels and motivational profiles toward PA engagement of young

adults enrolled in a required fitness introduction course. For the first research question, results revealed a significant between-group difference for change in PA across the intervention. These findings align with those in studies suggesting that individuals who post motivational exercise posts to SNS are more likely to maintain adherence to an exercise program (Teodoro & Naaman, 2013). Posting to an SNS may be an efficient way for a person to enhance conscientiousness about PA levels. A study by Treadwell and Taylor (2017) indicated that middle school children who post about their PA engagement to SNS are more likely to attach importance to engaging in a PA lifestyle than children who do not post about their PA engagement.

It has been observed that young adults may be particularly attentive to social networking interactions, preferring group-based approaches to studying and social activities (McMahon & Pospisil, 2005). Many young adults have been using SNS since childhood and are likely accustomed to navigating this medium. Ito et al. (2009) proposed that individuals will learn in new ways using SNS and that educators should embrace these platforms. Results from this study support the potential usage of SNS as a tool for increasing PA among young adults. Given that habits maintained in adulthood are often formed in childhood (Boreham & Riddoch, 2001), physical educators can equip students with the knowledge and tools to use SNS for the purpose of increasing PA rather than as a substitute for PA engagement.

Possible explanations for the non-SNS group's declining PA levels compared to the SNS group's PA levels across the 2-week intervention could be that the non-SNS group experienced an initial placebo effect. It is not unreasonable that the novelty of participating in a research study, along with emails and increased personal attention, influenced the initial PA patterns of the control group. However, perhaps when the novelty wore off, these students regressed toward the original baseline mean (see Harvard Health Publishing, 2017).

Social Networking and Motivation Toward Physical Activity

Within the SDT framework, intrinsic motivation refers to doing something because it is inherently interesting and enjoyable. When motivation is internally—rather than externally—originating, enhanced affect, behavior, and learning may result (Deci & Ryan, 1985). Correlation analysis in this study suggests a positive linear

relationship between PA and identified regulation and between PA and intrinsic motivation, regardless of group assignment. Simply put, those who identified with the activities and whose motivation was intrinsically originating were more likely to engage in PA than their peers with more externally originating motivation or amotivation toward the activities. These findings align with research supporting the theoretical constructs of SDT (Deci & Ryan, 1985).

We hypothesized that posting daily pictures of PA to an SNS would increase self-determination relative to engaging in PA as a result of increased perceived relatedness support. This hypothesis was not supported in these data. In fact, between-group results suggest that posting to an SNS may have had the opposite effect and caused participants in the treatment group to feel compelled to post on the SNS and also compelled to engage in PA. These results would align with other research suggesting that posting to an SNS may be positively associated with extrinsic motivation and amotivation (Alt, 2015). It is also possible that treatment group participants perceived thwarted autonomy because they did not self-select an SNS and were additionally tasked with obligatory daily posting to a specified SNS. Research has suggested that autonomy support is a critical nutriment in influencing a person's intrinsic motivation (Deci, 1971). We additionally state that external regulators for participating in an activity can cause participants to lose interest in that activity.

Limitations

Limitations of the study include the purposeful selection of college-aged students in an introductory fitness course, thus limiting the generalizability of the findings. Likewise, this study included the use of convenience—rather than random—sampling and self-reporting of PA. Further, the sample size is relatively small, though repeated measures accounted for this. Student attrition and the unpredictable nature of performing research and self-report in an ecologically valid setting can also affect the study results. The duration of the study is an additional limitation. A longer study duration could influence student PA patterns and motivation in a way that a shorter intervention cannot detect.

Conclusion

Social networking has become a way of life for youth and young adults. Given the time that young people spend on SNS, posting pictures of PA participation and increased dialogue around PA participation hold the potential to be part of a public health tool for enhancing students' participation in health-enhancing levels of PA. University faculty and K–12 teachers alike have an opportunity to be forward-thinking by creatively utilizing online platforms to enhance student engagement in healthful behaviors. However, it is unclear to what extent posting to an SNS influences PA engagement. Posting to an SNS is autonomous and spontaneous in nature, and designing a controlled experimental study that involves posting to an SNS as the independent variable is riddled with challenges. Recent research has reported that middle school students who kept an online PA log were significantly more self-determined than their peers who did not keep a log (Fullmer et al., 2018). Perhaps the most important implication is for young adults and children to be aware of and competent in tracking their own PA engagement regardless of the medium. Keeping a personal PA log or journal may be helpful for some, but coupling individual reporting with public sharing of activities may increase a person's feelings of relatedness over time when the posts are more organic and autonomous in nature. However, more research is needed to support these conclusions.

