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Prescriptive exercises on arm strength and endurance among x university high school students

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ABSTRACT

The main goal of this study is to ascertain how prescribed exercises affect the arm strength and endurance of X University High School students. In this study, two fitness groups participate in a randomized pre- and post-test experimental group design using a quasi-experimental methodology. According to the study, mesomorphic and normal weight respondents make up the majority of the sample, whereas endomorphic and obese respondents are the least common. Following the prescribed activities, participants in the first year show a Marginal Fitness Zone, those in the second year and fourth year a Good to High Performance Zone, while those in the third year a High Performance Zone. In the total arm fitness category, there is no significant difference between the first-year, third-year, fourth-year, and second-year male respondents who perform the prescribed exercises and the second-year female respondents who show a significant difference. Additionally, the study demonstrates that the push-up exercise group, regardless of gender, exhibits greater improvement than the prescription barbell exercise group, indicating that push-up exercises are a more efficient means of building arm strength and endurance than barbell exercises. The body mass index and pre-existing individual differences causes significant variations in the over-all arm fitness of the respondents which means that the higher the pre-existing individual difference, the improvement becomes lower as very apparent in all groups of respondents.

Keywords: Barbell, Body Mass Index, Physical Fitness, Push-Up, And Somatoytpe

INTRODUCTION

Assisting each student in developing the attitudes, abilities, and human mobility that will lead to a lifetime participation in physical activity is the main objective of physical education in schools. This objective can only be accomplished in a setting where all students—the "skilled" and the "average" as well as the "gifted"—have a greater appreciation for movement. In physical education classes, students' developmental needs are satisfied by a range of experiences involving

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increasingly difficult tasks. A person who is fit is one who is able to appear, feel, and perform at their best. According to the Council Publications of Fitness Fundamentals: Guidelines for Personal Exercise Program (2009), it is more precisely defined as "the ability to perform daily tasks vigorously and alertly, with energy left over for enjoying leisure-time activities and meeting emergency demands. It is the ability to endure, to bear up, to withstand stress, to carry on in circumstances where an unfit person could not continue, and is a major basis for good health and well-being." It is not the duty of physical educators to "make" kids fit. Its goals are to encourage kids to move, impart skills that can improve their fitness, and teach them the value of movement in daily life (Flohr and Williams, 1997). The arm strength and endurance test component of this study, which focuses on muscular fitness, includes the prescription of standard pull-up exercises for men and modified push-up activities for women. Students from X University High School in the academic year 2009–2010 are the study's subjects. This study attempts to determine the Effects of Prescriptive Exercises on Arm Strength and Endurance among X University High School Students. Specifically, this study seek to answer the following questions: What is the profile of the student-respondents' in terms of: year level, somatotype structure according to year level, overall somatotype structure, body mass index according to year level, and overall body mass index; What is the profile of the student-respondents' arm fitness categories before and after the prescriptive push-up exercises when grouped according to year level?; What is the profile of the student-respondents' arm fitness categories before and after the prescriptive barbell exercises when grouped according to the year level?; Do the student-respondents' arm strength and endurance level differ before and after the prescriptive push-up exercises considering gender grouped by year level?; Do the student-respondents' arm strength and endurance level differ before and after the prescriptive barbell exercises considering gender grouped by year level?; and, Which of the two prescriptive exercises have caused significant improvement on the overall arm fitness category of the student-respondents? Statement of Null Hypotheses: With the given problems in this study, question numbers 1, 2, and 3 are hypotheses-free. For question numbers 4, 5 and 6, null hypotheses are formulated and tested at α=0.05, level of significance. There is no significant difference in the student-respondents arm strength and endurance level before and after the prescriptive push-up exercises considering gender grouped by year level? There is no significant difference in the student-respondents arm strength and endurance level before and after the prescriptive barbell exercises considering gender grouped by year level? There is no significant difference in the effects of the two prescriptive exercises on the over-all arm fitness category of the student-respondents.

RESEARCH METHODOLOGY

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Research Design

The study makes use of nonrandomized pretest and posttest experimental group designs in quasi-experimental designs. Murray (1998) stated that his method uses some nonrandom technique to allocate recognizable groups of people to the intervention or comparison condition. In this study, there are two groups: experimental fitness groups. The first set of observations, known as the pre-test, and the second round of observations, known as the post-test, are given to both groups. With the exception of the lack of randomization, this design is comparable to actual experimental designs, according to Leedy (1993). This design is used to evaluate and compare the efficacy of the prescribed exercises as an intervention program, as well as to ascertain the overall profile of arm strength and endurance level among the student responders.

RESULTS AND DISCUSSION

Table 1.1. Frequency and Percentage Distribution of Student-Respondents in terms of Year Level

Year Level	**Frequency**	**Percentage**
First Year	51	**27.0**
Second Year	44	23.3
Third Year	48	25.4
Fourth Year	46	24.3
Total	**189**	100.0

Table 1.2 shows the frequency and percentage distribution of student-respondents in terms of somatotype structure according to year level.

