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Comparison Between Perceived and Actual Physical Activity of Physical Education Teacher Education Students

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Abstract

The purpose of this study was threefold: (a) to evaluate whether physical education teacher education (PETE) students were meeting minimum standards for physical activity, (b) obtain and compare different measures of body mass, and (c) determine the accuracy of self-report measures of physical activity. Twenty-six undergraduate PETE students wore an accelerometer for seven days, received a body scan via dual energy x-ray absorptiometry (DEXA), and completed the International Physical Activity Questionnaire L7S at the end of the week. Participants took significantly ($p < .001$) more steps per day than 10,000 but had significantly higher body fat percentages than population norms. Results indicated that participants significantly overestimated their time in physical activity ($p = .004$) and physical activity intensity ($p < .001$). Findings support that these PETE students are physically active but highlight the need to use valid and reliable measures in evaluating health and physical activity status. Avenues for future research are also discussed.

Key words: PETE, fitness testing, BMI, accelerometer, role model, fitness tracker

Résumé

Cette recherche vise trois buts: (a) évaluer si la condition physique d'étudiants en formation à l'enseignement en éducation physique répond à des standards mimima de pratique d'activité physique, (b) obtenir et comparer différentes mesures de masse corporelle, et (c) determiner la justesse de mesures auto-rapportés d'activité physique. Vingt six (26) étudiants en formation à l'enseignement en éducation physique ont porté un accéléromètre pendant sept jours, ont subi un scan corporel (DEXA) et complété le Questionnaire international sur l'activité physique à la fin de la semaine. Les participants ont réalisé significativement plus de 10 000 pas mais avaient un pourcentage de gras corporel significativement supérieur aux normes de la population en général. Les résultats révèlent que les participants surestimaient significativement leur temps consacré à l'activité physique et l'intensité de cette activité. Ces résultats confirment que ces étudiants sont physiquement actifs mais mettent en lumière le besoin de mesures valides et fidèles pour évaluer la santé et le niveau de pratique d'activité physique. La discussion met de l'avant des pistes pour de futures recherches.

Mots clés: étudiant en formation à l'enseignement en éducation physique; évaluation de la condition physique; indice de masse corporelle; modèle; moniteur d'activité physique

Introduction

As part of achieving national accreditation through their Specialized Professional Association (SPA), physical education teacher education (PETE) programs in the United States are expected to show their students can achieve and maintain a health-enhancing level of fitness (Council for the Accreditation of Educator Preparation, 2017; SHAPE America, Society for Health and Physical Educators America, 2015). Beyond meeting accrediting expectations, the primary purpose of fitness testing is to provide evidence that future physical education teachers are setting a good example for their students. These fitness tests, along with other tests, such as skill proficiency (Baghurst, Richard, Mwavita, & Ramos, 2015), are both commendable and expected among of physical education practitioners (e.g., Baghurst & Bryant, 2012). SHAPE America (National Association for Sport and Physical Education; 2010) highlighted its importance in the position paper, *A Philosophical Position on Physical Activity & Fitness for Physical Activity Professionals*. Modeling serves to "influence many attitudes and behaviors, including health practices, motor skill acquisition and the adoption of physical activity patterns. Physical educators, coaches and other professionals in fitness and physical activity carry strong modeling status among many children and youths" (p. 2-3).

With the advent of new wearable technology that measures physical activity and fitness levels, employing an often infrequent fitness test (Baghurst & Mwavita, 2014) may no longer be the most effective way to measure whether a student is achieving and maintaining a health-enhancing level of physical fitness (SHAPE America, 2015). Fitness testing generally measures activity around a specific time point in a program, which they can prepare for, but a single test of fitness may not accurately reflect an individual's regular physical activity and behavior (Trost, McIver, & Pate, 2005). In addition, fitness tests are not always used to provide accountability, but rather provide feedback on health and fitness levels to those that were measured. It gives those being tested an opportunity to evaluate their own health and fitness in comparison to standardized norms.

