9-2022

Motivation to Be Active and Use of Technology to Monitor Physical Activity Levels: Comparing PE and Non-PE Majors

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Abstract

The purpose of the current study was to examine (a) the use of technology to monitor physical activity (PA) between PE students and non-PE students, (b) the motivation to be physically active between PE students and non-PE students, (c) and the PA levels between PE students and non-PE students. **Methods**: A survey that asked demographic, technology use, PA level, and PA motivation questions was distributed to undergraduate students. **Results**: Students majoring in PE were more physically active, used technology more often to monitor PA, and perceived their need to be physically active as satisfied more than non-PE students. **Discussion**: PA is a vital part of PE in K-12 schools, and K-12 PE teachers can play a large role in helping students to be physically active by using their own experiences of knowledge acquisition, skill acquisition, reinforcement, and technology use to monitor PA. In conclusion, it could be hypothesized that the PE students in this study have been trained to use technology to increase their PA and should be able to translate this into their K-12 PE classroom to educate their students on how to use technology for health benefits.

The Centers for Disease Control and Prevention (CDC) (2021) recommends that adults participate in at least 150 minutes of moderate-intensity aerobic activity every week in order to see benefits from physical activity (PA), such as maintaining a healthy body weight, muscle and bone strength, and flexibility. However, the surgeon general report by the CDC (2015) found that more than 60% of Americans are not regularly active and 25% of Americans are not active at all. Additionally, it has been found that approximately 50% of college students do not meet PA recommendations, obesity rates often increase when young adults enter university settings, and 22.4% of 18 to 24 year-old college students engage in little to no PA (American College Health Association, 2012; Bhochibhoya, Branscum, Taylor, & Hofford, 2014; Gropper, Simmons, Connell, & Ulrich, 2012).

The motivation to be physically active can decrease when students enter a university, and it was found that time, energy, and willpower can be some of the main reasons why college students are not motivated to be physically active (Kulavic, Hultquist, & McLester, 2013). Deci and Ryan (1985) developed the Self Determination Theory (SDT) to help understand and explain motivation in many areas. The basis of this theory is that motivation can occur when three basic psychological needs are met: autonomy (power to choose), competence (mastery of skills), and relatedness (meaningful connections) (Deci & Ryan, 1985, 2000, 2002). The SDT has been used in many studies to understand what motivational factors influence people to engage in regular PA. One conclusion from a systematic review of the literature on PA and SDT was that competence was shown to have consistent support for a positive association with PA (Teixeira, Carraca, Markland, Silva, & Ryan, 2012). Based on this finding, people who are motivated to be physically active must have the knowledge of how to be physically active. Technology can help provide the knowledge of how to be physically active and be used to help monitor and motivate PA behaviors (McFadden & Li, 2019).

Technology to track activity is not restricted solely to wearable devices. Different types of mobile phone applications allow individuals to match health goals with unique tracking systems (Fanning, Mullen, & McAuley, 2012). The past few years have resulted in an increase in mobile phone applications as well as internet-based interventions using social media platforms, such as Facebook, Instagram, and Twitter, to share

knowledge, provide support, and give resources for various types of PA (Medairos, Kang, Aboubakare, Kramer, & Dugan, 2017). Through social networking, the usage of mobile apps, and/or social media platforms, individuals who share PA levels may gain motivation to be physically active (Althoff, White, & Horvitz, 2016; Maher et al., 2015).

Technology can be an effective tool in assisting and motivating university students to meet health goals by monitoring health-related behaviors, such as dietary intake and PA, and energy expenditure (Althoff, Jindal, & Leskovec, 2017; Bice, Ball, & McClaran 2015; Fanning, et. al, 2012; McFadden & Li, 2019). An advantage of the integration of technology use is that it provides immediate tracking response for consumers to view (Ball, Bice, & Adkins, 2015; Bice, et. al, 2015). Individuals who have not met their health goals can assess current behaviors by analyzing data from the device to help figure out what modifications will support meeting their goals (Dallinga, Mennes, Alpay, Bijwaard, & Baart De La Faille-Deutekom, 2015). However, the ability to do so assumes that the individual has the knowledge of how to integrate technology into their lifestyle and has the education to assess their data and apply what they have learned to implement behavior change. In a study that combined education and technology to assess behavioral changes in PA, it was revealed that education alone did not have the same impact on individual activity patterns as compared to education being paired with a piece of technology (Rote, 2017). Educational information is important, but in many cases, individuals do not know how to apply knowledge into making positive lifestyle changes. University students going into health professions such as physical education (PE) can help provide the knowledge and application of technology to help others learn how to use technology to monitor health behaviors.

