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Effects of a Home-based Programme on Physical Activity among Undergraduate Female Students in Iraq

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Abstract
The study aimed to evaluate the effect of home-based programme to improve physical activity among undergraduate female students in Iraq. The participants were Iraqi sedentary undergraduate female students (N=44) who were assigned to two groups consisted of experimental group (N=22) and control group (N=22) respectively. The experimental group received a 12-week home based intervention programme which focuses on PA, while the control group were maintaining their usual life. Measurements for all the variables were taken prior to the intervention (pre-test), at week 6 (post-test1), and after 12 weeks (post-test2). The results of Mixed between-within subjects analysis of variance shows a statistically significant between the mean test scores in the pre-test, post-test1, and post-test2 measurements of PA in the experimental group. This study provided evidence that home-based intervention programme which focused on physical activity had a significant effect on improving physical activity.
Keywords: Home-Based Programme; Physical Activity; Undergraduate Female Students

Introduction

Physical inactivity has been identified as important public health concerns for the youth. According to WHO's reports, the lack of exercise cause an increase in the rate of global deaths from non-infectious diseases by an estimated 60% (Al-Tamimi, 2007). Poor physical inactivity causes 310,000 to 580,000 deaths per year and are the major contributors to disabilities that result from diabetes, osteoporosis, obesity, and stroke (Pribis et al., 2010). This phenomenon has highlighted the importance of PA in our daily life behaviour and how the lack of PA can be dangerous, especially to youth life. Accordingly, Mirkin (2010) indicated that Iraq has approximately 50% of the population under the age of 19. However, it is difficult for people in this country to keep healthy and live actively due to poor security conditions and the instability of safety.

Different studies conducted on PA among adolescents and adults show a significant decline in the rate of PA in adolescence (Caspersen et al., 2000; Malina, 2001). This rate continues to decline throughout adulthood (Dwyer et al., 2013; Malina, 2001). Furthermore, research has

shown that the level of PA has declined among college students in recent years. It was reported that up to 50% of college students are not physically active at the recommended levels (Jackson & Howton, 2008; Leslie et al., 2001). Al Subaie (2005) revealed a low percentage of students (5.8%) involved in physical activities in Saudi Arabia during the period of university study. In tracking PA participation in the early college years, Racette et al. (2005) found that 30% of students did not do physical exercise during their freshman year.

Ismail and Shihab (1994) showed the negative trends and misconceptions among educators, teaching staff, and management in schools in Iraq, who consider PA as an outsider subject in education. In addition, the evidence indicates that physical education is not properly acknowledged in education system due to the lack of interest in physical education lessons, lack of facilities and equipment, insufficient time allocated to physical education lessons, and lack of interest in school administration to support PA.

Despite the significant number of evidence regarding the benefits of being physically active and improving students physically, there is no physical education course in the curriculum of non-sports colleges in Iraqi universities. This problem is faced by college students to engage in PA during their undergraduate years. Moreover, the lack of adequate encouragement that students receive from faculty members, the congestion of university lectures, and the lack of credits for PA in the educational calendar of universities, are the factors leading students' poor participation in sports activities in the university. Furthermore, the unsecure society (e.g. students to do exercises at home with lack of time and poor application of the lessons on physical education) is the key factor that the very few students receive proper physical.

The above mentioned issues are the reasons behind the manifestation of potentially inactive and uneducated healthily generation of young people. Phenomenon of inactivity is prevalent, especially among female members of the society, who are prone to various physiological, physical, and mental problems as the consequence of not engaging in any type of PA or sports. Therefore, there seems to be an urgent need to design a home-based intervention programme to help the sedentary young Iraqi female students improve their health physiologically and physically. This intervention should include physical activities and simple exercises tailored for these inactive young women, which can be carried out easily at home where most of these students spend a great deal of their free time. In addition, it is important to know which health indicators (i.e. physiologically or physically) is mostly affected by this intervention programme.

