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Physical Activity and Health-Related Fitness of Grade 11 Students

Darlene H. Callas, MAEd
Negros Occidental High School
darlenecallas09@gmail.com

Charles H. Nillos, PhD
La Consolacion College Bacolod City
charlesnillos@lccbonline.edu.ph

Melona Q. Guitche, PhD
La Consolacion College Bacolod City
melonaguitche@lccbonline.edu.ph

Rexomar D. Perez, EdD
Victorias National High School
rexoperez19@yahoo.com.ph

Abstract. The lockdown period has led to a decline in physical activity and fitness among students with increasingly embraced sedentary behaviour. This study aimed to assess the physical activity (PA) level and health-related fitness (HRF) status of students according to sex and academic strand, also determining whether significant differences existed. The study was conducted in a large public high school responding to the International Physical Activity Questionnaire-Long Form (IPAQ) and the Philippine Physical Fitness Test. The study employed a descriptive-comparative research design and employed stratified random sampling with proportional allocation. The students demonstrated a moderate PA level, regardless of sex and academic strand. Regarding health-related fitness, most students exhibited normal BMI, excellent strength in the basic plank, good cardiovascular endurance in the 3-minute step test, good flexibility in the zipper test, fair flexibility in the sit and reach test, and poor performance in the push-up. Furthermore, significant differences were found in BMI and strength when grouped by sex. In conclusion, most students maintain moderate physical activity, surpassing local restrictions and avoiding sedentary behaviour. Also, most students have shown muscular endurance and flexibility in various tasks but have yet to focus as much on strengthening their arms and core muscles. The FIT-UP YOU program has been developed to address this issue, focusing on improving weight and overall HRF status among young overweight/obese and underweight students.

Keywords. Physical Education, Physical Activity, Health-Related Physical Fitness, Descriptive, Comparative, *Philippines*

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1. Introduction

Physical activity is any body movement that demands energy expenditure [38]. Several health problems that are detrimental to health are caused by physical inactivity, which is why added that participation in physical activity among adolescents' benefits both physical and psychological well-being [13]. However, due to the nationwide lockdowns, physical activity and physical fitness have drastically decreased [23]. Health-related fitness assessments must be administered to promote adolescents' participation in physical activity [30].

Health-related fitness components include cardiovascular endurance, muscular strength, endurance, flexibility, and body composition. Some studies mentioned that moderate-vigorous physical activity and health-related physical fitness involvement enhance cardiovascular functions [3], develop muscular strength and endurance [35], increase range of motion [12] and improve weight status. Physical education lessons in school can also be seen as a viable setting for boosting students' participation in physical activities within and outside the classroom. They could yield a variety of health-related fitness advantages [1].

Internationally, findings reveal that adolescents' physical activity levels have dropped and that the problem worsens specifically during the pandemic [37]. To set priority strategies against physical inactivity, international and national public health institutions must identify and understand the significant variables contributing to insufficient and reduced physical activity levels [31]. Moreover, improving physical activity properly and reducing an excessive exercise workload might assist in the preservation of adolescents' personal and mental well-being [19]. Additionally, many health professionals have been promoting more physically active lifestyles in the United States. However, most PE programs emphasize the opposite [14].

In several Asian cities, there was a substantial difference in adolescents' physical activity and fitness levels associated with their health. Asian adolescents were more likely to be in the healthy fitness zone of muscular and aerobic fitness when they met physical activity standards [14]. Likewise, the findings show that healthy-weight adolescents outperformed the overweight/obese group in cardiorespiratory and muscular strength tests. It is conceivable that overweight or obese students may demonstrate physical fitness skills with less competence, which could lead to weaker expectancy-related views. Given this, physical educators must pay closer attention to the needs of overweight and obese adolescents to improve their fitness levels [9].

