

PROGRESSIVE AEROBIC CARDIOVASCULAR ENDURANCE RUN (PACER) AS TOOL IN IMPROVING STUDENTS' PHYSICAL FITNESS IN CANDELARIA, ZAMBALES, PHILIPPINES

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ABSTRACT

Developing the 21st century learners require not only the enhancement of their cognitive and affective domain but also their psychomotor aspect. Hence, enhancing students' physical fitness should be magnified in the physical education curriculum. This study sought to investigate the effectiveness of the Progressive Aerobic Cardiovascular Endurance Run (PACER) as a tool to improve students' physical fitness. The study involved sixty (60) Grade 7 students, thirty (30) in the experimental group and thirty (30) in the control group of Pamibian Integrated School for school year 2017-2018. Pre-assessment and post-assessment using the self-assessment physical fitness questionnaires and the physical fitness tests were administered before and after the application of the intervention. The study found that there was no significant difference in the self-assessment of the students in their physical fitness in the experimental and control group. This research also revealed that there was a significant difference in the physical fitness of the students in the controlled and experimental group. However, the use of PACER yielded a higher gain score (3.00) compared to the gain score in the use of one mile run/walk (1.15). Moreover, 22 students in the experimental group belonged to the health fitness zone compared to the 11 students from the control group, implying the intervention's effectiveness.

Keywords: PACER physical fitness test, physical fitness, action research, experimental design.

1. INTRODUCTION

Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness, (Caspersen, Powell, & Christenson, 1985). Physical fitness is a set of attributes that are either health- or skill-related. The degree to which people have these attributes can be measured with specific tests, (Caspersen *et al.*, 1985). According to Park (2012) physical inactivity has become a global pandemic. According to one of the reports, lack of exercise causes as many as 1 in 10 premature deaths around the world each year, roughly as many as smoking. Park (2012) cited that in the division of preventive medicine at Brigham and Women's Hospital, scientists calculated something called a population attributable fraction (PAF), a measure of the contribution of risk factors like physical inactivity to diseases such as heart disease or diabetes, and even risk of death. In its positive side, there has been greater awareness about the importance of physical activity in improving health, about 31% of adults do report engaging in vigorous exercise three or more days a week.

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In the Philippines, the 1987 Philippine Constitution mandates that the State shall promote physical education and encourage sports programs, league competitions, and amateur sports, including training for international competitions, to foster self-discipline, teamwork, and excellence for the development of a healthy and alert citizenry, (Article XIV section 1987). In pursuit of this, schools adhere to improve students participatory in physical fitness activities and schools' sports program development. According to the American Academy of Pediatrics (2000), schools are in a uniquely favorable position to increase physical activity and fitness among their students. Thus, this research aims to investigate the effectiveness of Progressive Aerobic Cardiovascular Endurance Run (PACER) which created by Leger, Mercier, Gadoury, and Lambert, in 1982 to improve physical fitness of Grade 7 students of Pamibian Integrated School in the Municipality of Candelaria, Schools Division of Zambales. In the 21st century, students with good physical fitness condition were ahead of normal capacitated students. As cited by Harvard School for Public Health (2013), says that many parents were concerned about inadequate levels of physical education in schools. Almost seven in 10 parents said that their child's school does not provide daily physical education. These concerns expressed by some parents' drives the researcher to investigate the effectiveness PACER test to improve physical fitness of Grade 7 students.

If found effective among the Grade 7 students, the PACER test shall be recommended to all public and private secondary schools in the Municipality of Candelaria and Schools Division of Zambales, as well, as their innovative physical fitness test and it would be best warm up exercise to prepare the body for physical activity, improve performance in sports events and reduces injuries in all undertaking in physical fitness and other related activities.

This study aimed to investigate the effectiveness of Progressive Aerobic Cardiovascular Endurance Run (PACER) as tool to improve physical fitness among the Grade 7 students of Pamibian Integrated School for academic year 2017-2018. Specifically, this study seeks answers to the following questions: 1. What level of physical fitness do Grade 7 students have in the two groups before the intervention period as measured in terms of: a. students' physical fitness self-assessment, and; b. physical fitness test? 2. What level of physical fitness do Grade 7 students have in the two groups after the intervention period as measured in terms of: a. students' physical fitness self-assessment, and; b. physical fitness test? 3. Is there a significant difference in the physical fitness of control and experimental groups before and after the intervention?