References

Alt, D. (2015). College students' academic motivation, media engagement, and fear of missing out. *Computers in Human Behavior*, *49*, 111–119. https://doi.org/10.1016/j.chb.2015.02.057

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.

Barkoukis, V., Tsorbatzoudis, H., Grouios, G., & Sideridis, G. (2008). The assessment of intrinsic and extrinsic motivation and amotivation: Validity and reliability of the Greek version of the Academic Motivation Scale. *Assessment in Education: Principles, Policy, & Practice*, *15*(1), 39–55. https://doi.org/10.1080/09695940701876128

Bartholemew, K. J., Ntoumanis, N., Ryan, R. M., & Thogersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport & Exercise Psychology*, *33*(1), 75–102. https://doi.org/10.1123/jsep.33.1.75

Boreham, C., & Riddoch, C. (2001). The physical activity, fitness and health of children. *Journal of Sports Sciences*, *19*(12), 915–929. https://doi.org/10.1080/026404101317108426

Centers for Disease Control and Prevention. (2013, May 2). *One in five adults meet overall physical activity guidelines* [Press release]. https://www.cdc.gov/media/releases/2013/p0502-physical-activity.html

Chakravarthy, M. V., & Booth F. W. (2004). Eating, exercise, and "thrifty" genotypes: Connecting the dots toward and evolutionary understanding of modern chronic diseases. *Journal of Applied Physiology*, *96*(1), 3–10. https://doi.org/10.1152/japplphysiol.00757.2003

Connel, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system process. In M. R. Gunnar & L. A. Sroufe (Eds.), *The Minnesota Symposia on Child Psychology: Vol. 23* (pp. 43–77). Lawrence Erlbaum Associates.

Consolvo, S., Klasnja, P., McDonald, D. W., & Landay, J. A. (2009). Goal-setting considerations for persuasive technologies that encourage physical activity. In *Proceedings of the 4th International Conference on Persuasive Technology, Persuasive 2009*. Association for Computing Machinery. https://doi.org/10.1145/1541948.1541960

Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology, 18*(1), 105–115. https://doi.org/10.1037/h0030644

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*(2), 109–134. https://doi.org/10.1016/0092-6566(85)90023-6

Faucette, N., McKenzie, T. L., & Patterson, P. (1990). Descriptive analysis of nonspecialist elementary physical education teachers' curricular choices and class organization. *Journal of Teaching Physical Education*, *9*(4), 284–293. https://doi.org/10.1123/jtpe.9.4.284

Fogg, B. J. (2003). *Persuasive technology: Using computers to change what we think and do*. Morgan Kaufmann Publishers.

Fullmer, M. O., Wilkinson, C., Prusak, K. A., Eggett, D., & Pennington, T. (2018). Adolescent physical activity and motivational profiles while keeping a physical activity record. *Journal of Teaching in Physical Activity*, *37*(1), 1–11. https://doi.org/10.1123/jtpe.2017-0072

Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the assessment of situational intrinsic and extrinsic motivation: The Situational Motivation Scale (SIMS). *Motivation and Emotion*, *24*(3), 175–213. https://doi.org/10.1037/t12678-000

Gunnel, K. E., Crocker, P. R. E., Wilson, P. M., Mack, D. E., & Zumbo, B. D. (2013). Psychological need satisfaction and thwarting: A test of basic psychological needs theory in physical activity contexts. *Psychology of Sport and Science*, *14*(5), 599–607. https://doi.org/10.1016/j.psychsport.2013.03.007

Harvard Health Publishing. (2017, May). *The power of the placebo effect*. https://www.health.harvard.edu/mental-health/the-power-of-the-placebo-effect