In the Philippines, children and adolescents still need to meet the prescribed levels of physical exercise for health, despite government programs on the country's physical activity [7]. Adolescents should indeed engage in more physical activity to enhance their overall health and prepare themselves for the challenges of college life. Consequently, it has been identified that there need to be more studies on the level of physical activity and health-related fitness status of grade 11 students. Since they are a group of students that experienced modular learning in physical education subject, the researcher recognizes the necessity to assist them in breaking the pattern of sedentary behaviours and promoting holistic health [32].

Thus, this study mainly aims to determine the level of physical activity and health-related fitness status of Grade 11 students. The outcome of this study will serve as a basis for developing a physical fitness program.

2. Methodology

This study employed a Descriptive-Comparative research design with 255 grade 11 students from a large public high school in Bacolod City, Negros Occidental. The International Physical Activity Questionnaire and Philippine Physical Fitness Test were administered through

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stratified random sampling based on academic strands, without considering sex. The questionnaires have undergone validity assessment and demonstrated high reliability. Consent was obtained from the School Principal, and participants received digital assent and parental consent forms. Data collection took place using an online platform, and responses were manually coded and analyzed by a statistician. Results were interpreted based on established scoring protocols. Furthermore, the researcher upheld the study's ethical principles of respect for persons, beneficence, and justice.

3. Results and Discussion

Table 1 Physical Activity Level of Students

Variable	Grouping	n	Mean	Sd	Interpretation
Whole		255	1.74	0.530	Moderate
Sex	Male	78	1.76	0.585	Moderate
	Female	177	1.73	0.506	Moderate
Strand	ABM	69	1.73	0.482	Moderate
	HUMSS	128	1.74	0.551	Moderate
	STEM	58	1.74	0.548	Moderate

Table 1 presents the physical activity level of grade 11 students is moderate regardless of their sex and strand. The result above implied that students were not engaged in physical activities during the lockdown since health protocols and restrictions abound. Additionally, most students engage in vigorous-intensity activity on at least three or more days, accumulating at least 20 minutes per day or five or more days of moderate-intensity activity and walking for at least 30 minutes daily. The student's physical activity was based on their existing part-time or freelance jobs, household chores, modified recreational activities, and home-based exercises.

Similar studies in some countries like Spain, Indonesia, Australia, and India asserted that students' levels of walking, vigorous physical activity, and overall physical activity reduced during the COVID-19 because of safety health protocols and restrictions like the nationwide lockdown [18]. Additionally, it was concluded that both men and women adopted sedentary behaviours, refused to engage in strenuous physical activity, and developed mental health issues, leading to low-moderate levels of physical activity [15].

Table 2 Health-Related Fitness Status of Students in Terms of Body Mass Index

Variable	n	Obese		Overweight		Normal		Underweight	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	6	2.353	21	8.24	148	58.04	80	31.37
Sex									
Male	78	3	3.846	13	16.67	46	58.97	16	20.51
Female	177	3	1.695	8	4.52	102	57.63	64	36.16
Strand									
ABM	69	1	1.449	5	7.25	35	50.72	28	40.58
HUMSS	128	4	3.125	10	7.81	74	57.81	40	31.25
STEM	58	1	1.724	6	10.34	39	67.24	12	20.69

Table 2 showed that many grade 11 students achieved an average body weight when viewed collectively and grouped by sex and academic strand. However, male students who were overweight outnumbered female students, and female students who were underweight dominated male students. This situation implied that the amount of time they spend sitting down

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and adapting sedentary behaviours affected their concept of average body weight and reduced their engagement in various physical activities. The findings of [17] supported the result of this study that students were becoming more overweight, and that most young adults mostly do not work out to the required levels.

Lastly, there is a risk of obesity in male because most of them believe that their weight is lower than their actual weight and an increased problem in weight loss for female as they believed that their weight is higher than the actual weight [10].