Table 1.2 Somatotype Structure According to Year Level

Somatotype Structure	**Year Level**								**Total**	
	First Year		**Second Year**		**Third Year**		**Fourth Year**			
	f	%	F	%	f	%	f	%	f	%
Endomorph	10	19.6	7	15.9	11	**22.9**	9	19.6	37	19.5
Mesomorph	25	**49.0**	20	**45.5**	22	**45.8**	28	**60.9**	**95**	**50.3**
Ectomorph	16	31.4	17	**38.6**	15	31.3	9	19.6	57	30.2
Total	51	100.0	44	100.0	48	100.0	46	100.0	189	100.0

In this context, the basic shape of the body is called a somatotype. The suitability of a person for a given sport or physical activity can be greatly influenced by their somatotype. While it certainly helps, being in the correct shape for a given activity does not ensure success on its own. Three

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primary body shapes can be used to categorize somatotypes: mesomorph/mesotonic, ectomorph/ectotonic, and endomorph/endotonic. These establish how an individual's arm strength and endurance relate to their physique and body type (somatotype). According to the tabulated figures, the fourth year respondents have the highest mesomorphic structure; of the 46 respondents, 28 or 60.9% have this structure, indicating that their medium structure, height, and propensity to put on muscle and strength quickly make them a formidable contender for any sport's top athlete (BrianMac, 2008). Mesotonic people, he continued, typically have athletic, strong physiques with the ideal quantity of fat. Mesomorphs are indifferent to weight increase or loss. They simply eat more to gain weight or less to reduce it because they are in sync with their metabolisms. Afterwards, 25 out of 51 respondents, or 49.0% of the second year respondents, are in the mesomorphic structure. Next up are respondents from the second and third year levels, who make up 45.5% and 22 out of 44 respondents, respectively, and 45.8% and 22 out of 48 respondents, respectively. The majority of the sampled respondents have mesomorphic structures, according to the findings. However, when it comes to the percentage of ectomorphic structures, the second year level scored highest, with seventeen out of forty-four respondents, or 38.6%, having ectomorphic bodies. According to Brian Mac (2008), as endomorphic people tend to be long, slender, and thin, power and strength sports are essentially unfeasible for them. They are also more vulnerable to injury due to their tiny build. Concurrently, 31.4% and 31.3% of respondents in the first and second year levels, respectively, reported having ectomorphic bodies. Out of 48 respondents, 11 or 22.9% have an endomorphic body, which indicates that these respondents are more likely to be obese and have more fat on their bodies than muscle. The third year level of respondents is represented by the majority of endomorphic bodies among the respondents. According to Kazlev (2004), endotonic people usually have trouble competing in sports that call for a high degree of speed or agility. The first and fourth year level respondents are next examined, and according to the previously mentioned structure, ten out of fifty-one and nine out of forty-six respondents, respectively, demonstrate a negligible difference from the third year level. The data also indicates that seven out of forty-four respondents, or 15.9%, belong to endomorphic structure, making the second year level respondents the least represented endomorphic body. Lastly, nine out of forty-six respondents, or 19.6%, belong to the endomorphic body that is least represented among respondents at the fourth year level. The table provides additional evidence for Sheldon's (1940) theory, which links three fundamental body types to personality traits that indicate a relationship between temperament and physical attributes. The data from respondents at the fourth year level provide a specific example; they found that the endomorphic structure has the lowest percentage, the mesomorphic structure has the highest percentage, and the ectomorphic structure has the lowest

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%. This indicates unequivocally that the responders in their fourth year are forceful, competitive, and engaged. They become extremely restless without exercise since they need it and want to. They take pleasure in taking chances in social and physical contexts. They are therefore frequently perceived as motivated and unwavering in their goals. They continue to concentrate on the objective until it is accomplished, at which point they turn to the next one.

Table 1.3 Body Mass Index According to Year Level

Body Mass Index Categories	**Year Level**								**Total**	
	First Year		**Second Year**		**Third Year**		**Fourth Year**			
	f	%	f	%	f	%	f	%	f	%
Underweight	9	17.6	12	**27.3**	11	22.9	5	10.9	37	19.6
Normal Weight	32	**62.7**	26	**59.1**	30	**62.5**	32	**69.6**	**120**	**63.4**
Overweight	6	11.8	6	13.6	4	8.3	8	**17.4**	24	12.7
Obesity	4	**7.8**	0	0	3	6.3	1	2.2	8	4.2
Total	51	100	44	100	48	100	46	100	189	100