Steps per day can be used as a measure of daily physical activity. Although the standard remains one of discussion in the literature, 10,000 steps per day can be interpreted as being "active" (Tudor-Locke & Bassett Jr., 2004). In a recent study using accelerometers, Baghurst, Richard, and Boolani (2016) reported that PETE students were achieving a minimum average of 10,000 steps and 30 minutes of moderate/vigorous physical activity daily. Yet, they reported non-significant associations among moderate physical activity levels, as recorded by the accelerometer, and PACER scores from the Fitnessgram (2015). The Fitnessgram (2015) is one of the most commonly used methods for determining student fitness within PETE programs (Baghurst & Mwavita, 2014), and is comprised of multiple areas of competency including cardiorespiratory endurance, strength, flexibility, and body mass index (BMI). Many programs use all or most of these areas to determine a student's supposed fitness.

Baghurst and colleagues (2016) reported that although participants achieved minimum levels of physical activity for health throughout the week, only 40% of participants achieved passing totals on the PACER, which suggests a disconnect between daily activity and a singular fitness test. Castelli and Valley (2007) also reported only moderate associations between PACER and moderate physical activity, which may be due to a lack of motivation during the test; participants may not be intrinsically driven to do their best (Baghurst et al., 2016). Therefore, a first purpose of the present study was to re-assess the daily steps per day and moderate physical activity levels reported by Baghurst et al. (2016) to determine whether a different group of PETE students would exhibit similar levels of physical activity. Comparable findings might suggest that accelerometers could be used as an alternative to the PACER test in PETE fitness testing and accreditation reports, as accelerometers provide valid and reliable measures of physical activity on a regular basis rather than a one-off test.

Body Mass Index as a Measure

Body Mass Index (BMI) is a component of the Fitnessgram (2015) and is often used as evidence within accreditation reports and measures of PETE student fitness (Baghurst & Mwavita, 2014). BMI is calculated based on an individual's height and weight and compared to a table of norms to determine whether an individual is underweight, normal, overweight, obese, or class III obese (Centers for Disease Control, n.d.).

Although Baghurst et al. (2016) reported significant associations among BMI, PACER scores, and steps per day, there remains debate whether BMI can and should be used as an effective means of identifying health status (Henningsen, Boros, Ingvalson, Fontana, & Matvienko, 2015). For example, BMI may not be accurate in measuring those who are athletes with higher levels of muscularity (Szabo & Tolnay, 2014). This inaccuracy in measurement is sometimes also true in physical education where students are often athletes or have athletic backgrounds. Dodds and colleagues (1991) reported that 96% of their teacher candidates participated in school-sponsored sports, and 49% were still engaged in athletics as college students. Therefore, it might be expected that BMI scores are higher than a typical population with similar demographics.

For individuals unfamiliar with the discrepancies associated with BMI measurement (e.g., an accreditation reviewer), there may be a tendency to misinterpret high BMI scores, as athletic backgrounds of many students are rarely considered. BMI scores may be higher due to either high body fat percentage of participants or high lean body mass associated with physical activity. These two conflicting reasons are hard to distinguish by BMI scores alone. Therefore, a second purpose of the study was to acquire exact body fat percentages of participants, using more accurate instrumentation, and to evaluate these percentages against physical activity levels and population norms.

Perceptions versus Reality

In a study of physical education physiques, Baghurst, Sandlin, Holden, and Parish (2015) reported that PETE students perceived their professors, physical education teachers in the field, and themselves to possess significantly larger physiques than they thought they should. Such perceptions indicate that while PETE students recognize that they do not portray an ideal physique, there is a disproportion between what is and what should be, perhaps due to a distorted body image or, as Baghurst and colleagues suggested, a lack of positive role models in the profession. If a physical education public school teacher or professor does not model an appearance that is healthy, why should the students?