Objectives

The main objective for this research is to investigate the effect of the 12 week home based intervention programme on the physical activity among undergraduate female students in Iraq.

Literature Review

Physical Activity

Physical activity can be defined as any bodily movement that is performed by muscles and results of EI (Bouchard et al., 1990). Such active performance needs to spend an amount of energy including exercise as well as other activities. Bodily movement is clearly manifested in activities such as playing, working, active transportation, house chores and recreational activities, and its intensity varies between people (WHO, 2004b). The intensity of PA depends on an individual's previous exercise experience and their relative level of fitness (WHO, 2004b). From another point of view, Malina et al. (2004) indicated that PA has mechanical, physiological, and behavioural components according to the individual function, the use of apparatus, or the interaction with others.

Caspersen et al. (1985), explained that everyone practices PA in order to maintain life. However, the amount of PA depends on personal choice in a sense that it may vary greatly from person to another as well as for a given person over time. The most common unit used in PA is referred to as kcals calculated per week and per day (Paffenbarger et al., 1978; Taylor et al., 1978). Furthermore, PA during monthly, seasonal, or yearly periods can also be tested to prove the stability of PA for longer time periods (Caspersen et al., 1985).

PA can be categorized into a variety of ways. A commonly used approach in PA is on the basis of the portions of daily life when the activity occurs. The PA occurs while sleeping, at work, and at leisure categorized as the simplest action (Montoye, 1975). PA is a complex behaviour. However, it can be divided into different categories. For example, all physical activities might further be divided into light, moderate, or heavy intensity. It has to be done in a wilful or compulsory way; or done at weekdays or on weekends. All of these are considered as acceptable ways to categorize PA. The only requirement is that the subdivisions be mutually exclusive, and that they sum to the total caloric intake due to PA (Caspersen et al., 1985).

Regular PA helps improve overall health and fitness, and reduce risk of many chronic diseases. Fitting regular exercise into daily schedule may seem difficult at first. Nevertheless, the 2008 Physical Activity Guidelines for Americans, recommends that it should have freedom to reach PA goals through different types and amount of activities each week. For example, adults aged between 16-64 need to do two types of PA each week to improve their health–aerobic and muscle-strengthening, within two hours and 30 minutes (150 minutes) of moderate-intensity aerobic activity (i.e., brisk walking) every week and muscle-strengthening activities within two or more days a week that involves all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms) (P. A. G. A. Committee, 2008a). A hundred and fifty minutes of physical exercise conducted in chunks during the week and implemented them into smaller sessions during the day can make exercise easier to practice. In addition, it can be done at a moderate or vigorous effort for at least 10 minutes at a time and can be engaged in many different forms, at any time of the day. Participation in any PA is better than doing none. The appropriate way is to

start by doing some, and gradually building up to the recommended amount which is expected for all adults aged 18 to 64 years, irrespective of cultural background, gender or ability.

According to Adams (2009), regular PA is associated with prevention of morbidity. Additionally, low levels of PA are associated with an increased risk of cardiovascular mortality, and a substantially higher risk of stroke and coronary events. The protective effects of PA on cardiovascular disease start at moderate levels of regular activity (Arroll and Beaglehole, 1992; Kelley & McClellan, 1994). On the other hand, Elliot et al. (2012) showed a positive impact of PA level on seven mental health variables related to depression among undergraduate students. Engagement in PA can be an important contributory factor in the PD of undergraduate students. In another study, Tyson et al. (2010) found a significant relationship between PA and PD and indicated that engaging in more exercise leads to decreasing PD for college students.

Sugiyama et al. (2008) mentioned that according to the WHO reports, the lack of exercise is among the most important causes of increasing global deaths from non-infectious diseases. Thus, engaging in physical activities including 150 minutes (2 ½ hours) of moderate intensity in a weekly basis consistently reduces the risk of many chronic diseases and other adverse health outcomes such as heart disease, coronary heart disease, stroke, some cancers, type 2 diabetes, osteoporosis, and depression and even death.