According to the table, the fourth, first, and third year respondents seem to be highly representative in the normal weight category. In terms of underweight respondents, the second year respondents have the largest representation (27.3%), with the third and first year respondents showing only a slight difference. On the other hand, the second year respondents have the least representation of the normal weight category. The lowest percentage of underweight respondents is seen among the fourth-year respondents, with an average of 10.9%. Even the third year respondents, who are rated as having the lowest percentage at 8.3%, most likely receive reasonable percentages for the overweight group, ranging from 11.8% to 13.6% for the first and second years. Remarkably, the respondents in their fourth year have the lowest percentage (17.4%). The second, third, and fourth year respondents, however, do not appear to be having any issues with the obese group. The data also reveals that a comparatively higher number of first-year respondents fall into the obese group. Table 2 illustrates the summary table of the frequency and percentage distribution of all student-respondents performance before and after the prescriptive push-up exercise. It has been shown that the pretest result varies according to year level. Both first and second year respondents approximately had a similar outcome in terms of lowest represented fitness zone which is the low fitness category. While the third year respondents and fourth year respondent also obtain similar outcome in terms of the least represented fitness zone which is the marginal fitness category.

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Table 2 Table of Push-up Exercises Performance of all Student-Respondents in the Pre-test and Post-test

Overall Arm Fitness Categories	Gender	YEAR LEVEL															
		First Year				Second Year				Third Year				Fourth Year			
		Pre-test		Post-test		Pre-test		Post-test		Pre-test		Post-test		Pre-test		Pos-test	
		f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
High Performance	Male	1	7.7	2	15.4	2	15.4	4	30.8	1	8.3	4	33.3	0	0	1	8.3
	Female	8	66.7	6	50.0	3	23.1	10	76.9	5	41.7	10	83.3	1	9.1	4	36.4
Good Fitness Zone	Male	1	7.7	1	7.7	1	7.7	4	30.8	0	0	0	0	2	16.7	4	33.3
	Female	2	16.7	3	25.0	7	53.8	3	23.1	3	25.0	2	16.7	4	36.4	3	27.3
Average Fitness Zone	Male	5	38.5	3	23.1	5	38.5	1	7.7	7	58.3	8	66.7	3	25.0	5	41.7
	Female	0	0	2	16.7	3	23.1	0	0	3	25.0	0	0	3	27.3	1	9.1
Marginal Fitness Zone	Male	3	23.1	6	46.2	3	23.1	2	15.4	4	33.3	0	0	6	50.0	1	8.3
	Female	1	8.3	1	8.3	0	0	0	0	1	8.3	0	0	3	27.3	3	27.3
Low Fitness Zone	Male	2	15.4	0	0	2	15.4	2	15.4	0	0	0	0	1	8.3	1	8.3
	Female	1	8.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Very Low Fitness Zone	Male	1	7.7	1	7.7	0	0	0	0	0	0	0	0	0	0	0	0
	Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		13	100	13	100	13	100	13	100	12	100	12	100	12	100	12	100

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	12	100	12	100	13	100	13	100	12	100	12	100	11	100	11	100

Note: Percentage value is within the year level based on gender

Moreover, the post test reveals that third and second year respondents obtained the highest number of respondents lifted to HPZ. This is followed by the first and fourth year respondents. Generally, there are number of respondents that are placed in the good, average and marginal fitness zones. The table further explains that the female respondents garner more number of muscular repetitions than the male respondents. This implies that male respondent's experience a bit of difficulty in performing the required skills. However, more likely it is expected in the same way because male respondents are given standard push-up exercise while the female respondents are given modified push-up as their prescriptive exercises. As described in the previous tables, there is an increment of their overall arm strength and endurance after the intervention program which is mostly common to student-respondents in all year level.

Table 3 Table of Barbell Exercises Performance of all Student-Respondents in the Pre-test and Post-test

Overall Arm Fitness Categories	**Gender**	**YEAR LEVEL**															
		First Year				**Second Year**				**Third Year**				**Fourth Year**			
		Pre-test		Post-test		Pre-test		Post-test		Pretest		Post-test		Pretest		Post-test	
		f	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**	**f**	**%**	f	%	f	%
High Performance	Male	0	0	1	7.7	0	0	1	11.1	0	0	4	33.3	0	0	3	25.0
	Female	2	15.4	4	30.8	0	0	2	22.2	1	8.3	5	41.7	0	0	4	36.4
Good Fitness Zone	Male	0	0	0	0	1	11.1	3	33.3	2	16.7	5	41.7	1	8.3	2	16.7
	Female	4	30.8	3	23.1	1	11.1	3	33.3	1	8.3	3	25.0	3	27.3	4	36.4
Average Fitness Zone	Male	4	30.8	1	7.7	5	55.6	4	44.4	5	41.7	1	8.3	3	25.0	3	25.0
	Female	3	23.1	2	15.4	3	33.3	2	22.2	6	50.0	2	16.7	5	45.5	2	18.2