Findings such as those by Baghurst et al. (2015) that compare the perceptions about others against self-appraisal may translate to a clearer understanding of physical activity. The number of steps per day that a person accumulates can be considered a good measurement for physical activity (Lee et al., 2013), where 10,000 steps daily achieves a healthy level of physical activity (Tudor-Locke, 2010). Because 10,000 steps per day can equate to 30 minutes of moderate to vigorous activity (Le Masurier, Sidman, & Corbin, 2003), this measure can and is used to evaluate physical activity status in a non-invasive manner (Baghurst et al., 2016). Therefore, a third purpose of this study was to examine differences between participants' perceived physical and their actual physical activity levels.

Understanding potential incongruities between perceived and actual physical activity is important, especially in physical education, a field where PETE students who typically become teachers should uphold standards of physical activity and health (National Association for Sport and Physical Education (2010). SHAPE America's (n.d.) standards three and five require that the physically literate individual "demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness," and "recognizes the value of physical activity for health, enjoyment, challenge, self-expression, and/or social interaction."

Unfortunately, data supporting PETE students' achievement of these expectations is mixed (e.g., Baghurst & Mwavita, 2014; Baghurst et al., 2016; LaVine & Ray, 2006). Therefore, PETE students may have an inaccurate opinion of their health and physical activity status; they may fail to meet these standards because they incorrectly believe they are being met. Therefore, evaluating actual and perceived levels of physical activity provides an opportunity to determine whether PETE students are cognizant of their physical activity levels, and if not, helps to evaluate whether self-assessment training might be necessary.

Modeling Value and Study Purpose

According to Baghurst et al. (2016), "it is logical that PETE students should seek to model the positive benefits of engaging in a healthy lifestyle (e.g., positive affect, physique, physical health) to motivate students for lifelong health and exercise" (p. 3). Further, this modeling should be present during training because it provides them with the knowledge necessary to evaluate what appropriate levels of physical activity are when they become professionals. Those who fail to adopt these standards for health are less likely to exhibit appropriate physical activity, which can decrease the amount of physical activity of their students (Baghurst & Bryant, 2012).

Whether PETE students are meeting minimum standards for physical activity and are able to evaluate their own physical activity levels accurately, remains unclear. A first purpose of the present study was to re-assess the daily steps per day and moderate physical activity levels reported by Baghurst et al. (2016) to determine whether a different group of PETE students would exhibit similar levels of physical activity. A second purpose was to acquire exact body fat percentages of participants, using high accuracy instrumentation, and to evaluate these percentages against physical activity levels and population norms. A third purpose of this study was to examine differences between perceived physical activity of participants and their actual physical activity levels.

Method

Participants

Participants were 26 undergraduate students (16 male, 10 female) of mean age 19.8 (*SD* = 1.2) years declared as majors in a physical education teacher education (PETE) program at a large state university in the Southern United States. Participants identified themselves as 73% Caucasian, 11% African-American, 7% Native-American, 6% Hispanic, and 3% as Other. Student classification consisted of eight freshmen, eight sophomores, six juniors, and three seniors, with one participant not reporting student classification. Additionally, half of the participants reported being employed.

Instruments

Demographic Questionnaire. Participants completed a short demographic questionnaire at the beginning of the study that included year in college, ethnicity, and whether the individual was physically able to participate in the study. Information necessary for the calibration of accelerometers was also requested such as height, weight, date of birth, and dominant arm.

Accelerometry. Participants wore an Actigraph wGTX-3 accelerometer for seven consecutive days without removing it. An accelerometer is a small device located on an individual's ankle, hip, or wrist that measures steps taken per day, amount of daily physical activity accrued, and time spent in exercise (Korpan, Schafer, Wilson, & Weber, 2015). An axis-based motion detection system determines the device's orientation to the ground, and mathematical algorithms are programmed into the device. Supporting software then calculates movement into steps per day as well as changes in velocity or speed divided by time. Accelerometers can also delineate between levels of physical activity by measuring acceleration forces, static movement, or continuous force (Peterson, Sirard, Kulbok, DeBoer, & Erickson, 2015). Therefore, data can be produced including kcals expenditure. The Actigraph wGTX-3 has been shown to be reliable across wrist, hip, and ankle sites (Ozemek, Kirschner, Wilkerson, Byun, & Kaminsky, 2014).