2. METHODS AND MATERIALS

2.1 Research Design

The study utilized a two-group experimental design was adhere to use of PACER in the implementation of the study comparing the two variables, the control and experimental group using pretest and posttest. The Group 1 was assigned as the control group while the Group 2 was assigned as the experimental group. The control group was given basic physical fitness test such as one-mile run/ walk test as the traditional method of exercise while the other group served as the experimental group who tested the effectiveness of Progressive Aerobic Cardiovascular Endurance Run (PACER) as fitness intervention.

2.2 Participants

The participants in this study were the Grade 7 students of Pamibian Integrated School for the academic year 2017-2018. The participants were ages 11 years old as common age for Grade 7 students. The sample of the study includes sixty (60) randomly selected male and female students distributed over the two groups 1 and 2. The Group 1 has 30 participants as the control group, while the Group 2 was assigned as the experimental group with 30 participants. The groupings of

the two groups are determined based on the result of the physical fitness test undertaken before the intervention. Students who fall under the normal level of nutritional status (NS) were considered participants. The two groups were advised to wear proper physical education uniform composed of jogging pants, rubber shoes, white t-shirt and enough water to avoid dehydration during the fitness activities.

2.3 Instruments

To be able to gather from the control and experimental groups the sufficient data for analysis, the researcher utilized pretest-posttest designs to compare participant groups and measure the degree of chance occurring as a result of treatment or interventions. The one-mile run test was used for control group as a traditional form of exercise while the experimental group conducted the PACER test as fitness intervention. The administration of the test was during the first quarter period of students' physical education (PE) classes under the subject MAPEH. The researcher used PACER Manual as basis for the fitness test administration. The researcher and the student-participants performed the activity using a 20-meter open space including the use of marker tapes and cones, measuring tape, PACER CD, CD player, PACER Manual, copies of the score sheet, pencil and a designated cool-down area with sufficient water for consumption.

2.4 Data Collection

Upon the approval of the research proposal from the school principal, the researcher administered the basic physical fitness test such as the one-mile run test as the traditional method of exercise to the control group to establish the baseline data of the participants. Afterwards, the researcher administered the posttest to determine the level of adoptability of the students in the control group. Likewise, pretest and posttest activities will also be presented to the experimental group using the PACER test as intervention. The gathered results from the two groups were analyzed and interpreted by the researcher using *t*-test to determine the level of improvement of the students.

2.5 Data Analysis

The data collected was analyzed and interpreted using FITNESSGRAMS' Standard for Health-Related Fitness Zones (HRFZ) classified as follows: I =Needs Improvement Zone (does not meet health-related standard) F =Health Fitness Zone (meets health-related standard) H=High Fitness Performance Zone (exceeds health-related standard).

2.6 Assessment Rubric

	Age	One-Mile Run/Walk			20-meter PACER		
		I	F	H	I	F	H
Boys	11	> 11:00	11:00-8:30	< 8:30	0-22	22-72	> 72
Girls	11	> 12:00	12:00-9:00	< 9:00	0-14	15-41	> 41

3. RESULTS AND DISCUSSION

The following tables show the results of the action research conducted of the researcher to evaluate the effectiveness of Progressive Aerobic Cardiovascular Endurance Run (PACER) to improve physical fitness of Grade 7 students of Pamibian Integrated School, this SY 2017-2018.