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Marginal Fitness Zone	Male	5	38.5	8	61.5	2	22.2	1	11.1	4	33.3	1	8.3	3	25.0	1	8.3
	Female	3	23.1	3	23.1	3	33.3	2	22.2	3	25.0	2	16.7	3	27.3	0	0
Low Fitness Zone	Male	4	30.8	2	15.4	1	11.1	0	0	1	8.3	1	8.3	4	33.3	3	25.0
	Female	1	7.7	1	7.7	2	22.2	0	0	1	8.3	0	0	0	0	1	9.1
Very Low Fitness Zone	Male	0	0	1	7.7	0	0	0	0	0	0	0	0	1	8.3	0	0
	Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		13	100	13	100	9	100	9	100	12	100	12	100	12	100	12	100
		13	100	13	100	9	100	9	100	12	100	12	100	11	100	11	100

Note: Percentage value is within the year level based on gender

Table 4.1 presents the distribution of mean and test statistics (T-Value) of arm strength and endurance level of male student-respondents before and after the prescriptive push-up exercise.

Table 4.1 Mean and T-Value Distribution of Arm Strength and Endurance Level of Male Student-Respondents Before and After the Prescriptive Push-up Exercise

Year Level	*n*	**Prescriptive Exercise Mean**				T-Value
		Before	Description	After	Description	
First Year	*(n=13)*	3.54	Average Fitness Zone	3.31	Average Fitness Zone	1.148 (ns)
Second Year	*(n=13)*	3.15	Average Fitness Zone	2.54	Good Fitness Zone	**2.551 ***
Third Year	*(n=12)*	3.17	Average Fitness Zone	2.33	Good Fitness Zone	**3.458 ***

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Fourth Year	*(n=11)*	3.50	Average Fitness Zone	2.75	Good Fitness Zone	1.827 (ns)

** Significance value is at <.05*

The table reveals no significant difference in the arm strength and endurance level among the first year male student-respondents after the prescriptive push-up exercise was given. Post-test prescriptive exercise mean value of first year respondents does not show significant improvement in their over-all arm strength and endurance level, in fact they obtained almost the same mean in their pre and post-test. Relative to the insignificance of the prescriptive push-up exercise given to the first year respondents, conceivably it is because a number of respondents were categorized in the endomorphic body structures and more number of respondents belonged to ectomorphic structures. Upper muscular strength and endurance are still questionable among first year respondents since muscles and body structure are still underdeveloped. Although they got the highest number of mesomorphic body structures, but studies show being in the ideal body structure does not guarantee good result of physical performance if it is not enhanced. The prevailing body mass index among of these populations are considered another factor that can affect arm strength and endurance since they are ranked first and second in terms of underweight, overweight and obese respectively. Thus the findings confirm the experimental research by Ferrera (2005) regarding the associations between BMI towards physical performance. In his eight dimensions of fitness test, it shows that persons with moderate and morbid obesity have significantly lower scores. Therefore the null hypothesis stipulated in relation to the arm strength and endurance level before and after the prescriptive push-up exercises in so far as first year student-respondents are concerned, is accepted. The figures for the second year male student-respondents on the other hand show significant difference in their over-all arm strength and endurance level after the prescriptive push-up exercises are given. From 3.15 pre-test mean value categorized in the average fitness zone are raised to 2.54 post-test mean value categorized as good fitness zone. This means that the prescriptive push exercises significantly influence the over-all arm strength and endurance level of the second year respondents. As it is revealed in the previous tables, this population get the lowest number of endotonic respondents, highest number of ectomorphic body structures and underweight respondents in terms of BMI. It means that even if they have a considerable number of underweight and ectomorph respondents they perform higher number of repetitions. Aside from the positive outlook, self-confidence and previous physical fitness activities and training, it is found out that the second year sampled respondents in particular are interpreted as “strong” and are ranked second in the area of ***Kinesthetic Sense***, ***XUHS Interest and Study Habits Inventory***