The formula presented in Freedson, Melanson, and Sirard (1998) for calculating activity levels was adopted. Physical activity levels were measured in 60-second epochs, and a data point was recorded every minute for the entire seven days. Epoch length was determined based on comparison of various epoch length cut points with accuracy in extrapolating predictions in health-related outcomes (Gabriel et al., 2010; Trost et al., 2005).

Metabolic equivalents (METS) were calculated from accelerometry data. They are a standardized measure of absolute intensity (ACSM, 2013), and the measure allows for a comparison across different measures of physical activity. The measure ranges between light physical activity (<3), moderate (3-6), and vigorous (>6). In the present study, METS were calculated using the Actigraph wGTX-3 accelerometer as well as the IPAQ L7S to permit comparisons between actual and perceived physical activity. Accelerometer data were analyzed using Actigraph ActiLife software and the Freedson Adult (1998) equation to calculate METS. METS were also calculated from minutes of activity reported from IPAQ data.

Dual Energy X-ray Absorptiometry (DEXA). For assessment of body composition, Dual Energy X-ray Absorptiometry (DEXA) was used, which is currently considered a highly effective method for evaluating body composition (Marks, Van Meel, Robinson, & Robinson, 2015). DEXA sends a thin, low dose beam of x-rays through the body to determine bone density and calculate an individual's body composition including body fat percentage and lean body mass. Body fat percentage is calculated for different body parts and a total body fat percentage is provided. Authorized DEXA technicians administered the scans.

The DEXA scan was chosen above other methods because of its non-invasiveness and convenience. Further, it is a four-compartment model (i.e., accounts for water, bone mineral mass, fat, and residual) and can thereby factor out water, bone, and residual to provide an accurate measurement of the remaining components of body weight, body fat and fat free mass (i.e., muscle). According to van der Ploeg, Withers, and Laforgia (2003), the four-compartment model serves as a gold standard measurement of body fat percentage because it does not depend on variables such as age, gender, race, and health status.

International Physical Activity Questionnaire L7S (IPAQ L7S). The IPAQ L7S consists of 27 questions that collectively estimate an individual's physical activity levels over the course of a seven-day period. The long version was used in the present study, as it is self-administered and more applicable for the study's design. It is comprised of four physical activity domains of work related, transportation, housework/gardening, and leisure/sport participation.

The IPAQ has been shown to be both reliable and valid across multiple physical activity levels and patterns of physical activity in healthy adults (Hagstromer, Ainsworth, Oja, & Sjostrom, 2010). Its reliability and validity have also been demonstrated across multiple countries and populations (see International Physical Activity Questionnaire, n.d.) and the long version has been reported to have the greatest construct validity out of 260 other physical activity questionnaires (van Poppel, Chinapaw, Mokkink, van Mechelen, & Terwee, 2010).

Procedure

Following university Institutional Review Board (IRB) approval, participants were recruited from a core class within the PETE program over a two-semester period. Participants were informed that the purpose of the study was to evaluate their physical activity levels and body fat percentage. In their earlier study using accelerometers, Baghurst and colleagues (2016) posited that participants aware they were being evaluated might be more apt to exercise more than normal; however, they reported no difference between those who believed they were or were not being evaluated. Therefore, no deception regarding the purpose was used in the present study. There were no direct incentives for participation, but participants were provided the opportunity to view their results, including the DEXA output, which was approximately a $50 value.

To begin the study, participants completed a consent form and a demographic form, which was required for accelerometer calibration. Accelerometers were calibrated individually and were worn on the non-dominant arm for seven consecutive days without removal. No participants identified as ambidextrous.

Participants were able to view their steps per day on the accelerometers, which were set to record data from the end of the class period to exactly seven days later. During this week, they scheduled and completed a DEXA scan, the results of which were shown to them upon request. At the end of the seven-day period, participants returned the accelerometers during class, and were asked to complete the IPAQ, in which they reported their physical activity for the seven days prior.