Table 1: Physical fitness pre self-assessment in the control group

Question	Mean	sd	VI
1. I feel body pain when I perform physical activity.	2.30	0.82	SE
2. My body becomes weak as I perform the physical activity.	1.90	0.70	SE
3. I drink enough water to avoid dehydration during the activity.	3.50	0.72	A
4. I wears appropriate clothing during fitness performance task.	3.23	0.72	SO
5. I ask assistance from friends to address some difficult activities.	2.67	0.65	SO
6. I display excellent understanding towards physical health.	3.63	0.66	A
7. I take initiative to fully complete my warm-up to condition myself.	3.40	0.61	A
8. I demonstrate respect and care to equipment and facilities.	3.70	0.59	A
9. I display open-mindedness to new physical fitness activities taught by the teacher.	3.60	0.49	A
10. I work on my health related fitness such as cardiovascular, strength, flexibility, muscular endurance test.	2.90	0.65	SO
11. I am ready when executing new fitness components.	3.63	0.55	A
12. I display team cooperation and involvement to master the concept of physical fitness activities.	3.60	0.55	A
13. I understand the concepts of fair play.	3.43	0.72	A
14. I understand the application and impact of a lifelong active health lifestyle.	3.63	0.55	A
15. I observe confidence to finish all tasks related to assess my physical fitness.	3.30	0.46	A
16. I practice sportsmanship in all levels of competition.	3.33	0.79	A
17. I exhibit leadership and make myself as role model to my classmates during fitness activities.	3.10	0.65	SO
18. I follow instructions carefully and honestly.	3.63	0.55	A
19. I contribute as a key player towards mastery of fitness for myself and others.	3.33	0.65	A
20. I involve myself to physical fitness to achieve healthy lifestyle.	3.47	0.67	A

Legend: Always (A) 3.26-4.00; Sometimes (SO) 2.51-3.25; Seldom (SE) 1.76-2.50; Never (NE) 1.00-1.75.

Table 1 shows the physical fitness pre self-assessment of the students in the control group. In particular, students classified the indicators with four (4) highest means, as follows: (8) demonstrate respect and care to equipment and facilities (3.70) with verbal interpretation of Always (A), (6) I display excellent understanding towards physical health (3.63) with verbal interpretation of Always (A); (11) I am ready when executing new fitness components (3.63) with verbal interpretation of Always (A); and (18) I follow instructions carefully and honestly (3.63) with verbal interpretation of Always (A).

Table 2: Physical fitness pre self-assessment in the experimental group

Question	Mean	sd	VI
1. I feel body pain when I perform physical activity.	2.13	0.81	SE
2. My body becomes weak as I perform the physical activity.	1.57	0.67	NE
3. I drink enough water to avoid dehydration during the activity.	2.80	0.87	SO
4. I wears appropriate clothing during fitness performance task.	3.60	0.66	A
5. I ask assistance from friends to address some difficult activities.	2.83	0.73	SO
6. I display excellent understanding towards physical health.	3.77	0.56	A
7. I take initiative to fully complete my warm-up to condition my self.	3.40	0.71	A
8. I demonstrate respect and care to equipment and facilities.	3.90	0.30	A
9. I display open-mindedness to new physical fitness activities taught by the teacher.	3.77	0.62	A
10. I work on my health related fitness such as cardiovascular, strength, flexibility, muscular endurance test.	3.50	0.62	A
11. I am ready when executing new fitness components.	3.67	0.65	A
12. I display team cooperation and involvement to master the concept of physical fitness activities.	3.20	0.83	SO
13. I understand the concepts of fair play.	3.87	0.43	A
14. I understand the application and impact of a lifelong active health lifestyle.	3.60	0.61	A
15. I observe confidence to finish all tasks related to assess my physical fitness.	3.47	0.72	A
16. I practice sportsmanship in all levels of competition.	3.33	0.75	A
17. I exhibit leadership and make myself as role model to my classmates during fitness	3.30	0.82	A

activities.

18. I follow instructions carefully and honestly.	3.87	0.34	A
19. I contribute as a key player towards mastery of fitness for myself and others.	3.43	0.72	A
20. I involve myself to physical fitness to achieve healthy lifestyle.	3.70	0.53	A

Legend: Always (A) 3.26-4.00; Sometimes (SO) 2.51-3.25; Seldom (SE) 1.76-2.50; Never (NE) 1.00-1.75.

Table 2 shows the physical fitness pre self-assessment of the students in the experimental group. In particular, students classified the indicators with three (3) highest means, as follows: (8) demonstrate respect and care to equipment and facilities (3.90) with verbal interpretation of Always (A), (13) I understand the concepts of fair play (3.87) with verbal interpretation of Always (A); and (18) I follow instructions carefully and honestly (3.87) with verbal interpretation of Always (A).