The Benefits of Intervention Programme on Physical Activity

It is generally accepted that PA benefits psychosocial health, functional ability and general quality of life and reduces the risk of coronary heart disease and some types of cancers (Allender et al., 2006). Caspersen et al. (2000) confirmed that PA and strengthening patters erode among adolescents and young adulthood in the 12-29 age range, PA level among female were moderately greater than men. Further, intervention would be necessary for limiting a decline in PA in adolescence and adulthood.

As mentioned before, Iraq is still one of the poor countries in terms of sports activities due to wars and instability, which highlights the cultural awareness of PA and their importance in building a healthy society. The need to have intervention programme performed at home or anywhere can be beneficial especially for females. Recent research conducted in North America or in Europe and some Arab countries showed a significant decrease in the level of PA after the age of 12 and continues until the age of 29. It is agreed that a decrease in PA leads to the increased rates of physical inactivity accompanied by a significant rise in the proportion of obesity (Al-Haifi et al., 2013; Al-Hazzaa, 2005).

Leavey et al., 2010; Leslie et al., 2001). Malina (2001) stated that contemporary thinking in public health posits that childhood and adolescent PA and physical fitness may influence health status during childhood and adolescence, as well as throughout adulthood. Generally, low level of PA in childhood and adolescent leads to a decrease in adult PA and health. Nevertheless, the trends emphasize the importance of a lifestyle characterised with regular PA during childhood

and adolescence, which continues in adulthood, which ensures health and well-being of the individuals and populations. With regard to the achievements of interventions with different programmes, Jackson and Howton (2008) found that the pedometer is an effective way to increase walking in college students during 5 days per week for 12 week intervention programme. Also, Adams (2009) stated that the pedometer intervention increases walking in female college students. He found that participants increased their activity by 851 steps per day or approximately 5,957 steps per week and 3.34 minutes per day or approximately 23.38 minutes moderate-to-vigorous PA per week from baseline to the intervention phase over 10 weeks. Accordingly, the finding of Jackson and Howton (2008) and Adams (2009) showed the effects of the pedometer on increasing PA level, especially for female college students during intervention programme to improve PA level. Promoting young adult females to walking and adopting other forms of moderate-intensity activity to complement walking help to increase the level of PA over the adult lifespan.

However, many types of intervention can help improve individuals' health. However, a PA programme positively affects the maintenance of regular PA. A study conducted by Dunlap (2012) showed the impact of an intervention programme on the knowledge and behaviours of school-aged children aged 10, 11, and 12. The students were assigned into an experimental group (n=43) and a control group (n=39). Specifically, the study examined the degree to which CHAMPION (Community Health Aerobic Motivational Programme Initiating Optimal Nutrition) increases positive nutrition knowledge and healthy PA behaviours. The results of the study showed that the students who were involved in the intervention programme changed in their knowledge and PA behaviours positively. Also, Dunlap (2012) agree with Burke et al. (2013) in a view that low cost PA and nutrition home-based intervention programme can enhance the level of PA during the changes in daily life behaviour. This can confirm the benefits of PA in one intervention programme to improve daily PA behaviour.

Strong et al. (2005) in their review of 850 articles related to the effects of PA on health and behavioural outcomes developed evidence-based recommendations for PA in the youth. Most intervention studies with supervised programmes consisting of moderate to vigorous physical activity of 30-45 minutes, 3-5 day per week are effective in improving PA. However, greater amount of PA would be necessary for achieving positive effects on health and behavioural outcomes in ordinary daily circumstances.

Methodology

Research Design

In this study, two groups (experimental and control) and the samples were selected randomly. The variable for the study is the simple PA.

