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An Examination of an 8-Week Online Activity-Specific Skills Program to BMI of Local College Students

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Abstract: *Requiring college students to participate in basic resistance training movement patterns and locomotor and non-locomotor exercises has decreased and improved BMI. This study aimed to examine the effectiveness of the online activity-specific skills program to college students' BMI. This study has employed an experimental research design in which the students undergo a series of activity-specific skills for eight consecutive weeks. Demographic characteristics such as gender, BMI (pre- and post-test), and the Physical Activity Readiness Questionnaire are all included. Independent Sample T-Test was utilized to determine the significant difference based on the post-test scores of the participants concerning gender. Lastly, the Paired samples T-test was executed to the significant difference in the pre-and-test scores of the participants. It was found that no significant difference was observed in the pre-test scores of the participants; lastly, after performing the Paired samples t-test, it was found that there was no significant difference observed between the pre-and post-test score of the participants after performing a series of activity-specific skills activities for eight weeks. Students' body mass indexes were not affected by the movement patterns taught in PE 1, which included locomotor, non-locomotor, and basic resistance training. The results of this study may encourage teachers to reevaluate the efficacy of the existing physical education practices or to look for alternatives that have better potential to reduce students' BMI. Since the study's findings are inconclusive, more research with a larger sample size is required to establish the reliability of the claims presented herein.*
Keywords: *basic resistance training movement patterns, college student, locomotor movements, non-locomotor movements, online setting, physical education.*

INTRODUCTION

As a preventative measure against the spread of the deadly COVID-19 virus, most colleges in the Philippines and other areas of the world switched to online or distance learning two years ago (Foo et al., 2021; Gabriel & Rhonda, 2020; Prevandos & Martin, 2022). The dramatic shifts in the modern educational system have had far-reaching effects on the lives of most college students, causing problems with their mental and, more importantly, their physical health as a result of decreased participation in a wide range of physical activities (Gewalt et al., 2022; Y. Guo et al., 2021; Idris et al., 2021). Utilizing the online learning mode provided numerous benefits and advantages, which was especially helpful during the assault of COVID-19. As was previously said, various educational institutions around the world have leveraged technology to bring learning into the homes of their students. Surprisingly in the post-pandemic era, this form of instruction will play a vital role in assisting HEIs in providing students with a superior education (Pokhrel & Chhetri, 2021). The primary objective of most physical education courses is to instill in students a lifelong routine of regular physical activity. Although online learning has its uses, it does not appear to be a good fit for this area. While the main advantages of online education are their accessibility and safety, physical education classes have a little impact on students' skill sets and tacit knowledge. Despite this, higher education institutions nevertheless face a wide range of difficulties. Educators from throughout the world have voiced concerns about the use of online physical education courses. These challenges stem from factors like insufficient IT skills, the use of many

platforms, and a general lack of access to home-based technology (Korcz et al., 2021). Due to the repetitive nature of sessions within the constraints of the setting and the ineffectiveness of instructional tools, it can be difficult to convey the true objective and relevance of physical education (Jeong & So, 2020). Furthermore, due to teachers' inexperience in the field, acquired mostly through trial and error, it is challenging to perform comprehensive assessments of physical education sessions online. However, research has also revealed that student engagement is low in virtual classes because of the lack of a physical connection between the teacher and the learner. This is a problem on top of the other challenges online instructors already face while running classes. The lack of real-world experience, flagging motivation, and diminished social opportunities are all potential repercussions. The data shown thus far highlights the challenges that institutions around the world are having with the deployment of e-learning in the wake of the global pandemic. The nature of physical education (PE) may lead some to believe that it is impossible to teach PE online. Despite recent technological advancements, physical education cannot be properly taught in a solitary online format due to the interactive and social aspect of the subject (Moustakas & Robrade, 2022).

Effectiveness of Locomotor, Non-Locomotor, and Basis Resistance Training Movement patterns in a home-based setting