In a study that surveyed PE student teachers, an overwhelming majority felt they were either trained or highly trained to use technology in the classroom (Krause, 2017). However, Hill and Valdez-Garcia (2020) found that one of the top barriers stated by PE teachers when using technology was a lack of understanding of how to integrate technology. PE undergraduate students should be acquiring the knowledge of how to integrate technological devices into the classroom because it has been found that technology is an integral part of PE classes that can support teaching and learning (Casey, Goodyear, & Armour, 2017; Lee & Gao, 2020). Teaching others how to use the technology to monitor and change behaviors is essential for PE students to understand.

In a study of undergraduate students in a PE and sports management department, it was found that PE students were more active than sports management students, but there was no comparison of technology use, and research is limited on the use of technology by PE students to monitor their PA (Yildirim, 2018). Literature is also limited on the amount of PA that PE students get as compared to students in other degrees. The purpose of the current study was to compare (a) the use of technology to monitor PA between PE students and non-PE students, (b) the motivation to be physically active between PE students and non-PE students, (c) and the PA levels between PE students and non- PE students.

Methods

Protocol

Permission to contact university students was approved by the primary investigator's Institutional Review Board (IRB). Study participants included students at a midsized Midwestern 4-year university. Participants were voluntarily solicited and recruited due to their university status of being an active student. Participants were approached and asked to complete a survey that included informed consent, demographic information, technology use as it relates to health behaviors, PA behaviors, and motivation to be physically active.

Participant Demographics

Demographic information included each participants' age, height (inches), weight (pounds), race, and gender. In addition, the researchers identified PE students from the student population by asking participants to report their major.

Measured Variables

Technology use was assessed by asking participants if they utilized smartphone applications or activity tracking devices to monitor their PA behaviors. PA was assessed by asking students if they were physically active for 30 minutes or more 3 times a week. Participants were given a list of examples of PA that included walking, hiking, jogging, running, stair climbing, biking, elliptical, aerobic classes, water aerobics, cycling, rowing, swimming, weight training, and sports (tennis, basketball, softball, football, racquetball, soccer, etc…).

The Perceived Need Satisfaction Exercise (PNSE) scale, developed by Wilson, Rogers, Rodgers, and Wild (2006), was used to assess PA motivation. The PNSE scale assesses how the participant perceives their basic

psychological needs for exercise (autonomy, competence, and relatedness) are met (Deci & Ryan, 1985, 2002). The PNSE consists of 18 items measuring three constructs [autonomy (n = 6), competence (n = 6), relatedness (n = 6)]. Information obtained from the PNSE allowed investigators to evaluate student psychological needs satisfaction. Some questions included "I feel confident that I can do even the most challenging exercises"(competence), "I feel like I am the one who decides what exercises I do" (autonomy), and "I feel close to my exercise companions who appreciate how difficult exercise can be" (relatedness).

Data Analysis

Descriptive statistics were used to assess demographic information. An analysis of variance (ANOVA) was used to assess group differences between competence, autonomy, and relatedness among PE and non-PE majors. In addition, PA behaviors and technology use were assessed using an ANOVA to measure differences among study participants. Data were analyzed using SPSS v22. Statistical significance was established at $p < 0.01$.

Results

Participants completed the survey and were categorized as those PE ($n = 153$) and non-PE majors ($n = 213$), and those who utilized technology (n = 187) and those who do not use technology (n=213). Thirty-four participants did not report their gender or major, illustrating the difference in group sample sizes (Table 1). There was a statistically significant group difference in the motivation constructs of competence, autonomy, and relatedness among PE and non-PE majors. Students majoring in PE perceived their needs in competency [$M = 36.06$, ($F = 50.71$, $p = 0.001$)], autonomy [$M = 38.84$, ($F = 36.74$, $p = 0.001$)], and relatedness [$M = 33.77$, ($F = 8.83$, $p = 0.003$)] significantly higher than non-PE majors (Table 2). Findings between the constructs directly related to significant differences in the overall PNSE model when constructs were combined (Table 2). Students majoring in PE (n = 156, $M = 0.82$) met the defined PA parameters of being physically active at least 3 times a week for a minimum of 30 minutes which was statistically more than non- PE majors (n = 213, $M = 0.60$) [$F = 22.91$, $p = 0.001$). Lastly, students majoring in PE (n = 156, $M = 0.58$) used technology more than non-PE majors (n = 209, $M = 0.41$) [$F = 10.203$, $p = 0.002$) (Table 3).

Discussion

For students to be active and meet the PA guidelines set by the CDC, it is important for them to understand what they need to do (competence), be able to choose how they do it (autonomy), and have a support system to reinforce being physically active (relatedness). Research shows that support provided in school is associated with increased PA, with the assumption that the earlier health-related skills are learned and acquired (Kulik, et al 2015). This study revealed that PE students perceive their needs to be physically active as satisfied compared to non-PE majors. It was also revealed that more PE majors met the defined PA parameters than non-PE majors. These two findings are important because it has been suggested that PE teachers can impact student achievements through their experiences, PA behaviors, and appearance (Lunenberg, Korthagen & Swennen, 2007; Metzler & Woessmann, 2012). PA is a vital part of PE in schools and PE teachers can play a large role in helping students to be physically active by using their own experiences of knowledge acquisition, skill acquisition, PA behavior, reinforcement, and technology use to monitor PA.