Population and Sampling Procedures

The target population of the present study was the non-sports freshman female university students in Iraq. The complex and dangerous security situation in Iraq forced the researcher to conduct the research in the Northern Region of Iraq since it is safer than other regions in Iraq. Soran university was randomly selected from 14 universities in the Northern Region of Iraq by simple random sampling. Random sampling was further used and as a result, Education faculty was selected out of the five Colleges of Soran University for the academic year 2014-2015. The total population for the freshman female students in the Education Faculty was (N=106) taken from the three departments (General Science, Mathematics, and Kurdish language). The demographic variables of age, weight, height, parents' education, health state, involvement in any PA and previous knowledge of the treatments were considered in this study to ensure that the students were not follow any PA programme (Minhas, 2013a). The respondents who did not fit the required conditions of the study were excluded from the study. The inclusion criteria for this study are as follows:

1. Healthy undergraduate female students aged 18- 22 years old free from any disease.
2. Not associated with any medication or treatment.
3. Not pregnant.
4. Willing and able to adhere to the PA programme and nutrition knowledge sections of the study and the variables' test schedules.

In other words, the exclusion criteria for this study are listed as follows:

1. Females with health problems.
2. Females attending sport clubs or training sections.
3. Pregnant females.
4. Females on diet.

The demographic information showed that seventy (N=70) of the population were reported that they are not active and not follow any diet programme. After that, in order to ensure that the respondents were not really active, they were asked to answer the PA questionnaire of the stage of change model. The results showed that forty four (N=44) of the population were not really active; they do not follow any PA programme by answering Q1 = 0 and Q 2 = 0, which shows that they are in stage 1 (Pre-contemplation). Then, they constituted the total sample size for this study. Using the G-power method (Faul et al., 2007) the minimum sample size of the current study was calculated to be 32 (effect size: 0.25, Alpha (α): 0.05, power: 0.85)

In order to avoid the dropout or withdrawal of some students from the experiment, the total sample (N=44) was involved in the study, and they were assigned randomly into two groups, experimental group (N=22) and control group (N=22) by using the simple random sampling. This technique was employed in order to achieve unbiased selection of subjects (Ary et al., 2010).

Through these procedures, the researcher was able to reduce the impact of the sample threats, avoid confounding effect on the experimental results, and give the students the opportunity to involve through either the control or the experimental groups. The process of the groups' selection was conducted with the assistance of the college lecturers and the approval by the Dean of the College of Education. At the onset of the study, all the research groups could be considered statistically equivalent, and any difference between the control and the experimental groups was shown after that might be as a result of chance alone and not because of research bias, subjects' bias or any other factors. (Ary et al., 1990)

Instrumentation

Practical Tests for Measuring Physical Activity Variable

PA is defined as the movement of the human body by skeletal muscle, leading to the exchange of energy beyond what is distracted from the power during the rest (Caspersen et al., 1985; US Department of Health & Services, 1996). The measurement of the level of PA among individuals mean determining the amount of energy spent during normal daily or weekly activity. The monitoring and follow-up PA levels periodically and regularly helps sounding pattern of PA among individual in general and help detect the phenomenon of physical inactivity and modify the low levels of activity among individuals (Al-Hazzaa, 2005).

There are several methods of measuring PA, ranging from the simple tools and methods and ending with the most complex and expensive, and direct methods to the indirect one, such as measurement of PA by pedometer, the use of a pedometer provides easy way to monitor the PA level. Thus, in this research the Yamax Digi-Walker® SW-200 pedometer was used (Yamax Corp. Tokyo, Japan). The SW-200 is a small (2.0 in. x 1.5 in. x .75 in.), lightweight (.75 oz.) pedometer worn on a waistband or belt which was used to measure the level of PA by counting the steps average for three days each week. According to Labrosse (2008), The Yamax Digi-Walker® is widely known as an objective equipment, with reliability coefficient of 0.80 which was approved by Strycker, et al. (2007) as an accurate equipment to measure steps.

The Intervention Programme

In this study, the intervention programme for the undergraduate female students includes physical activities during 12 weeks. According to Söderlund et al. (2009) and Spark et al. (2013) studies, at least 3 months (12 weeks) is considered as an appropriate duration to show the benefit of intervention programme with PA. The students were required to practice some of the specific physical activities adapted from well-known physical activity guidelines (P. A. G. A. Committee, 2008b) within 5 days a week and follow consultation with experts in the field of physical education in Iraq.