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(SY 2009-2010). This implies that there is a higher level of ability to control or perceive body movements and handle objects skillfully. The organs of kinesthetic sense are the proprioceptors, which include specialized sensory receptors in muscles, tendons, joints and vestibular apparatus of the inner ear. Research has shown that proprioceptors provide feedback that aids future performances of a similar nature. ln view of the aforesaid findings, the null hypothesis stipulates in relation to the arm strength and endurance level before and after the prescriptive push-up exercises in so far as second year male student-respondents are concerned, is rejected. The figures obtain by their third year male respondents, show significant difference in their over-all arm strength and endurance level after the prescriptive push-up exercise is given. Among the four different year level particularly male respondents, the third year male respondents get the highest mean value before and after the prescriptive exercises. This implies that the designed prescriptive exercises provide significant influence in the overall arm strength and endurance level among the third year respondents. As revealed in this population, they get the highest number of endotonic respondents, moderate number of ectotonic respondents, highest number of underweight respondents and moderate numbers of overweight and obese respondents in terms of BMI. This means that even though they get the highest number of endomorph and underweight respondents, they still perform well and take full advantage of the activity given the fact that they had a minimal difference in terms of kinesthetic interest compared to second year respondents. With these findings therefore, the null hypothesis stipulated in relation to the arm strength and endurance level before and after the prescriptive push-up exercises in so far as third year male student-respondents are concerned, is rejected. Finally, the figures obtain by the fourth year male respondents shows no significant difference in their overall arm strength and endurance level after the prescriptive push-up exercise is given. It is therefore the null hypothesis stipulates in relation to the arm strength and endurance level before and after the prescriptive push-up exercises in so far as fourth year student-respondents are concerned, is accepted.

Table 4.2 presents the distribution of mean and test statistics (T-Value) of arm strength and endurance level of female student-respondents before and after the prescriptive push-up exercise.

Table 4.2 Mean and T-Value Distribution of Arm Strength and Endurance Level of Female Student-respondents Before and After the Prescriptive Push-up Exercise

Year Level	*n*	**Prescriptive Exercise Mean**				T-Value
		Before	Description	After	Description	

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First Year	*(n=12)*	1.75	High Performance Zone	1.83	High Performance Zone	-.321 (ns)
Second Year	*(n=13)*	2.00	Good Fitness Zone	1.23	High Performance Zone	**2.993 ***
Third Year	*(n=12)*	2.00	Good Fitness Zone	1.17	High Performance Zone	**3.079 ***
Fourth Year	*(n=11)*	2.73	Good Fitness Zone	2.27	Good Fitness Zone	1.336 (ns)

** Significance value is at <.05*

The tabulated t-values among female respondents in all year level reveal that there is a similarity of findings with the male respondents, particularly with regards to the effects of prescriptive push-up exercises to the over-all arm strength and endurance. However, female respondents obtain higher mean before and after the prescriptive exercises compared to the male respondents. This implies that perhaps the level of difficulty in terms of performing standard push-up exercise is higher compared to the modified push-up. Sherrill (2008) cited that modified push-up or commonly referred to as the "women's push up" was designed for women and for those who have weaker muscle strength and endurance. Women, on the average perform poorly in tests that require movement of the whole body weight. Based on the generated findings, it shows that there is no significant difference among first and fourth year female respondents in relation to their over-all arm strength and endurance level before and after the prescriptive push-up exercises; therefore, the null hypothesis is accepted. On the other hand, t-values among second and third year female respondents show significant difference in their overall arm strength and endurance level. However, it is good to point out that second year female respondents are able to obtain the highest number of respondents who are lifted to HPZ. Out of thirteen female respondents, ten of them are placed on the said fitness category and the remaining three respondents are in the GFZ. The same findings have been generated for the third year female respondents. Given as a result therefore, the null hypothesis which states that there is no significant difference in the student-respondents arm strength and endurance level before and after the prescriptive push-up exercises in so far as second and third year female respondents is rejected, respectively.

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Table 5.1 presents the distribution of mean and test statistics (T-Value) of arm strength and endurance level of male student-respondents before and after the prescriptive barbell exercise.

Table 5.1 Mean and T-Value Distribution of Arm Strength and Endurance Level of Male Student-Respondents Before and After the Prescriptive Barbell Exercise

Year Level	*n*	**Prescriptive Exercise Mean**				T-Value
		Before	Description	After	Description	
First Year	*(n=13)*	4.00	Marginal Fitness Zone	4.00	Marginal Fitness Zone	.000 (ns)
Second Year	*(n=9)*	3.33	Average Fitness Zone	2.56	Good Fitness Zone	**3.500 ***
Third Year	*(n=12)*	3.33	Average Fitness Zone	2.17	Good Fitness Zone	**4.841 ***
Fourth Year	*(n=12)*	4.08	Marginal Fitness Zone	2.92	Good Fitness Zone	**4.841 ***

** Significance value is at <.05*

The table reveals no significant difference in the arm strength and endurance level among the first year male student-respondents after the prescription of barbell exercise. The post-test mean value does imply any improvement after the prescription of exercise. Comparing to the post-test mean value for prescriptive push-up exercise is relatively higher compared to the first year male respondents who utilizes barbell prescription, but both of the two interventions have the same implication. Accordingly, the null hypothesis in so far as first year male respondents are concerned, is accepted. The table further shows there is a significant difference in the overall arm strength and endurance level after the intervention program among the second year male respondents. It is found out that there is a moderate increase in their level of arms strength and endurance one fitness category higher. Among the different year levels, second year male and female respondents, get the lowest number of sample respondents. As compared to the prescriptive push-up exercise, though the same fitness category is obtained and its significance, still push-up prescription get higher mean compared to barbell prescription. Hence, the null hypothesis which states that there is no significant difference in the student-respondents arm strength and endurance level before and