Data Analysis

The first purpose of the present study was to re-assess the daily steps per day and moderate physical activity levels reported by Baghurst et al. (2016) to determine whether a different group of PETE students would exhibit similar levels of physical activity. This was tested using one-sample *t*-tests, and other demographic variables of participants' sex, year/classification in school, and employment status were analyzed using one-way analyses of variance. A value of 10,000 steps was used to determine whether daily steps met American College of Sports Medicine (2013) guidelines for physical activity, and a value of 150 minutes of physical activity was used to determine whether physical activity levels were met.

A second purpose of the study was to acquire exact body fat percentages of participants, using high accuracy instrumentation, and to evaluate these percentages against physical activity levels and population norms. Body fat percentages of male and female participants, measured by DEXA, were compared to population body fat averages for females (18.8%) and males (15.8%), as presented by ACSM (2013). A one-sample *t*-test was used to determine whether the students in this study were above or below this mean.

Participants were also divided into categories based on body fat percentages, as suggested by ACSM (2008). The categories were as follows: Excellent (males = 7.1-9.3; females = 14.5-17); Good (males = 9.4-14; females = 17.1-20.5); Average (males = 14.1-17.5; females = 20.6-23.6); Below Average (males = 17.4-22.5; female = 23.7-27.6); Poor (males > 22.6; females > 27.7). Frequencies were used to determine distribution of participants. Pearson bivariate correlations evaluated relationships between BMI and lean mass, body fat, and steps per day.

A one-way ANOVA was used to determine differences in self-reported and actual physical activity levels, which were calculated as METS. Tukey's post-hoc analysis was used to determine differences between groups. Participants were also grouped by BMI standards set forth by the Centers for Disease Control (CDC, n.d.) into underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9) and obese (>30).

Results

Mean and standard deviations of accelerometer, DEXA, and IPAQ L7S are presented in Table 1. A primary aim of this study was to determine whether students met the physical activity standards set forth by ACSM (2013). Results indicated that participants took significantly more steps per day [(M = 15529.85; SD = 224.6), $t(25)=25.05$, $p < .001$, d = 10.02] than the ACSM recommendation of 10,000. Participants were also significantly more moderately/vigorously active [(M = 1525.73; SD = 405.69), $t(25) = 17.29$, $p < .001$, d = 6.92] than the ACSM recommendations of 150 minutes per week. No differences ($p > .05$) were noted based on comparisons by participants' sex, year/classification in school, or by whether they were employed.

Table 1
Outcomes of Accelerometer, IPAQ, and DEXA Measures

	Mean	*SD*
Actigraph[a]		
Steps per Day	15563.52	2285.90
Total Kcals	8478.21	5131.19
Average Kcals per Day	1075.94	650.43
METs	1.63	.22
Total Physical Activity (Light/Moderate) Minutes	5186.40	818.69
Total Time in Moderate to Vigorous Physical Activity (MVPA)	1524.84	414.03
Average Time in Moderate to Vigorous (MVPA) per Day	192.08	49.87
IPAQ[a]		
Total Physical Activity Minutes Week	2809.84	2359.264
Total Physical Activity Minutes Day	401.41	337.04
METs Calculated	4.66	.77
DEXA[b]		
Total Fat Mass (g)	19063.74	7285.26
Total Lean Mass (g)	57421.27	16467.58
Percent Body Fat	24.06	6.33
BMI	25.54	5.05

Note. [a]Actigraph and IPAQ (n = 25); [b]DEXA (n = 22)