Table 1: The intervention programme schedule for the physical activity

Week	Day	Time information	Physical activity Exercises
	M	-15min*2= 30min	- Brisk walk exercises 1 mile + Calisthenics (such as sit-ups 10, push-ups 5, Back exercise10) (muscle
		-1 min rest	strengthening)
	T	-15min*2= 30min	
	W	-1 min rest for each day	- Brisk walk exercises 1 mile
1	F		
5 days 150 min	Th	-15min*2= 30min	- Brisk walk exercises 1 mile + - Calisthenics (such as sit-ups 10, push-ups 5, Back exercise10) (muscle
		-1 min rest	strengthening)
	S	Rest	
	S		
	M	-15min*2= 30min	- Brisk walking exercises 1mile + Calisthenics (such as sit-ups 10, push-ups 10, Back exercise 10
		-1 min rest	(muscle strengthening).
	T	-15min*2= 30min	
	W	-1 min rest for each day	- Brisk walk exercises 1 mile
2	F		
5 days 150 min	Th	-15min*2= 30min	- Brisk walk exercises 1 mile + Calisthenics (such as sit-ups 10, push-ups 5, Back exercise10) (muscle
		-1 min rest	strengthening)
	S	Rest	
	S		
	M	15 min*2= 30min	-1 mile booster walk + Calisthenics (such as sit-ups 20, push-ups 15, Back exercise 20) (muscle
		1 min rest	strengthening).
	T	15 min*2= 30min	
	W	1 min rest for each day	-1 mile booster walk
3	F		
5 days 150 min	Th	15 min*2= 30min	-1 mile booster walk + Calisthenics (such as sit-ups 20, push-ups 15, Back exercise 20) (muscle
		1 min rest	strengthening).
	S	Rest	
	S		
	M	15 min*2= 30min, 1 min	-1 mile booster walk + -Calisthenics (such as sit-ups 20, push-ups 15, Back exercise 20) (muscle
		Rest	strengthening).
	T	15 min*2= 30min, 1 min	
	W	Rest	-1 mile booster walk
4	F		
5 days 150 min	Th	15 min*2= 30min, 1 min	-1 mile booster walk + -Calisthenics (such as sit-ups 20, push-ups 15, Back exercise 20) (muscle
		rest	strengthening).
	S	Rest	

	S		
	M	45 min , 2 min rest	- Brisk walking exercises 3 mile + Calisthenics (such as sit-ups 25, push-ups 20, Back exercise 25)
			(muscle strengthening)
	T	45 min , 2 min rest for each	
	W	day	- Brisk walking exercises 3 mile
5	F		
5 days 225 min	Th	45 min , 2 min rest	- Brisk walking exercises 3 mile + Calisthenics (such as sit-ups 25, push-ups 20, Back exercise 25)
			(muscle strengthening)
	S	Rest	
	S		
	M	45 min, 2 min rest	- Brisk walking exercises 3 mile + Calisthenics (such as sit-ups 25, push-ups 20, Back exercise 25)
			(muscle strengthening)
	T	45 min, 2 min rest for each	
6	W	day	- Brisk walking exercises 3 mile
5 days 225 min	F		
	Th	45 min, 2 min rest	- Brisk walking exercises 3 mile + Calisthenics (such as sit-ups 25, push-ups 20, Back exercise 25)
			(muscle strengthening)
	S	Rest	
	S		
	M	45 min 2 min rest	- Brisk walking exercises 3 mile + Calisthenics (such as sit-ups 30, push-ups 20, Back exercise 30)
			(muscle strengthening)
	T	45 min 2 min rest, for each	
	W	day	- Brisk walking exercises 3 mile
7	F		
5 days 225 min	Th	45 min 2 min rest	- Brisk walking exercises 3 mile + Calisthenics (such as sit-ups 30, push-ups 20, Back exercise 30)
			(muscle strengthening)
	S	Rest	
	S		
	M	45 min, 2 min rest	-Strong 3 mile walk + Calisthenics (such as sit-ups 30, push-ups 20, Back exercise 30) (muscle
			strengthening)
	T	45 min, 2 min rest for each	
8	W	day	-Strong 3 mile walk
5 days 225 min	F		
	Th	45 min, 2 min rest	-Strong 3 mile walk + Calisthenics (such as sit-ups 30, push-ups 20, Back exercise 30) (muscle
			strengthening)