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after the prescriptive push-up exercises in so far as second year male respondents are concerned is rejected. The third year student-respondents t-value on the other hand, shows that there is a significant difference in the overall arm strength and endurance level after the prescribed exercises is given. Notably, the figures show that more than half of the population are lifted to the first two higher fitness zones. The post-test mean value is significantly higher compared to the post-test mean value of push-up prescription with the same level. It is therefore the null hypothesis stipulated in relation to the arm strength and endurance level before and after the prescriptive push-up exercises in so far as third year male student-respondents are concerned, is accepted. Finally, the table shows that there is a significant difference in their overall arm strength and endurance after the prescription of barbell exercise among fourth year male respondents. As revealed after the prescription, out of twelve male respondents only four of them are lifted to high and good fitness categories respectively. Generally, this implies that there is a significant improvement but a lower percentage, majority of the sampled respondents of this year level did not increase in overall performance. Post-test mean value of push-up prescription is higher compared to the barbell prescription. Accordingly, the null hypothesis in so far as fourth year male respondents are concerned, is accepted.

Table 5.2 presents the distribution of mean and test statistics (T-Value) of arm strength and endurance level of female student-respondents before and after the prescriptive barbell exercise.

Table 5.2 Mean and T-Value Distribution of Arm Strength and Endurance Level of Female Student-Respondents Before and After the Prescriptive Barbell Exercise

Year Level	Population	**Prescriptive Exercise Mean**				T-Value
		Pre-test	Description	Post-test	Description	
First Year	*(n=13)*	2.77	Good Fitness Zone	2.54	Good Fitness Zone	1.000 (ns)
Second Year	*(n=9)*	3.67	Average Fitness Zone	2.44	Good Fitness Zone	2.137 (ns)
Third Year	*(n=12)*	3.17	Average Fitness Zone	2.08	Good Fitness Zone	**3.463 ***

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Fourth Year	*(n=11)*	3.00	Average Fitness Zone	2.09	Good Fitness Zone	**3.194 ***

** Significance value is at <.05*

The table shows both first and second year female respondents reveal no significant difference in their overall arm strength and endurance level after the barbell prescription. Consistently first year female respondents for this prescription obtain minimal increased from pre-test mean value of 2.77 to 2.54 post-test mean value. Apparently, push-up prescription obtains higher mean value as compared to barbell prescription. Second year female respondents on the other hand shows considerable increased in their overall arm strength and endurance level but did not reach the significant value wherein a number of respondents are still in the average and marginal fitness categories. It is therefore the null hypothesis stipulated in relation to the arm strength and endurance level before and after the prescriptive barbell exercises in so far as first and second year student-respondents are concerned, is accepted. The table further shows that there is a significant difference in the overall arm strength and endurance level among the third and fourth year female respondents. Both groups of respondents are able to show significant difference since a number of respondents are raised to higher fitness categories after the prescription. It is good to note that for the group of respondents are able to obtain higher mean compared to push-up prescription. It is therefore the null hypothesis stipulated in relation to the arm strength and endurance level before and after the prescriptive barbell exercises in so far as third and fourth year student-respondents are concerned, is rejected. The two groups did not start with comparable overall fitness level. However, this study is able to generate sufficient data that their pretest and posttest scores are related. This is explained in each of the year level data by gender. In this study, certain personal characteristics such as body mass index and their somatotype structures could be sources of significant variations in the overall arm fitness categories of the students. Previous findings found in Table 4.1.1 show that the two approaches; namely, the standard push up and the barbell exercises did not have significant effect on the overall arm fitness levels of the first year male and female respondent. Table 6.1, on the other hand shows the table of the analysis of covariance used in the study to determine whether the standard push up caused improved categories on the overall arm fitness level compared than to the other prescriptive exercise which is the barbell exercise. In other words, the answer to the question “Is the standard push up more effective than the barbell exercise in improving over-all fitness levels of the respondents?” or “Is the barbell exercise more effective than the standard push up exercise?” can be answered by the data from the table shown below.