Table 3: Level of physical fitness in the control and experimental group before the treatment

Level	Control Group		Experimental Group	
	Frequency	Percent	Frequency	Percent
High Fitness Performance Zone (H)	0	0.00	0	0.00
Health Fitness Zone (F)	7	23.33	15	50.00
Needs Improvement Zone (I)	23	76.67	15	50.00

Table 3 shows the level of physical fitness in the control and experimental group before the treatment. The control group was composed of thirty (30) participants, there were 7 or 23.33 percent belonged to Health Fitness Zone (F), while 23 or 76.67 percent were belonged to Needs Improvement Zone (I). However, the experimental group also composed of 30 participants, there were 15 or 50.00 percent were belonged to Health Fitness Zone (F) and 15 or 50.00 percent were belonged to Needs Improvement Zone (I).

Table 4: Physical fitness post self-assessment in the control group

Question	Mean	sd	VI
1. I feel body pain when I perform physical activity.	2.40	0.95	SE
2. My body becomes weak as I perform the physical activity.	2.23	0.99	SE
3. I drink enough water to avoid dehydration during the activity.	3.67	0.60	A
4. I wears appropriate clothing during fitness performance task.	3.33	0.54	A
5. I ask assistance from friends to address some difficult activities.	2.70	0.74	SO
6. I display excellent understanding towards physical health.	3.87	0.34	A
7. I take initiative to fully complete my warm-up to condition myself.	3.40	0.71	A
8. I demonstrate respect and care to equipment and facilities.	3.77	0.56	A
9. I display open-mindedness to new physical fitness activities taught by the teacher.	3.37	0.48	A
10. I work on my health related fitness such as cardiovascular, strength, flexibility, muscular endurance test.	2.73	0.68	SO
11. I am ready when executing new fitness components.	3.70	0.53	A
12. I display team cooperation and involvement to master the concept of physical fitness activities.	3.50	0.67	A
13. I understand the concepts of fair play.	3.53	0.56	A
14. I understand the application and impact of a lifelong active health lifestyle.	3.63	0.48	A
15. I observe confidence to finish all tasks related to assess my physical fitness.	3.37	0.48	A
16. I practice sportsmanship in all levels of competition.	3.30	0.82	A
17. I exhibit leadership and make myself as role model to my classmates during fitness activities.	2.97	0.60	SO
18. I follow instructions carefully and honestly.	3.63	0.48	A
19. I contribute as a key player towards mastery of fitness for myself and others.	3.10	0.60	SO
20. I involve myself to physical fitness to achieve healthy lifestyle.	3.43	0.76	A

Legend: Always (A) 3.26-4.00; Sometimes (SO) 2.51-3.25; Seldom (SE) 1.76-2.50; Never (NE) 1.00-1.75.

Table 4 shows the physical fitness post self-assessment of the students in the control group. In particular, students classified the indicators with three (3) highest means, as follows: (6) I display excellent understanding towards physical health (3.87) with verbal interpretation of Always (A), (8) I demonstrate respect and care to equipment and facilities (3.77) with verbal interpretation of Always (A); and (11) I am ready when executing new fitness components (3.70) with verbal interpretation of Always (A).

Table 5: Physical fitness post self-assessment in the experimental group

Question	Mean	sd	VI
1. I feel body pain when I perform physical activity.	1.93	0.77	SE
2. My body becomes weak as I perform the physical activity.	1.73	0.73	NE
3. I drink enough water to avoid dehydration during the activity.	2.63	0.80	SE
4. I wears appropriate clothing during fitness performance task.	3.40	0.80	A
5. I ask assistance from friends to address some difficult activities.	2.83	0.64	SO
6. I display excellent understanding towards physical health.	3.80	0.40	A
7. I take initiative to fully complete my warm-up to condition myself.	3.30	0.94	A
8. I demonstrate respect and care to equipment and facilities.	3.80	0.40	A
9. I display open-mindedness to new physical fitness activities taught by the teacher.	3.57	0.92	A
10. I work on my health related fitness such as cardiovascular, strength, flexibility, muscular endurance test.	3.63	0.71	A
11. I am ready when executing new fitness components.	3.67	0.65	A
12. I display team cooperation and involvement to master the concept of physical fitness activities.	3.13	0.96	SO
13. I understand the concepts of fair play.	3.77	0.62	A
14. I understand the application and impact of a lifelong active health lifestyle.	3.53	0.67	A
15. I observe confidence to finish all tasks related to assess my physical fitness.	3.47	0.81	A
16. I practice sportsmanship in all levels of competition.	3.50	0.67	A
17. I exhibit leadership and make myself as role model to my classmates during fitness activities.	3.13	0.99	SO
18. I follow instructions carefully and honestly.	3.80	0.40	A
19. I contribute as a key player towards mastery of fitness for myself and others.	3.27	0.81	A
20. I involve myself to physical fitness to achieve healthy lifestyle.	3.73	0.51	A

Legend: Always (A) 3.26-4.00; Sometimes (SO) 2.51-3.25; Seldom (SE) 1.76-2.50; Never (NE) 1.00-1.75.