	S	Rest	
	S		
	M	50 min , 2min rest	-Brisk walking exercises 4 mile + Calisthenics (such as sit-ups 35, push-ups 20, Back exercise 35)
9			(muscle strengthening)
5 days 250 min	T	50 min , 2min rest for each	
	W	day	-Brisk walking exercises 4 mile
	F		
	Th	50 min , 2min rest	-Brisk walking exercises 4 mile + Calisthenics (such as sit-ups 35, push-ups 20, Back exercise 35)
			(muscle strengthening)
	S	Rest	
	S		
	M	50 min, 2min	-Brisk walking exercises 4 mile + Calisthenics (such as sit-ups 35, push-ups 20, Back exercise 35)
			(muscle strengthening)
	T	50 min, 2min rest for each	
	W	day	-Brisk walking exercises 4 mile
10	F		
5 days 250 min			
	Th	50 min, 2min rest	-Brisk walking exercises 4 mile + Calisthenics (such as sit-ups 35, push-ups 20, Back exercise 35)
			(muscle strengthening)
	S	Rest	
	S		
	M	50 mi, 2 min rest	-Brisk walking exercises 5 mile + Calisthenics (such as sit-ups 40, push-ups 20, Back exercise 40)
			(muscle strengthening)
	T	50 min, 2min rest for each	
	W	day	-Brisk walking exercises 5 mile
11	F		
5 days 250 min	Th	50 min, 2min rest	-Brisk walking exercises 5 mile + Calisthenics (such as sit-ups 40, push-ups 20, Back exercise 40)
			(muscle strengthening)
	S	Rest	
	S		
	M	50 mi, 2 min rest	-Brisk walking exercises 5 mile + Calisthenics (such as sit-ups 40, push-ups 20, Back exercise 40)
			(muscle strengthening)
	T	50 mi, 2 min rest for each	-Brisk walking exercises 5 mile
	W	day	
12	F		
5 days 250	Th	50 mi, 2 min rest	-Brisk walking exercises 5 mile + Calisthenics (such as sit-ups 40,

min			push-ups 20, Back exercise 40)
			(muscle strengthening)
	S	Rest	
	S		

Before starting the programme, the goals of this home-based intervention programme were explained to the students; then, the pre-tests were given to them in both groups before starting the experiment, followed by the intervention programme which was given to the female students in the experimental group starting from the first week until the end of week 12 as described in the schedule shown in Table 1, and Table 2, while the control group continued their normal life.

Research Procedure

The key research procedures is explained as below:

1. Receiving the ethical approval option is the first step for conducting research. This study was approved by the ethical approval committee in University Putra Malaysia -Malaysia, (Reff.: UPM/UPMTNCPI/RMC/1.4.18.1 (JKEUPM)/F2, and it was also approved by the scientific committee in the college of Education in Soran University - Kurdistan Regional - Iraq, (Ref. No.: 3).
2. Permission was asked from the Ministry of Higher Education and Scientific Research MOHERS-Iraq to conduct this experiment in Iraq. Additionally, the permission was obtained from the presidency of Soran University to gather the data for this research.
3. Before conducting the experiment, freshman female students were gathered to explain the experiment steps and the kind of the intervention programme, the duration of the experiment, and the tests. All of them were done to get their permission to conduct in this study.
4. In the beginning of the study, the PA was tested by administrating the pre-test to all the students in order to determine their level and the possible differences between the students in both groups before the onset of the programme.
5. The students in the experimental group underwent the home-based intervention programme for 6 weeks including: 5 days a week starting with 30 minutes daily for PA treatment. Where the intervention programme was delivered to them week by week to ensure that they followed the correct progression. The PA was explained by the researcher and presented by video record, then asked them to practice it at home, it was confirmed by daily visits during their PA practice. Meanwhile, the students in the control group were asked to continue their daily life without attending any intervention programme.
6. PA was tested as a post-test1 after 6 weeks of treatment to ensure the effectiveness of the intervention programme and ensure that this programme is working in proper way.
7. After that, the students in the experimental group underwent the home-based intervention programme for the second 6 weeks including: 5 days a week starting with 45 minutes daily for PA treatment. The PA was explained by the researcher and presented by video record, then asked them to practice it at home, it was confirmed by

daily visits during their PA practice. Meanwhile, the students in the control group were asked to continue their daily life without attending any intervention programme.

8. Post-test2 was conducted at the end of week 12 of the home-based intervention programme in order to test the PA.
9. The results of pre-test, post-tset1, and post-test2 were analyzed in order to determine the effectiveness of intervention programme on sedentary undergraduate female students during the study.

Data Analysis

In order to determine the effects of the intervention on the dependent variables of the present study, namely PA in the experimental group, mixed between-within subjects analysis of variance, two way repeated measures ANOVA, and Cohan's d were performed.

Results

Before the data were analysed the data had been examined in terms of the Equality of groups at pre-test, normality (kurtosis, skewess) and homogeneity (Levene's test) using exploratory data analysis. The aim of this analysis was to determine the normal distribution of the variables and homogeneity of variance between the two groups prior to conducting inferential analysis of the data. In order to preform mixed between-within subjects' analysis of variance and two way repeated measures ANOVA, the data should meet the assumption of normal distribution of variables in the population and homogeneity of variance between groups. Additionally, the descriptive statistics for the data related to the dependent variables are presented in this part.

Test of Equality of Groups at pre-test

The Independent sample t-test was used to compare the mean scores of pre-tests between the two groups. Table 3 illustrates the mean score of pre-test on PA in the experimental and control groups. The results showed no significant difference in the mean scores of pre-tests on PA, for experimental and control groups.

Table 3: Independent Sample Test of Pre-tests

	t-test for Mean Score of Equality				
	Mean		**T**	**Df**	**Sig. (2-tailed)**
PA	3905.258	4136.379	-1.363	42	0.180

These initial tests indicated that before the experiment, students in both had statistically equivalent level of measurement of their PA.

Normality Assumption Test

To assess the normality, the researcher examined kurtosis and skewness which is considered one of the widely used statistics. Garson (2010) determines the normal distribution for the data at the level 0.05 with the value of kurtosis and skewness +2 and -2. Meanwhile, Byrne (2013) mentioned that kurtosis value between +7 and -7 indicates that data is normally distributed, and skewness value between +3 and -3 is indicative of normally distributed data.

Table 4 shows that data is not substantially kurtosis and skewed. The range of kurtosis in the experimental groups was between (-2.307, 4.051) while that in control group was between (-1.298, 3.584). Moreover, the range of skewness in the experimental group was between (-1.451, 1.711) while that in the control group was between (-.861, 1.98), indicating that the data is normally distributed. Therefore, it can be used for the analysis.

Table 4: Normality Test for The Dependent Variables of the Study

	Exp.		*Con.*	
	Skewness	Kurtosis	Skewness	Kurtosis
PA pre	0.398	0.383	-0.267	-0.597
PA post1	-0.248	0.379	-0.088	-1.298
PA post2	0.095	-1.184	0.328	-1.082

Homogeneity Assumption Test

Levene's Test of Equality of Error Variance test was performed in order to determine the equality of group variances of the dependent variables measured in the experimental and control groups to check if the study violates the assumption of the equality of variance. Table 5 shows that the assumption of homogeneity of variance of all dependent variables in the two groups is not violated.