Table 3 Health-Related Fitness Status of Students in Terms of Cardiovascular Endurance

		3-minute Step Test									
Variable	**n**	**Excellent**		**Very Good**		**Good**		**Fair**		**Needs Improvement**	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	6	2.35	79	30.98	80	31.37	54	21.18	36	14.12
Sex											
Male	78	2	2.56	27	34.62	22	28.21	17	21.79	10	12.82
Female	177	4	2.26	52	29.38	58	32.77	37	20.90	26	14.69
Strand											
ABM	69	5	7.25	27	39.13	21	30.43	9	13.04	7	10.14
HUMSS	128	1	0.78	36	28.13	40	31.25	35	27.34	16	12.50
STEM	58	0	0.00	16	27.59	19	32.76	10	17.24	13	22.41

Table 3 results implied that most grade 11 students could exercise at an equal intensity for an extended time even if they stayed home and had the modular distance learning approach. Moreover, they still engage in low to moderate physical activities like home workouts, household chores, simple stretching, and resistance training.

The cardiovascular fitness of adolescents has decreased, and physical activity has been given less priority due to various barriers [8]. Similar claims indicated that cardiovascular fitness was reduced because of significant movement restrictions implemented by the government during the pandemic [5]. The decline in health-related physical fitness was attributed to abrupt changes in health behaviour's, unhealthy dietary intake, and sedentary activities during their leisure time. Considering that schools and fitness gyms have closed during the lockdown leads to fewer opportunities to be physically active.

Table 4 Health-Related Fitness Status of Students in Terms of Strength

		Push-up Test									
Variable	**n**	**Excellent**		**Very Good**		**Good**		**Fair**		**Needs Improvement**	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	6	2.35	20	7.84	39	15.29	79	30.98	110	43.14
Sex											
Male	78	5	6.41	11	14.10	19	24.36	29	37.18	14	17.95
Female	177	2	1.13	9	5.08	20	11.30	50	28.25	96	54.24
Strand											
ABM	69	1	1.45	7	10.14	6	8.70	17	24.64	38	55.07

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HUMSS	128	5	3.91	8	6.25	22	17.19	41	32.03	52	40.63
STEM	58	1	1.72	5	8.62	11	18.97	21	36.21	20	34.48

		Basic Plank Test									
Variable	**n**	**Excellent**		**Very Good**		**Good**		**Fair**		**Needs Improvement**	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	176	69.02	11	4.31	35	13.73	27	10.59	6	2.35
Sex											
Male	78	70	89.74	4	5.13	3	3.85	1	1.28	0	0.00
Female	177	106	59.89	7	3.95	32	18.08	26	14.69	6	3.39
Strand											
ABM	69	44	63.77	5	7.25	10	14.49	8	11.59	2	2.90
HUMSS	128	86	67.19	4	3.13	18	14.06	17	13.28	3	2.34
STEM	58	46	79.31	2	3.45	7	12.07	2	3.45	1	1.72

Table 4 results revealed that most grade 11 students could hardly exert force in the push-up tests but could exert much force in the basic plank test. This implied that school closure, modular distance learning approach, implementation of healthy protocols, and restriction significantly affect the student's muscle growth since most of them adopted a sedentary habit. On the other hand, students showed excellent results in the basic plank test since they utilized their core muscles daily, even without vigorous physical activity.

The study's claims agreed with the findings that student performance in push-ups is poor compared to the established norms. This is typically attributed to a decline in the quality of life, decreased youth enthusiasm for active, vigorous exercise, and a lack of state support for physical education [26]. However, in the basic plank test, the result exhibited excellent results in both sexes which explained that completing a workout using various techniques resulted in various adaptations [21]. Compared to regular push-ups, circuit training boosts physical strength and endurance [22].