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Table 6.1 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the First Year Male Student-Respondents

Source of Variation	Adjusted Square	df	Mean Squares	F Value	P (α)	Decision
Adjusted Means	0.45	1	0.45	**01.73**	0.407	Not Significant
Adjusted Error	14.11	23	0.61			
Adjusted Total	14.56	24				Do Not Reject Ho

The computed f-value of 01.73 did not reach the critical level of rejection; therefore, the hypothesis is not rejected. This data represents that none of the two prescriptive exercises have been found to be more effective than the other in improving the overall arm fitness categories of the first year male students. These findings further imply that neither the standard push-up nor the barbell exercises have been found to cause greater significant effect on the overall arm fitness categories of the student-respondents. In short, for the first year male students, neither of these prescriptive exercises could be claimed to be more effective than the other. Results reveal in the mean and t-value distribution that there is no significant influence on the overall arm fitness levels of first year female respondents' using both prescriptions. Table 6.2 explains that there is a mean difference between the two groups of respondents that are not significant enough so as to cause variations as evidenced by the obtained f-value of 0.01 which did not reach the required value for significance. Therefore, the hypothesis is not accepted. Likely, the data represent that none of the two prescriptive exercises have been found to be more effective than the other in improving the overall arm fitness categories of the first year male students.

Table 6.2 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the First Year Female Student-Respondents

Source of Variation	Adjusted Square	df	Mean Squares	F Value	P (α)	Decision
Adjusted Means	0.01	1	0.01			Not

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Adjusted Error	14.4	22	0.65	**0.01**	0.921	Significant
Adjusted Total	14.4	23				Do Not Reject Ho

These findings further imply that neither the standard push-up nor the barbell exercises have been found to cause significant effect on the overall arm fitness categories of the students. In short, for the first year male students, neither of these prescriptive exercises could be claimed to be more effective than the other. The mean and t-value distribution among second year male respondents point out that there is a significant difference of the over-all arm fitness level after the prescriptive push-up and barbell exercises is given.

Table 6.3 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the Second Year Male Student-Respondents

Source of Variation	**Adjusted Square**	**df**	**Mean Squares**	**F Value**	**P (α)**	**Decision**
Adjusted Means	0.11	1	0.11	**0.17**	0.68	Not Significant
Adjusted Error	12.4	19	0.65			
Adjusted Total	12.51	20				Do Not Reject Ho

Previous findings found that prescriptive push-up and barbell exercises have significant effect on the overall arm fitness levels of the second year male and female respondents. However, the tabulated adjusted means, error, and the adjusted total on table 6.3, show the insignificance of both prescribed exercises to the overall arm fitness level among second year male respondents are the obtained f-value of 0.17 which did not reach the required value for significance. On the other hand, mean and t-value of both group respondents recognize that there is a significant influence of respondents' overall arm fitness level before and after the prescriptive exercises. Findings imply that standard push-up have higher percentages in improving arm fitness level compared to the prescriptive barbell exercise for the second year male respondents though both prescriptions reach the significance level. Table 6.4, on the other hand shows the table of the analysis of covariance used in the study to determine either of two prescribed exercises have caused improved categories on the overall arm fitness.

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Table 6.4 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the Second Year Female Student-Respondents

Source of Variation	Adjusted Square	df	Mean Squares	F Value	P (α)	Decision
Adjusted Means	7.05	1	7.05	**11.57**	0.003	**Significant**
Adjusted Error	11.57	19	0.61			
Adjusted Total	18.62	20				**Reject Ho**

The computed f-value of 11.57 has reached the critical level of rejection; therefore, the hypothesis is rejected. This data represents that the two prescriptive exercises furnished significant increase on the overall arm fitness categories of second year female respondents. However, it is found out that prescriptive push-up exercise caused greater significant effect compared to prescriptive barbell exercise on the overall arm fitness level among these respondents. In other words, prescriptive push-up exercises have been found to be more effective than the other in improving the overall arm fitness categories of the above-mentioned respondents. As manifested in the previous findings that after the prescriptive push-up and barbell exercises, out of thirteen second year female respondents ten of them are lifted to HPZ and out of nine respondents for prescriptive barbell exercise, only two respondents rise to HPZ. Table 6.5 presents the computed f-value of 0.82 did not reach the critical level of rejection; therefore, the hypothesis is not rejected. Based on the computed mean and t-value distribution, the two groups of respondents receive moderate increase on the overall arm fitness categories of third year male respondents. It has been revealed that barbell prescription obtained more number of respondents that are lifted to a higher fitness zone.

Table 6.5 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the Third Year Male Students

Source of Variation	Adjusted Square	df	Mean Squares	F Value	P (α)	Decision
Adjusted Means	0.59	1	0.59	**0.82**	0.38	Not Significant
Adjusted Error	15.16	21	0.72			

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Adjusted Total	15.76	22				Do Not Reject Ho

Table 6.6 presents that both prescriptive exercises did not show significant effect to the overall arm fitness level among third year female respondents are the obtained f-value of 1.63 which did not reach the required value for significance. On the other hand, mean and t-value of both group respondents recognize that there is a significant influence of respondents' overall arm fitness level before and after the prescriptive exercises. Findings imply that standard push-up have higher percentages in improving arm fitness level compared to the prescriptive barbell exercise for the second year female respondents though both prescriptions reach the significant level. In other words, for the third year female respondents, neither of these prescriptive exercises could be claimed to be more effective than the other.