There has been a rise in recent years in the amount of research published on the topic of using the internet and other technology means to motivate individuals to engage in fundamental resistance training movement patterns and locomotor and non-locomotor movements. It is fascinating to observe how different research settings shape the findings presented in academic journals. Students in the Elementary Teacher Education Program at the University of Mataram were surveyed online, and they assessed their own locomotor skills and their non-locomotor mobility very poorly (Safruddin et al., 2021). On the one hand, (Bulca et al., 2020) experimental study assessed the impact of digital physical activity films on the development of locomotor skills in preschoolers. A total of 906 kids, 442 in the intervention group and 464 in the control group, were studied. Locomotor skill improvement was compared between the intervention and control groups using Two 2 × 2 (Group × Time) ANOVAs with repeated measurements. The locomotor subscale exhibited significant ($p < 0.05$) group time interactions. Locomotor skill development was statistically significant in the intervention group but not in the control group. The results imply that performance can be improved with the help of digital tools aimed at enhancing locomotor skills. In addition, (Vikberg et al., 2022) investigated the barriers to and motivations for participation in an online-delivered, home-based RT program for older adults with low muscle mass. Thirty men and women, ages 70 to 71, with low muscle mass were given home-based RT with internet workout videos to perform three times a week for 45 minutes for 10 weeks. Out of a total of 30, 27% completed the study. The increase in chair stand time was 1.6 seconds (95% CI, 0.8-2.3 seconds), while the increase in lean body mass was 0.39 kilograms (95% CI, 0.06-0.72 pounds). The online RT program for elderly people with low muscle mass was practicable as evidenced by high compliance, user satisfaction, increased lean mass, and increased chair-stand duration. Participants' pleasant experiences may be responsible for the intervention's success and favorable outcomes. These results indicate that an RT program provided over the internet may be helpful for elderly people with muscle wastage. Similarly, Daveri et al. (2022) study aimed to compare the efficacy of three training programs, each of which consisted of 15 sessions (three per week): supervised livestreaming (LS), unsupervised following a video recording (VR), and unsupervised following a written curriculum (WP). We also tracked and compared metrics including muscular fitness, cardiovascular health, and total activity. In order to provide useful analysis for statistically significant comparisons between small groups, we also computed mean differences (), 95% confidence intervals (C.I.), and Cohen's effect sizes (E.S.). All three groups saw increases in their levels of physical activity: LS = 93.3%, VR = 86%, and WP = 74%. There was no change in weight, however there was a decrease in waist circumference of 1.3 cm (95% C.I. = 2.1, 0.5; E.S. = 0.170; p 0.004). Resting heart rate (Δ = −7.3 bpm; 95% C.I. = −11.9, −2.7; E.S. = 1.296; $p < 0.001$) and Ruffier's index (Δ = −2.1bpm; 95% C.I. = −3.5, −0.8; E.S. 1.099; $p < 0.001$) were both significantly reduced by LS, but not by VR or WP. It didn't take long to prove that online instruction from a distance was effective. However, the most effective method was supervision, demonstrating the need for an experienced trainer. From what has been discussed so far, it appears that not only can people be enticed to participate in fundamental resistance training movement patterns, but also locomotor and non-locomotor movement activities, but that a broad variety of ways and tools may be used to do so. However, college students are not the intended participants for these scholarly articles. There has probably

been little published research on the efficacy of providing these kinds of activities online. Therefore, it is vital that an investigation along these lines be carried out.

Purpose of the study

This research aims to assess the impact of an activity-specific skills program (including locomotor, non-locomotor, and basic resistance training movement patterns) on the body mass indexes of undergraduate students at a Philippine college in Region III.

MATERIALS AND METHODS

Research Design

The purpose of this experimental study was to evaluate the effectiveness of the activity-specific skills program included in the current Physical Education 1 course offered by the college's department of Physical Education.

Instruments and Data Gathering Procedure

A questionnaire comprised of four (4) sections was used to compile responses from the participants. The Physical Activity Readiness Questionnaire (PAR-Q), Body Mass Index (BMI) [pre- and post-test scores] are included as well as other demographic details (i.e., gender). Those who were found to have a preexisting medical condition were immediately disqualified from taking part in the study.

Study participants were given a list of activity-specific skills to complete, such as those found in the categories of *non-locomotor skills*, *locomotor skills*, and *basic resistance training movement patterns*. The students will complete each of the eight (8) weekly assignments. The instructor-in-charge will convene with students during a set week before to the events below to go over prerequisites and logistics. A video and a module were made available to students as part of the online format of the course to help them with the subsequent assignments. The required workout regimen for the experiment is laid forth in Table 1.