Holbrook, E. A., Barreira, T. V., & Kang, M. (2009). Validity and reliability of Omron pedometers for prescribed and self-paced walking. *Medicine & Science in Sports & Exercise*, *41*(3), 670–674. https://doi.org/10.1249/mss.0b013e3181886095

Ito, M., Baumer, S., Bittanti, M., Boyd, D., Cody, R., & Herr-Stephenson, B. (2009). *Hanging out, messing around, and geeking out: Kids living and learning with new media*. MIT Press. https://doi.org/10.7551/mitpress/11832.001.0001

Jenkins, H. (with Clinton, K., Purushotma, R., Robison, A. J., & Weigel, M.). (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. The John D. and Catherine T. MacArthur Foundation. https://www.macfound.org/media/article_pdfs/JENKINS_WHITE_PAPER.PDF

Kelder, S. H., Karp, G. G., Scruggs, P. W., & Brown, H. (2014). Setting the stage: Coordinated approaches to school health and physical education. *Journal of Teaching in Physical Education*, *33*(4), 440–448. https://doi.org/10.1123/jtpe.2014-0087

Kendzierski, D., & DeCarlo, K. J. (1991). Physical activity enjoyment scale: Two validation studies. *Journal of Sport & Exercise Psychology*, *13*(1), 50–64. https://doi.org/10.1123/jsep.13.1.50

Markland, D., & Tobin, V. (2004). A modification to the Behavioural Regulation in Exercise Questionnaire to include an assessment of amotivation. *Journal of Sport & Exercise Psychology*, *26*(2), 191–196. https://doi.org/10.1123/jsep.26.2.191

McGavock, J. M., Anderson, T. J., & Lewanczuk, R. Z. (2006). Sedentary lifestyle and antecedents of cardiovascular disease in young adults. *American Journal of Hypertension*, *19*(7), 701–707. https://doi.org/10.1016/j.amjhyper.2006.01.013

McMahon, M., & Pospisil, R. (2005). Laptops for a digital lifestyle: Millennial students and wireless mobile technologies. In *Proceedings of the 22nd ASCILITE Conference* (pp. 421–431). Australasian Society for Computers in Learning in Tertiary Education. https://www.ascilite.org/conferences/brisbane05/proceedings.shtml

Mullan, E., Markland, D., & Ingledew, D. K. (1997). A graded conceptualization of self-determination in the regulation of exercise behavior: Development of a measure using confirmatory factor analytic procedures. *Personality and Individual Differences*, *23*(5), 745–752. https://doi.org/10.1016/s0191-8869(97)00107-4

National Association for Sport and Physical Education. (2001). *Shape of the nation report: A survey of state physical education requirements*. American Alliance of Health, Physical Education, Recreation, and Dance.

National Center for Health Statistics. (1997). Update: Prevalence of overweight among children, adolescents, and adults—United States, 1988–1994. *Morbidity and Mortality Weekly Report*, *46*(09), 198–202.

The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development Network. (2003). Frequency and intensity of activity of third-grade children in physical education. *Archives of Pediatrics and Adolescent Medicine*, *157*(2), 185–190. https://doi.org/10.1001/archpedi.157.2.185

Parcel, G. S., Simmons-Morton, B. G., O'Hara, N. M., Baranowski, T., Kolbe, L. J., & Bee, D. E. (1987). School promotion of healthful diet and exercise behavior: An integration of organizational change and social learning theory interventions. *The Journal of School Health*, *57*(4), 150–156. https://doi.org/10. 1111/j.1746-1561.1987.tb04163.x

Prusak, K. A., Treasure, D. C., Darst, P. W., & Pangrazi, R. P. (2004). The effects of choice on the motivation of adolescent girls in physical education. *Journal of Teaching in Physical Education*, *23*(1), 19–29. https://doi.org/10.1123/jtpe.23.1.19

Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, *29*(4), 1841–1848. https://doi.org/10.1016/j.chb.2013.02.014

Roth, D. L. (1989). Acute emotional and psychophysiological effects of aerobic exercise. *Psychophysiology*, *26*(5), 593–602. https://doi.org/10.1111/j.1469-8986.1989.tb00716.x