Another important finding in this study is that PE majors used technology more to monitor their PA compared to non-PE majors. Technology has been used as a means to motivate individuals to be physically active, and this study shows that education, along with technology, can motivate undergraduate students in PE to effectively use technology to monitor their PA (Bice et al., 2015). It is important for PE students to understand and use technology because technology use in K-12 PE classes is becoming the norm. According to The Society of Health and Physical Educators (SHAPE) best practices document, the use of technology to increase the effectiveness of K-12 PE lessons is an appropriate and necessary practice at all levels (elementary, middle, and high school) (SHAPE, 2009). The SHAPE National Standards (3 and 4) for Physical Education Teacher Education (PETE) programs connect technology integration in the PE classroom to professional competencies (SHAPE, 2017). PE programs across the country benefit if PETE students graduate with an understanding of how to use and integrate technology (i.e. activity trackers) into the K-12 PE classroom.

Technology has been found to be a relevant tool to support teaching and learning within K-12 PE classes (Casey, et al., 2017; Lee & Gao, 2020). The understanding and use of technology can help future K-12 PE teachers bring in real life experiences to explain (and possibly use in class) the devices they use to track PA behaviors because there are so many options. Hill and Valdez-Garcia (2020) found that pedometers were one of the most available technologies reported by PE teachers. Pedometers are an inexpensive and effective way

to teach students how to track activity. However, with the availability of technology, PE teachers can develop some creative ways to integrate technology into the classroom. The use of apps within K-12 PE classes can help provide students with feedback, facilitate classroom management functions, and integrate health-related fitness into the curriculum (Armour, et al., 2016; Pyle & Esslinger, 2014; Sinelikov, 2012). It might be controversial in the field, but allowing students to bring their smartphones into the K-12 PE classroom is one option to teach students how to track PA using technology.

Limitations

This study relies on self-reported responses concerning motivation to be physically active, overall PA levels, and the use of technology to monitor PA levels. This study only focused on using activity trackers, yet there is more technology that can be used in the classroom. Another important limitation is generalizability, as surveys were only emailed to participants at one mid-sized university in the Midwest.

Conclusion

According to past research, PE student teachers feel they were trained or highly trained to use technology in the classroom, but one of the top barriers stated by PE teachers to using technology was a lack of understanding of how to integrate technology (Hill & Valdez-Garcia, 2020; Krause, 2017). PE majors in this study used technology more to track their PA and were more physically active than non-PE majors. In conclusion, it could be hypothesized that the PE students in this study have been trained to use technology to increase PA and should be able to translate this knowledge into their K-12 PE classroom to educate their students on how to use technology for health benefits. Future research should explore whether or not PE students can effectively translate their use of technology to monitor PA into the K-12 PE classroom to motivate their students to be more active.

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Appendices

Table 1

Descriptive Statistics of Gender, Major, and Technology Use

		PE Majors	Non PE Majors	Total
Gender	Female	58	132	190
	Male	95	81	176
Total		153	213	366

*34 participants did not report gender or major

		Technology Use		
		Yes	No	
Gender	Female	89	132	221
	Male	98	81	179
Total		187	213	400

Table 2

Analysis of Variance of Perceived Need Satisfaction

		N	*M*	St. Dev.	df	*F*	*p*
Competence	PE Majors	153	36.06	5.29	1.00	50.71	0.001*
	Non PE Majors	213	30.67	8.31	367.00		
	Total	366	32.95	7.66	368.00		
Autonomy	PE Majors	153	38.84	4.07	1.00	36.74	0.001*
	Non PE Majors	213	35.15	6.75	367.00		
	Total	366	36.71	6.04	368.00		
Relatedness	PE Majors	153	33.77	6.39	1.00	8.83	0.003*
	Non PE Majors	213	31.41	8.26	367.00		
	Total	366	32.41	7.60	368.00		
PNSE Total	PE Majors	153	108.67	12.40	1.00	41.19	0.001*
	Non PE Majors	213	97.23	19.56	367.00		
	Total	366	102.07	17.81	368.00		

*Significance established at $p < .01$

Table 3

Analysis of Variance of PA Behaviors and Technology

		N	*M*	St. Dev.	df	*F*	*p*
PA Behaviors	PE Majors	156	0.8269	0.37953	1	22.991	0.001*
	Non PE Majors	213	0.6009	0.49086	367		
	Total	369	0.6965	0.4604	368		
Technology Use	PE Majors	156	0.5833	0.49459	1	10.203	0.002*
	Non PE Majors	209	0.4163	0.49412	363		
	Total	365	0.4877	0.50053	364		

***Technology use to assist in reaching PA goals. This is why this is so important.**

*Significance established at $p < .01$