Table 1. *Activity-specific skills activities for the course of eight (8) weeks*

Week	Activities
Week 01	Non-Locomotor Skills • Bracing the core • Dead bug series
Week 02	• Rolling • Bird dog series
Week 03	• Press up, scapular protraction and retraction • Plank series • Squat series
Week 04	Locomotor Skills • Crawl and Creep • Landing and jumping • Throwing
Week 05	• Linear movements (hop, skip, leap or bound, jog, and run) • Lateral movements (slide, crossover, grapevine)
Week 06	Basic Resistance Training movement patterns • Lower body: squat, lunge & hinge
Week 07	• Upper body: Horizontal pull & push; vertical pull & push
Week 08	• Lifting and throwing

Participants of the Study

The selected participants for the study are undergraduate students enrolled in Physical Education 1 at a local college in Mabalacat City, Region III, Philippines. Therefore, *purposive sampling technique* was employed. Researchers use their own judgment to decide who will provide the most valuable data, rather than relying on statistical

probability (Etikan, 2016). To ensure that the data collected from the participants is as reliable as possible, a set of selection criteria has been developed:

1. 1st year student enrolled in Physical Education 1-Movement Competency;
2. Either male or female; and
3. No medical history.

Monitoring procedures activity-specific skills program adherence

The study participants were monitored in two ways to ensure they all completed the exercises: (1) they were required to submit an index card in the college-required format detailing the activities they took and Body Mass Index (post-test); and (2) they were required to submit unaltered and uncut video footage of themselves performing the exercises. Both of these vital monitoring tools were deposited in Google Drive by the participants. To show that they are making progress, students must submit the following weekly. Surprisingly, all of the participants contributed their full attention and turned in their work on time.

Statistical analysis

The data was analyzed using IBM SPSS 27 (IBM Statistical Package for the Social Sciences). Descriptive statistics were utilized to characterize the demographic features of the participants according to gender and body mass index scores (pre-test) using frequency and percentage. In addition, the *Independent Sample T-Test* was used to analyze the difference in participants' sex-based test results after the intervention. This test, classified as a parametric test, compares the dispersion of two independent variables (Gerald, 2018). Finally, the participants' pre- and post-test scores were compared using the *Paired samples T-test* to determine whether or not there was a statistically significant improvement in their performance after engaging in a battery of activity-specific skills exercises (Ross & Willson, 2017).

Ethical considerations

It was made clear to the participants what was being measured and how, as well as what the goals of the experiment were. Benefits to academia and the scientific community as a whole have also been detailed. With this in mind, the questionnaire asked participants to confirm their approval by clicking a box next to the attached agreement.

RESULTS

Table 2 illustrates the demographic characteristics of the participants according to gender [N_{male} = *32*(45.7%) and N_{female} = *38*(54.3%)] and body mass index scores (pre-test) [$N_{underweight}$ = *14*(20.0%), N_{normal} = *45*(64.3%), $N_{overweight}$ = *10*(14.3%) and N_{obese} = *1*(1.4%)].

Table 2. *Demographic Characteristics of the Participants*

Variable	Items	*N*(%)
Gender		
	Male	*32*(45.7%)
	Female	*38*(54.3%)
Body Mass Index (pre-test)		
	Underweight (UW)	*14*(20.00%)
	Normal (N)	*45*(64.3%)
	Overweight (OW)	*10*(14.3%)
	Obese (O)	*1*(1.4%)

Table 3 displays the body mass index (pre-test) classification of the participants according to gender. Based on the table, most male participants fall under the normal classification, followed by underweight and overweight, and lastly, obese [N_{normal} = *19*(59.38%), $N_{underweight}$ = *6*(18.75%), $N_{overweight}$ = *6*(18.75%), and N_{obese} = *1*(3.12%)]. For female participants, most are under the normal classification, followed by the underweight and overweight [N_{normal} = *26*(68.42%), $N_{underweight}$ = *8*(21.05%), $N_{overweight}$ = *4*(10.53%)], respectively.

Table 3. *Contingency table of the participants' gender and Body mass index (BMI) classification*

	Body Mass Index Classification			
Gender	*Underweight/UW* (%)	*Normal/N* (%)	*Overweight/OW* (%)	*Obese/O* (%)
Male	*6*(18.75%)	*19*(59.38%)	*6*(18.75%)	*1*(3.12%)
Female	8(21.05%)	26(68.42%)	4(10.53%)	*0*(0.0%)

Based on the Independent samples t-test findings which can be seen on Table 4, it was found that no significant difference was observed on the pre-test scores of the participants after performing a series of activity-specific skills activities for eight weeks [$t(60.228) = .732$, $p = .467$], even male participants (22.06 ± 4.61) has a slightly higher mean score compared to female participants (21.31 ± 3.81).

Table 4. *Independent samples t-Test results based on post-test scores*

	N	M ± SD	SE	*df*	*t*-test	Sig.	Decision
Post-test Scores							
Male	32	22.06 ± 4.61	.815	60.228	.732	.467	Not significant
Female	38	21.31 ± 3.81	.618				

After performing the Paired samples *t*-test, it was found that there was no significant difference observed between the pre- and post-test score of the participants after performing a series of activity-specific skills activities for eight weeks [$t(69) = -1.249$, $p = .216$], which can also be seen in Table 4 and 5.