A second purpose of the study was to acquire exact body fat percentages of participants, using high accuracy instrumentation, and to evaluate these percentages against physical activity levels and population norms (ACSM, 2013). Analysis yielded a significantly higher [$F(1,21) = 19.41$, $p < .001$, $\eta^2 = 0.48$] body fat percentage for females ($M = 28.680$; $SD = 5.68$) and males ($M = 19.67$; $SD = 4.15$) than the average body fat percentage. A one-way ANOVA revealed a significant difference [$F(3, 19) = 3.59$, $p = .03$, $\eta^2 = .36$] in body fat percentage categories and total time spent in moderate to vigorous physical activity. Post-hoc analyses revealed a significant difference between good ($M = 1260$; $SD = 226.22$min) and average ($p = .01$; $M = 1643.11$; $SD = 216.30$min.) and below average ($p = .02$; $M = 1828.14$; $SD = 460.02$min) groups. Therefore, participants with higher body fat percentages were more active. However, no significant difference ($p > .05$) was noted between the average and below average body fat group.

Comparisons were made between participants' activity data from their accelerometer against what they reported in the IPAQ. Variables included steps per day, total physical activity time, METs, and average kcals per day. All comparisons were non-significant ($p > .05$).

Participants were also split into the aforementioned BMI categories. A one-way ANOVA yielded significant differences between groups for actual METs [$F(3, 19) = 33.15$, $p = .01$, $\eta^2 = .67$]. Post-hoc analysis yielded significantly higher METs for the obese group (2.01) compared to both the overweight (1.67) and normal (1.53) groups; the overweight group was also significantly different to the normal group ($p < .05$).

Pearson bivariate correlations found significant positive relationships between BMI and lean mass ($p < .001$, $r = .71$), body fat ($p < .001$, $r = .86$), and steps per day ($p = .01$, $r = .51$). Therefore, as lean mass, body fat, and steps per day increased, BMI did also. Analysis yielded no significant relationship between body fat and steps per day ($p = .30$), but there was a significant positive relationship between body fat and daily physical activity ($p = .002$, $r = .60$).

The third purpose of the study was to determine potential differences between participants' abilities to recount their physical activity levels compared to actual levels. Participants were found to significantly ($t(25) = 21.28$, $p < .001$, $d = 8.51$) overestimate their self-reported physical activity (METS; $M = 4.65$; $SD = 76$) when compared to their calculated physical activity intensity (METS; $M = 1.62$; $SD = .21$). Furthermore, they significantly overestimated ($t(25) = 3.17$, $p = .004$, $d = 1.27$) their self-reported number of minutes of physical activity ($M = 398.41$; $SD = 330.58$) compared to their measured number of minutes of physical activity ($M = 192.13$; $SD = 48.86$).

Discussion

This study sought to evaluate the physical activity levels of PETE students, and to determine whether BMI can serve as a beneficial measure for evaluating whether students possess the knowledge and skills necessary to achieve and maintain a health-enhancing levels of physical fitness (SHAPE America, 2015). Lastly, an assessment of participant's perceived versus actual physical activity determined whether they were able to accurately recount their physical activity.

Findings support those of Baghurst et al. (2016), as participants significantly exceeded (15,529 steps) American College of Sports Medicine (2013) guidelines of 10,000 steps per day. Participants were approximately 3,000 steps per day more active than participants in the Baghurst et al. study, but they spent considerably more time in moderate/vigorous physical activity (i.e., 217 versus 30 minutes daily), and were much more active than ACSM's minimum guidelines of 150 minutes per week (i.e., 50 minutes, three times per week). It is unclear why there were differences, although a larger sample size may have yielded different results. However, it is encouraging that participants exceeded minimum requirements for health (Tudor-Locke, 2010), and it appears that participants in the present study were very active and modeled the importance of physical activity (Baghurst & Bryant, 2010).

Another aim of the present study was to acquire true body fat percentages of participants, and to evaluate these percentages against other variables including body fat percentages based on established norms. Body fat percentages were higher than established norms, and those categorized as obese on the BMI were significantly more active. It is unclear why those participants with higher levels of body fat were in general more active than other groups; however, there are several potential explanations. For example, those participants may have been athletes and thereby more active, which is common among PETE students (Dodds et al., 1991); athletic status should be investigated in future studies. Second, this was a homogenous group, possibly at the extreme end of the population when considering physical activity levels, which may generate different results compared to general population norms per ACSM (2013). For example, Bagley et al. (2017) demonstrated this phenomenon when measuring peak torque among resistance trained and recreationally active individuals. Therefore, future studies might consider comparing PETE student physical activity of those that volunteered to participate and the remaining PETE cohort or to those in other college majors that are and are not traditionally physically active.