Table 6.6 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the Third Year Female Student-Respondents

Source of Variation	**Adjusted Square**	**df**	**Mean Squares**	**F Value**	**P (α)**	**Decision**
Adjusted Means	1.03	1	1.03	**1.63**	0.22	Not Significant
Adjusted Error	13.29	21	0.63			Do Not Reject Ho
Adjusted Total	14.32	22				

Table 6.7 Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the Fourth Year Male Students

Source of Variation	**Adjusted Square**	**df**	**Mean Squares**	**F Value**	**P (α)**	**Decision**
Adjusted Means	0.31	1	0.31	**0.24**	0.63	Not Significant
Adjusted Error	27.67	21	1.32			Do Not Reject Ho
Adjusted Total	27.98	22				

However, the computed f-value of 0.24 did not reach to the level of significance therefore none of the two prescriptive exercises have been found to be more effective than the other in improving

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the overall arm fitness categories of the third year male students. In short, for the fourth year male students, neither of these prescriptive exercises could be claimed to be more effective than the other. Table 6.15 explain the r = 0.57 or an r^2=0.33 that there is a linear relationship between the overall arm fitness category of the fourth year female student-respondents before and after the standard push up and the barbell exercises were prescribed. Furthermore, the data also imply that of all the variability that exists among the post test scores, a matter of 33.0% can be traced to the pre-existing individual differences in the pretest scores.

Table 6.8. Table of One-Way ANCOVA to Determine Which of the Prescriptive Exercises Have Significant Effect on the Overall Arm Fitness Categories of the Fourth Year Female Students

Source of Variation	Adjusted Square	df	Mean Squares	F Value	P (α)	Decision
Adjusted Means	0.85	1	0.85	**0.77**	0.77	Not Significant Do Not Reject Ho
Adjusted Error	20.94	19	1.1			
Adjusted Total	21.79	20				

Table 6.8 presents the computed f-value of 0.77 did not reach the critical level of rejection; therefore, the hypothesis is not rejected. Based on the computed mean and t-value distribution, the two groups of respondents receive minimal increase on the overall arm fitness categories of fourth year female respondents. However, the computed f-value did not reach to the level of significance therefore none of the two prescriptive exercises have been found to be more effective than the other in improving the overall arm fitness categories of the third year male students. In short, for the fourth year female students, neither of these prescriptive exercises could be claimed to be more effective than the other. Based on the computed aggregate correlation within samples it shows that the higher the pre-existing individual differences, the improvement becomes lower. Although majority of the respondents are having the same findings *"not significant"* in both prescriptions in relation to the question which of the prescriptive exercises have great significant effect on the overall arm fitness categories?, except for the second year female respondents which shows great significance. Certainly, there is a reasonable improvement that took placed particularly in the pre-test and post-test scores of the respondents but findings confirmed that neither of the prescriptions could be claimed to be more effective than the other. That is why physical education curriculum should be viewed as a continuum, it is possible to appreciate the need for progression in both

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selection, presentation and prescription of activities and more effectively assess students' progress (Stillwell et. al. 1997).

Findings

In the light of the data gathered, analyzed and interpreted, the following were evident.

The study reveals that majority of the respondents have a normal weight and mesomorphic body structure while obese and endomorphic body structures are the least represented. After the prescriptive exercises, first year respondents have Marginal Fitness Zone, the second year respondents with Good to High Performance Zone, the third year respondents with High Performance and the fourth year respondents with Good to High Performance Zone. The prescriptive exercises show no significant difference in the overall arm fitness category of first year, third year, fourth year and second year male respondents with the second year female respondents show significant difference. The study also reveals that regardless of gender, the push-up exercise group shows more improvement compared to prescriptive barbell exercises group which indicates that the push-up exercises are effective than barbell exercises to improve the arm strength and endurance. The body mass index and pre-existing individual differences cause significant variations in the overall arm fitness of the respondents which means that the higher the pre-existing individual difference, the improvement becomes lower as very apparent in all groups of respondents.

Conclusions

The conclusions are drawn that the first year (male-female), third year (male-female), fourth year (male-female) and second year (male) respondents gain significant improvement but did not cause great significant difference in their overall arm fitness. Therefore, neither of these prescriptive exercises could be claimed to be more effective than the other. However, the second year female respondents show significant improvement for the wall push-up prescription.

Recommendations

In the light of the results of the study, the researcher suggests the following recommendations:

1. That school administrators consider the provision of progressive type of fitness gym with available set of conditioning and workout facilities to cater student's physical needs especially students identified with inadequate muscular strength and endurance and other health related fitness concerns.

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2. The physical education curriculum for secondary education be viewed as a continuum, it is possible to appreciate the need for progression in both the selection and presentation of activities, and more effectively observe and assess student progress.

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