Table 4. *Paired samples t-test results*

	Paired Differences				t	*df*	Sig.
	M ± SD	SE	95% Confidence Interval of the Difference				
			Lower	Upper			
[1] Pre-test - post-test	-.152 ± 1.02	.121	-.394	.091	-1.249	69	.216

Table 5. *Body Mass Index (BMI)-based on pre- and post-test scores of participants after completing a series of activity-specific skills activities*

Pre-test						Post-test					
Participants	BMI	Class	Participants	BMI	Class	Participants	BMI	Class	Participants	BMI	Class
1	17.90	1.00	36	20.22	2.00	1	17.90	1.00	36	19.70	2.00
2	21.30	2.00	37	33.57	3.00	2	21.30	2.00	37	32.59	3.00
3	19.70	2.00	38	21.00	2.00	3	20.10	2.00	38	20.70	2.00
4	17.50	1.00	39	21.10	2.00	4	18.00	1.00	39	21.60	2.00
5	17.30	1.00	40	20.40	2.00	5	17.30	1.00	40	20.00	2.00
6	18.67	2.00	41	20.06	2.00	6	16.20	1.00	41	20.06	2.00
7	22.80	2.00	42	19.93	2.00	7	22.80	2.00	42	20.65	2.00
8	33.60	3.00	43	25.60	3.00	8	32.50	3.00	43	24.91	2.00
9	21.00	2.00	44	19.53	2.00	9	20.00	2.00	44	19.00	2.00
10	19.30	2.00	45	21.21	2.00	10	19.30	2.00	45	19.90	2.00
11	25.50	3.00	46	15.75	1.00	11	25.00	3.00	46	15.80	1.00
12	22.90	2.00	47	25.70	3.00	12	24.30	2.00	47	26.00	3.00
13	26.20	3.00	48	21.00	2.00	13	25.83	3.00	48	21.00	2.00
14	24.40	2.00	49	23.40	2.00	14	24.70	2.00	49	22.16	2.00
15	18.50	2.00	50	16.00	1.00	15	19.25	2.00	50	16.25	1.00

16	23.52	2.00	51	19.84	2.00	16	24.10	2.00	51	24.10	2.00
17	16.30	1.00	52	18.38	1.00	17	16.30	1.00	52	20.20	2.00
18	29.80	3.00	53	20.38	2.00	18	29.80	3.00	53	20.77	2.00
19	20.90	2.00	54	21.20	2.00	19	21.30	2.00	54	21.60	2.00
20	21.20	2.00	55	18.67	2.00	20	21.20	2.00	55	22.30	2.00
21	19.61	2.00	56	17.58	1.00	21	19.61	2.00	56	18.60	2.00
22	21.80	2.00	57	22.93	2.00	22	21.80	2.00	57	24.81	2.00
23	35.76	4.00	58	18.60	2.00	23	35.76	4.00	58	18.17	1.00
24	19.90	2.00	59	23.44	2.00	24	20.80	2.00	59	24.54	2.00
25	20.40	2.00	60	18.10	1.00	25	21.80	2.00	60	17.90	1.00
26	22.50	2.00	61	20.00	2.00	26	22.20	2.00	61	18.93	2.00
27	18.50	2.00	62	16.79	1.00	27	18.50	2.00	62	16.79	1.00
28	16.46	1.00	63	23.59	2.00	28	17.31	1.00	63	24.23	2.00
29	19.80	2.00	64	32.87	3.00	29	20.70	2.00	64	33.80	3.00
30	18.60	2.00	65	21.78	2.00	30	19.00	2.00	65	21.92	2.00
31	21.73	2.00	66	17.56	1.00	31	20.77	2.00	66	18.28	1.00
32	24.60	2.00	67	28.30	3.00	32	23.40	2.00	67	27.10	3.00
33	26.39	3.00	68	21.32	2.00	33	27.40	3.00	68	20.46	2.00
34	18.50	2.00	69	20.95	2.00	34	18.50	2.00	69	21.09	2.00
35	18.10	1.00	70	17.50	1.00	35	17.70	1.00	70	17.47	1.00