It was interesting to note that while there was a significant positive relationship between BMI and lean mass, BMI and body fat were also significantly positively correlated. This finding indicates that a high BMI score failed to distinguish whether the score was high due to high levels of lean mass or body fat, which lends credence to the suggestion that BMI may not serve as a viable measure in evaluating the health status of PETE students. Therefore, the use of BMI as a measure included in data designed to support PETE program accreditation (e.g., Baghurst & Mwavita, 2014; Council for the Accreditation of Educator Preparation, 2017) should be reconsidered. This is particularly evident when considering the significant positive correlations between BMI and steps per day, suggesting that those with higher levels of BMI were quite active. Although measures such as DEXA are impractical for large groups, perhaps other measures such as skinfold would be more accurate and valuable.

The final purpose of the study was to examine differences between perceived and actual levels of physical activity. Participants significantly overestimated both their intensity of physical activity as well as their time in physical activity. This supports previous research in other populations (e.g., Watkinson, 2010) suggesting that individuals tend to overestimate their physical activity. Such behavior may be explained through illusory superiority (Hoorens, 1993), where individuals tend to overestimate personal attributes such as driving ability when comparing to others (Roy & Liersch, 2014). Therefore, it would be interesting for future research to determine how participants evaluated their self-reported physical activity levels against their perception of an average individual, or others in the major, for example. Regardless, this study demonstrates that the use of self-reporting measures as a valid tool in assessing levels of physical activity is questionable at best. Further, it raises the question whether perceptions of health status and physique among PETE students (Baghurst et al., 2015) may also be misrepresented, which also warrants further discovery. For those programs that evaluate the physical activity and fitness of their students, accelerometry appears to be a much more accurate measure than self-reflection and may serve as a substitute to the more common practice of fitness testing in PETE programs.

Limitations and Future Research

The findings of this study should be considered in light of its limitations, which provide direction for future research. Participants were limited to one university and one academic program, which has been recognized for promoting health and wellness (Vlastaras & Baghurst, 2014); therefore, students in other institutions may have differing levels of physical activity. Students voluntarily completed this study, and those who might be less active declined to participate. It would also be of value to compare the activity levels of all PETE students within a program, but also against students in other majors where being physically active is not a general expectation of their profession.

Second, the IPAQ has been reported to inflate physical activity levels (Hagstromer et al., 2010), but it is unlikely that any overestimation can explain the much higher estimations provided by the participants of the current study. Participants were not asked to evaluate their perceived physical activity levels against perceived norms or perhaps against others in PETE programs. Such questions may elicit new findings about how PETE students evaluate their physical activity, health, and physical appearance.

Last, SHAPE America (2015) standards, while part of accreditation expectations (CAEP, n.d.), articulate what a "student" should know, but fail to clarify whether these standards apply to PETE programs, even though the assumption through national accreditation is that they do (CAEP). In addition, Standard 3 states, "The physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness." Within this framework, there is the expectation that the student demonstrates *knowledge and skills*, but there is no clear expectation that the student must *physically* achieve and maintain the level of fitness described. Therefore, future research should investigate how faculty within PETE programs interprets these standards, and whether the inclusion of fitness testing scores in accreditation standards is necessary.

What does this article add?

This study demonstrated that PETE students are achieving physical activity levels above minimum expectations, but findings question the use of BMI as a viable measure used in reporting the fitness levels of PETE students. Physical activity levels of PETE students should not be acquired using self-report measures, as participants significantly over-estimated their physical activity levels. Future research needs to re-consider how and why fitness testing is conducted in PETE programs, and evaluate whether it serves to meet accrediting and SHAPE America (2015) standards, which are also unclear.

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