Table 5 Health-Related Status of Students in Terms of Flexibility

		Right Arm Zipper Test									
Variable	**n**	**Excellent**		**Very Good**		**Good**		**Fair**		**Needs Improvement**	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	63	24.71	56	21.96	69	27.06	21	8.24	46	18.04
Sex											
Male	78	22	28.21	16	20.51	19	24.36	7	8.97	14	17.95
Female	177	41	23.16	40	22.60	50	28.25	14	7.91	32	18.08
Strand											
ABM	69	19	27.54	12	17.39	21	30.43	4	5.80	13	18.84
HUMSS	128	27	21.09	31	24.22	35	27.34	11	8.59	24	18.75
STEM	58	17	29.31	13	22.41	13	22.41	6	10.34	9	15.52

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Left Arm Zipper Test											
Variable	**n**	**Excellent**		**Very Good**		**Good**		**Fair**		**Needs Improvement**	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	56	21.96	60	23.53	70	27.45	25	9.80	44	17.25
Sex											
Male	78	13	16.67	19	24.36	28	35.90	7	8.97	11	14.10
Female	177	43	24.29	41	23.16	42	23.73	18	10.17	33	18.64
Strand											
ABM	69	16	23.19	17	24.64	15	21.74	10	14.49	11	15.94
HUMSS	128	30	23.44	29	22.66	37	28.91	8	6.25	24	18.75
STEM	58	10	17.24	14	24.14	18	31.03	7	12.07	9	15.52
Sit and Reach Test											
Variable	**n**	**Excellent**		**Very Good**		**Good**		**Fair**		**Needs Improvement**	
		f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Whole	255	46	18.04	40	15.69	47	18.43	89	34.90	33	12.94
Sex											
Male	78	14	17.95	11	14.10	18	23.08	23	29.49	12	15.38
Female	177	32	18.08	29	16.38	29	16.38	66	37.29	21	11.86
Strand											
ABM	69	17	24.64	5	7.25	14	20.29	23	33.33	10	14.49
HUMSS	128	19	14.84	24	18.75	27	21.09	40	31.25	18	14.06
STEM	58	10	17.24	11	18.97	6	10.34	26	44.83	5	8.62

Table 5 results implies that a sedentary lifestyle has been adopted during the pandemic. With remote learning and limited physical activity opportunities, students may spend long hours sitting in front of screens, leading to poor posture and limited movement. Moreover, the pandemic has disrupted regular physical education classes and sports activities promoting overall body flexibility and strength. With limited access to gymnasiums, sports facilities, and organized sports, students may have missed out on opportunities to engage in exercises and stretches that specifically target these areas of the body. As a result, their arm flexibility may have been maintained or even improved due to everyday activities like reaching for objects or carrying bags. In contrast, their lower back and hamstring flexibility may have been neglected.

The findings agreed with the World Health Organization [38] statement that many people spend more time at home and adopt a sedentary lifestyle due to the COVID-19 pandemic. Many people find it challenging to exercise in the same way that they frequently do. It is considerably more difficult for individuals who do not regularly engage in physically strenuous activities. This can be explained by the fact that additional dynamic activities can help sustained stretching and provide the most significant gains in flexibility. By adjusting confounding factors, including time, population, capacity, test applicability, and frequency, one may identify the muscle response to stretching [28].

Moreover, the finding of the study conducted reveals that students' hamstring extensibility can be improved by a short stretching routine that is only conducted once a week

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[29]. This information could aid and direct teachers in creating programs that provide a realistic and successful development of students' flexibility in the context of physical education.

Table 6 Difference in the Physical Activity Level of Students

Variable	Grouping	Mean	Sd	p-value	Significance @ 0.05	Status of hypothesis
Sex	Male	1.76	0.585	0.836	Not Significant	Accepted
	Female	1.73	0.506			
Strand	ABM	1.73	0.482	0.996	Not Significant	Accepted
	HUMSS	1.74	0.551			
	STEM	1.74	0.548			

Table 6 shows that regardless of their gender or chosen academic path, the students demonstrated similar engagement in physical activities. For instance, during the pandemic, when many students had to attend classes remotely and engage in online learning, it was expected that there might be variations in physical activity levels due to different circumstances. However, the findings suggest that both male and female students and students from various academic strands maintained a comparable level of physical activity.