Class: 1- Underweight, 2- Normal, 3- Overweight, 4- Obese

DISCUSSION

Different findings have surfaced at different points throughout the investigation. No significant differences in performance were found across groups of participants who were tested for a variety of activity-specific skills (including locomotor, non-locomotor, and basic Resistance Training movement patterns). Multiple experiments carried out over the period of several years support this finding. There were no significant variations in performance between the sexes in terms of locomotor skill competency, as determined by an analysis of variance (ANOVA) done in the study by Jiménez Díaz et al. (2015). Similarly, Niemistö et al. (2020) found no difference in performance to locomotor movements based on gender. However, the study by Kit et al. (2017) found that girls averaged higher than boys did on tests of locomotor ability. ANOVA results ($p < .05$) also show that girls outperform boys when it comes to locomotor ability (Bolger et al., 2018). Zheng et al. (2022) also found that girls outpace boys when it comes to locomotor competence (SMD = −0.07 (95 % CI −0.15, 0.01), $p = 0.09$, $I^2 = 66\%$). The age-sex trend model also revealed that girls' locomotor skills grew at a considerably faster rate than boys' ($\beta = 6.3004$ and 4.6782, $p < 0.001$) (Wang et al., 2020). Meanwhile, Robinson (2011) shows that boys, on average, outperform girls when it comes to locomotor skills proficiency. A study by (Xia et al., 2022) found that when comparing the ability levels of boys and girls in hop, skip, and slide, the former group did better ($p < .05$). After searching extensively through academic literature, researchers were unable to locate any research that specifically addressed non-locomotor skills. Furthermore, no substantial difference was identified between the sexes in regards to basic resistance training movement patterns, which contradicts a number of previously published scholarly publications. Women have had a larger increase in relative upper-body strength with resistance training than men, according to a systematic review and meta-analysis by Roberts et al. (2020). In addition, a gender gap was found for increases in knee extensor maximal torque and muscle quality ($p < .05$), with men showing higher gains than women (Da Boit et al., 2016). Increases in maximal torque were 15.8 ± 10.6% for women and 41.7 ± 25.5% for men, while improvements in muscle quality were 8.8 ± 17.5% for women and 33.7 ± 25.5% for men. Males and females may respond differently to resistance training, at least in terms of the degree of adaptability. Finally, Shin et al. (2012) found that there were disparities in absolute strength between the sexes prior to resistance training, but that following training, both men and women saw a rise in absolute strength in the shoulder press, lat pull down, biceps curl, and strength per lean body mass. Squat, leg extension, and leg curl absolute strength were found to be significantly different between the sexes prior to resistance training, but increased for both sexes following resistance training. Prior to resistance training, gender differences in leg extension and leg curl per lean

body mass were visible, while differences in squat per lean body mass were not. All of the foregoing data points to the fact that research have reached diverse conclusions when looking for differences between the sexes. In addition, most studies in this area have been undertaken with students in primary or secondary education. In this regard, it is plausible to conclude that there is a dearth of articles reporting on scholarly research undertaken in universities and colleges. Therefore, it is highly recommended that a comparable study be conducted in the field of HE.

When the participants' body mass index (BMI) was compared before and after the intervention, researchers discovered no statistically significant improvement. The results of this study go counter to those of other studies that have looked at the correlation between physical activity and body mass index. For example, in boys and girls alike, (Cerit et al., 2020) found a correlation between BMI and motor development in the preschool years. Total MS score was significantly correlated with PA body mass index z score (p = .03), as reported by (H. Guo et al., 2018). Despite the results of this study, it is reasonable to assume that people's body mass index will increase if they engage in more locomotor and non-locomotor related activities. Resistance training plus other forms of exercise (like HIIT) and dietary advice was also found to be useful in lowering and improving body mass index (Ahmadi et al., 2020). Equally convincing is the evidence from study (Jin et al., 2018), which shows that a regimen that incorporates both aerobic and anaerobic exercise reduces body mass index. However, the aforementioned studies do not seek out prospective college students, nor do the tasks assigned to participants in the various studies parallel one another. That is what it is recommended to study these methods in greater depth.

CONCLUSION

The different locomotor, non-locomotor, and basic resistance training movement patterns taught in Physical Education 1 did not seem to have a positive effect on students' body mass indexes, even when the course was offered online. Researchers hope their findings will prompt colleges to rethink their current approaches to physical education or to seek out promising new methods of lowering students' BMIs. Although these studies have limitations, they can nevertheless contribute to the promotion of physical fitness on campus if they are combined with other activities and dietary advice created in conjunction with the school's dietitian. It is advised that a similar study be conducted with a bigger sample size to further analyze whether or not the claims stated by this investigation may be accepted or rejected, as the results of this investigation remain inconclusive.

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