Table 5 shows the physical fitness post self-assessment of the students in the experimental group. In particular, students classified the indicators with three (3) highest means, as follows: (6) I display excellent understanding towards physical health (3.80) with verbal interpretation of Always (A), (8) I demonstrate respect and care to equipment and facilities. (3.80) with verbal interpretation of Always (A); and (18) I follow instructions carefully and honestly (3.87) with verbal interpretation of Always (A).

Table 6: Level of physical fitness in the control and experimental group after the treatment

Level	Control Group		Experimental Group	
	Frequency	Percent	Frequency	Percent
High Fitness Performance Zone (H)	0	0.00	0	0.00
Health Fitness Zone (F)	11	36.67	22	73.33
Needs Improvement Zone (I)	19	63.33	8	26.67

Table 6 shows the level of physical fitness in the control and experimental group after the treatment. The control group was composed of thirty (30) participants, there were 11 or 36.67 percent belonged to Health Fitness Zone (F), while 19 or 63.33 percent were belonged to Needs Improvement Zone (I). However, the experimental group also composed of 30 participants, there

were 22 or 73.33 percent were belonged to Health Fitness Zone (F) and 8 or 26.67 percent were belonged to Needs Improvement Zone (I).

Table 7: T-test of the control and experimental groups in the self-assessment physical fitness test

Group	Post-assessment Mean	Pre-assessment Mean	Gain Score	t-value	p-value	Remarks
Control	3.28	3.26	0.02	0.276	0.7840	Not Significant
Experimental	3.34	3.28	0.06	0.605	0.5500	Not Significant

p<.05 **equal variances assumed*

Because change in self-assessment, which is attitudinal in nature, takes longer time to change based on previous studies. Therefore, no significant difference in the students' self-assessment in the control and experimental group before and after the treatment. According to Triolet (2015), the teachers should have spent more time performing effective self-evaluation/reflection. By doing so, it would notice an increase in teacher effectiveness in teaching students. Checklists should focus on targeted goals of the students to understand deeply how the process of the physical fitness turned to be successful.

Table 8. T-test of the control and experimental groups in the physical fitness test

Group	Post-assessment Mean	Pre-assessment Mean	Gain Score	t-value	p-value	Remarks
Control	12.26	11.11	1.15	3.789	0.001	Significant
Experimental	22.77	19.77	3.00	8.361	0.000	Significant

p<.05 **equal variances assumed*

Although both significant, the experimental group yielded higher gain of 3.0 score compare to the 1.15 score of the control group which implies that it is more effective to use in enhancing students' physical fitness. Moreover, compared to the individual results, 22 students in the experimental group belonged to health fitness zone compared to the 11 students from the control group. The findings found similar to the recommendations of the World Health Organizations (2017), for children aged 5-17 years, (1) should do at least 60 minutes of moderate to vigorous-intensity physical activity daily. (2) physical activity of amounts greater than 60 minutes daily will provide additional health benefits.

The PACER is often preferred over distance run tests because it is externally paced, which enhances test reliability (Lui, Plowman, & Looney, 1992), requires minimal space, which allows it to be performed indoors (Leger *et al.*, 1988), and allows for self-selected completion time if children feel they are unable to continue, which reduces test anxiety often associated with the traditional distance tests. Moreover, Bice (2011) suggested that Physical Education teachers should provide warm-up time prior to test and cool-down after the test to the students.

4. CONCLUSION

Based on the summary of the investigations conducted, the researcher concluded that:

- The study found out that there was no significant difference in the self-assessment of the students in their physical fitness in the experimental and control group.
- This research also revealed that there was a significant difference in the physical fitness of the students in the control and experimental group. However, the use of PACER yielded a higher gain score (3.00) compared to the gain score in the use of one mile

run/walk (1.15). Moreover, 22 students in the experimental group belonged to the health fitness zone compared to the 11 students from the controlled group, implying the intervention's effectiveness.

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