This is supported by the study which provided evidence that the level, mode, and intensity of physical activity affect the physical and mental health benefits experienced by males and females differently [20]. It was also demonstrated that they participate in and react to physical activity options in various ways. Additionally, analysis found no differences between males and females in walking, moderate physical activity, or vigorous physical activity [20]. On the contrary, it was mentioned that the categories of motor performance, physical activity, and health-related physical fitness were used to review the evolution of gender differences in physical activity. Most variations are thought to have been impacted by the environment before puberty but by a biological-environmental interaction after [36].

Table 7 Difference in the HRF Status of Students in Terms of Body Mass Index

Variable	Grouping	Mean	Sd	p-value	Significance @ 0.05	Status of hypothesis
Sex	Male	2.04	0.729	0.001	Significant	Rejected
	Female	1.72	0.630			
Strand	ABM	1.70	0.671	0.086	Not Significant	Accepted
	HUMSS	1.83	0.700			
	STEM	1.93	0.617			

Table implies that during the pandemic, it was observed that male students had a higher average BMI compared to their female counterparts. This difference in BMI could be attributed to various factors, such as differences in physical activity levels, dietary habits, and hormonal variations between males and females. On the other hand, when analysing the data based on academic strands, it was found that students from different strands did not exhibit a significant difference in their BMI. This suggests that a particular strand's academic focus or curriculum did not have a notable impact on the BMI of grade 11 students during the pandemic.

The result of the study is supported by findings which state that the body mass index results for the two sexes varied [40]. Compared to men, women were more likely to be underweight and more likely to be overweight. Therefore, it was established that men had a

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higher prevalence of higher BMIs. Additionally, more men were overweight, whereas more women were underweighted. Also, both sexes had an inaccurate perception of their body weight status [33].

Moreover, there are findings that men are 20% more likely to be overweight or obese than women, and the number of underweight women is twice that of men [2]. Also, it supports the same conclusions, indicating that there are already noticeable gender differences in body composition before puberty even strikes [27].

Table 8 Difference in the HRF Status of Students in Terms of Cardiovascular Endurance

3-minute step test						
Variable	**Grouping**	**Mean**	**Sd**	**p-value**	**Significance @ 0.05**	**Status of hypothesis**
Sex	Male	2.92	1.090	0.509	Not Significant	Accepted
	Female	2.83	1.079			
Strand	ABM	3.20	1.092	0.008	Not Significant	Accepted
	HUMSS	2.77	1.023			
	STEM	2.66	1.117			

Table 8 results implies that the cardiovascular endurance of students remains unchanged, regardless of whether there is a pandemic. This finding implies that the sedentary behaviour of students during the pandemic does not significantly impact their cardiovascular fitness. It is worth noting that despite the restrictions and reduced physical activity opportunities during the pandemic, the cardiovascular endurance levels of students have not shown a noticeable decline compared to non-pandemic times. This indicates that factors other than sedentary behaviours may be more dominant in influencing cardiovascular endurance or that students have found alternative ways to engage in physical activity and maintain their fitness levels during the pandemic.

The result of this study is supported by which stated that the respiratory exchange ratio during exercise was similar in more males and females, encompassing both trained and untrained people [34]. On the contrary, it mentioned that the physiological differences between average males and females are relatively significant [4]. However, these differences are significantly decreased when compared to highly trained male and female athletes competing in the same sport. Male and female highly trained athletes are comparable in lower body strength, cardiovascular endurance, and body composition. What initially seemed to be apparent physical disparities in how the two sexes' bodies work may have more to do with the societal and cultural pressures placed on girls as they approach puberty and inactive lifestyles.