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066x.55.1.68

Sallis, J. F., & McKenzie, T. L. (1991). Physical education's role in public health. *Research Quarterly for Exercise and Sport*, *62*(2), 124–137. https://doi.org/10.1080/02701367.1991.10608701

Sarkin, J. A., McKenzie, T. L., & Sallis, J. F. (1991). Gender differences in physical activity during fifth-grade physical education and recess periods. *Journal of Teaching Physical Education*, *17*(1), 99–106. https://doi.org/10.1123/jtpe.17.1.99

Schurgin O'Keeffe, G., & Clarke-Pearson, K. (2011). Clinical report – The impact of social media on children, adolescents, and families. *Pediatrics*, *127*(4), 800–804. https://doi.org/10.1542/peds.2011-0054

So-Kum Tang, K., Woen Koh, Y., & Gan, Y. (2017). Addiction to internet use, online gaming, and online social networking among young adults in China, Singapore, and the United States. *Asia Pacific Journal of Public Health*, *29*(8), 673–682. https://doi.org/10.1177/1010539517739558

Strong, W. B., Malina, R. M., Blimkie, C. J. R., Daniels, S. R., Dishman, R. K., Gutin, B., Hergenroeder, A. C., Must, A., Nixon, P. A., Pivarnik, J. M., Rowland, T., Trost, S., &Trudeau, F. (2005). Evidence based physical activity for school-age youth. *The Journal of Pediatrics*, *146*(6), 732–737. https://doi.org/10.1016/j.jpeds.2005.01.055

Sun, H., & Chen, A. (2010). A pedagogical understanding of the self-determination theory in physical education. *Quest*, *62*(4), 364–384. https://doi.org/10.1080/00336297.2010.10483655

Tarantino, K., McDonough, J., & Hua, M. (2013). Effects of student engagement with social media on student learning: A review of literature. *The Journal of Technology in Student Affairs*, *2013*. https://www.studentaffairs.com/resources/ejournal/archives/2013-summer/

Telama, R. (2009). Tracking of physical activity from childhood to adulthood: A review. *Obesity Facts*, *2*(3), 187–195. https://doi.org/10.1159/000222244

Teodoro, R., & Naaman, M. (2013). Fitter with Twitter: Understanding personal health and fitness activity in social media. In *Proceedings of the Seventh International Conference on Weblogs and Social Media* (pp. 611–620). The AAAI Press. https://www.aaai.org/Library/ICWSM/icwsm13contents.php

Treadwell, S. M., & Taylor, N. (2017). PE in pictures: Using Photovoice to promote middle school students' reflections on physical activity during free time. *Journal of Physical Education, Recreation, & Dance*, *88*(4), 26–33. https://doi.org/10.1080/07303084.2017.1280436

Troiano, R. P., Berrigan, D., Dodd, K. W., Masse, L. C., Tilert, T., & Mcdowell, M. (2008). Physical activity in the United States measured by accelerometer. *Medicine & Science in Sports & Exercise*, *40*(1), 181–188. https://doi.org/10.1249/mss.0b013e31815a51b3

U.S. Department of Health and Human Services. (2018). *Physical activity guidelines for Americans* (2nd ed.). https://health.gov/paguidelines/second-edition/

Vallerand, R. J. (1997). Toward a hierarchial model of intrinsic and extrinsic motivation. *Advances in Experimental Social Psychology*, *29*, 271–360. https://doi.org/10.1016/s0065-2601(08)60019-2

Van den Broeck, A., Ferris, D. L., Chang, C., & Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management*, *42*(5), 1195–1229. https://doi.org/10.1177/0149206316632058

Wankel, L. M. (1993). The importance of enjoyment to adherence and psychological benefits from physical activity. *International Journal of Sport Psychology*, *24*(2), 151–169.

Whiting, A., & Williams, D. (2013). Why people use social media: A uses and gratifications approach. *Qualitative Market Research: An International Journal*, *16*(4), 362–369. https://doi.org/10.1108/qmr-06-2013-0041

Zajonc, R. B. (1965). Social facilitation. *Science*, *149*, 269–274.