Table 9 Difference in the HRF Status of Students in Terms of Strength

Push-up Test						
Variable	**Grouping**	**Mean**	**Sd**	**p-value**	**Significance @ 0.05**	**Status of hypothesis**
Sex	Male	2.53	1.148	0.001	Significant	Rejected
	Female	1.70	0.940			
Strand	ABM	1.78	1.069	0.127	Not Significant	Accepted
	HUMSS	1.98	1.101			
	STEM	2.07	1.024			

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Basic Plank Test						
Variable	**Grouping**	**Mean**	**Sd**	**p-value**	**Significance @ 0.05**	**Status of hypothesis**
Sex	Male	4.83	0.545	0.001	Significant	Rejected
	Female	4.02	1.295			
Strand	ABM	4.17	1.224	0.106	Not	Accepted
	HUMSS	4.19	1.234		Significant	
	STEM	4.55	0.958			

Table 9 finding implies that underlying factors related to sedentary behaviours may contribute to this observed difference. Many students have experienced disruptions in their regular physical activities, such as attending school, participating in sports, or engaging in outdoor play. The sedentary behaviour that often accompanies remote learning and limited social interactions may have negatively impacted students' physical fitness and strength. Prolonged sitting or a lack of physical exercise can lead to muscle weakness, reduced endurance, and diminished physical performance. These factors and potential differences in exercise habits and opportunities between males and females explained the significant disparity in strength observed among the students.

The same findings were produced which state that differences in lean body weight and the distribution of muscle and fat in the body segments are the cause of gender disparities in upper and lower body strength [39]. When defining the gender difference in strength, upper body strength is comparatively more significant than lower body strength. Moreover, it proved that the smaller shoulders and higher proportions of slow-twitch fibres that are physical characteristics of women had been cited as contributing causes to gender strength discrepancies [6]. Whatever the cause, the average male has substantially greater overall strength than the average woman. On the contrary, the gender disparities in strength are quantifiable. This indicates that even though males typically have larger muscles than women, equal-sized muscles in both sexes produce the same force.

Table 10 Difference in the HRF Status of Students in Terms of Flexibility

Right Arm Zipper Test						
Variable	**Grouping**	**Mean**	**Sd**	**p-value**	**Significance @ 0.05**	**Status of hypothesis**
Sex	Male	3.31	1.444	0.719	Not	Accepted
	Female	3.25	1.385		Significant	
Strand	ABM	3.29	1.426	0.706	Not	Accepted
	HUMSS	3.21	1.384		Significant	
	STEM	3.38	1.424			
Left Arm Zipper Test						
Variable	**Grouping**	**Mean**	**Sd**	**p-value**	**Significance @ 0.05**	**Status of hypothesis**
Sex	Male	3.22	1.26	0.718	Not	Accepted
	Female	3.24	1.42		Significant	
Strand	ABM	3.25	1.39	0.875	Not	Accepted
	HUMSS	3.26	1.39		Significant	
	STEM	3.17	1.31			

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Sit and Reach Test						
Variable	**Grouping**	**Mean**	**Sd**	**p-value**	**Significance @ 0.05**	**Status of hypothesis**
Sex	Male	2.90	1.335	0.954	Not	Accepted
	Female	2.92	1.325		Significant	
Strand	ABM	2.96	1.429	0.978	Not	Accepted
	HUMSS	2.89	1.287		Significant	
	STEM	2.91	1.302			

Table 10 findings implies that male and female students can equally adapt to different flexibility exercises or stretching routines. This encourages inclusivity and ensures that individuals of all genders and academic backgrounds can participate without any disadvantage.

The findings of the study are supported by the result stated that there were no statistically significant differences in the flexibility of students [39]. Also, the result revealed that female students' fitness levels are lower than those of male students; however, in performing the sit and reach test, female students executed better than male students [24].

4. Conclusion

This study highlights the physical activity levels and health-related fitness of grade 11 students. Most students engage in moderate physical activity, participating in various activities during their leisure time. They exhibit good cardiovascular endurance and flexibility through home exercises and stretching, but there's room for improvement in strength, particularly in push-ups. Male students show higher strength levels compared to females. The study emphasizes the importance of promoting an active lifestyle and calls for comprehensive fitness programs that address students' specific needs, including strength training, to improve their overall well-being and create a healthier future generation.

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