Table 5: Levene's Test of Equality of Error Variances between the Two Groups Based on Mean Scores

	Levense's Statistic	*df1*	*df2*	*sig.*
PA	2.299	1	42	0.137

Table 5 above shows that the significant values for all variables are greater than Alpha value of 0.05, which indicates that the data is acceptable and can be used with high reliability in the research for homogeneity of variances between the two groups.

The Demographic Characteristics of the Respondents

The description of the frequency and percentage for the distribution of the categorical variables such as age in years, weight in kilograms, height in meters, father's education level, mother's

education level; are reported. This is reported based on range, mean and standard deviations of PA The data was examined in details to detect error in coding during the data entry, to screen out any unusual values, identify outliers, and assess the normality of distribution and homogeneity of variance of the population from which samples were draw.

The total population for the freshman female students in the faculty of education, Soran University was 106. They were asked to report their demographic information which shows that seventy (N=70) of the population are not active. Additionally, to ensure that the sample is really not active, all the answers of the stages of change showed that forty four (N=44) of the population are really not active. Thus, they became the total sample size for this study. The students were assigned randomly into two groups, experiment group (N=22) and control group (N=22). The frequency distributions of the groups are shown in Table 6.

Table 6: Frequency and Percentage Distribution of the Two Groups.

Groups	**Frequency**	**Percentage (%)**
Experimental	22	50
Control	22	50
Total	44	100

Table 7 shows the frequency and the percentage for the demographic variables of age, father's education level and mother's education level as well as the mean and standard deviation of the variables of weight and height. In the present study, the descriptive statistics was used to summarize the demographics variables of the students in both experimental and control groups. The range of age was between (18-22), weight between (39.70 - 84.30) kg, height between (1.44 -1.75) meters respectively. The frequency and percentage of father's education level and mother's education level are described in Table 7 with five levels (non-educated level, primary school level, secondary school level, high school level, and institute or university level).

As shown in Table 7, Chi square was used to analyse the demographic data considering the $p>0.005$ in terms of age, father's education level, mother's education level, weight and height. The results indicated that these variables between the experimental and control groups were equal.

International Journal of Academic Research in Business and Social Sciences
Vol. 7, Special Issue - 4th International Conference on Educational Research and Practice 2017
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Table 7: Descriptive Statistics of the Students' Demographic Variables in Both Experimental and Control Groups

Variable	**Level**	**EXP**	**CON**	**χ^2/t**	**P value**
Age	18 years	9(40.9)	4(18.2)		
	19 years	7(31.8)	6(27.3)		
				5.026	
	20 years	5(22.7)	8(36.4)		0.285
	21 years	1(4.5)	2(9.1)		
	22 years	0(0)	2(9.1)		
Father's Education level	Non-educated	13(59.1)	10(45.5)		
	primary school	3(13.6)	6(27.3)		
	secondary school	4(18.2)	2(9.1)	3.258	0.516
	high school	0(0)	1(4.5)		
	Institute/ university	2(9.1)	3(13.6)		
Mother's Education level	Non-educated	15(68.2)	19(86.4)		
	primary school	6(27.3)	2(9.1)		
	secondary school	1(4.5)	0(0)	4.471	0.215
	Institute/ university	0(0)	1(4.5)		
Weight (kg)	Mean±SD	59.718±12.452	55.454±8.982	1.302	0.200
Height (m)	Mean±SD	1.563±0.056	1.575±0.065	-0.610	0.541

Descriptive Data of the Dependent Variables

The mean and standard deviation of the dependant variables (PA) are reported for both groups (experimental and control). All the variables were measured three times: pre-test, post-test1, and post-test2 as shown in Table 8.

Table 8: Descriptive Statistics Scores of Physical Activity of Experimental and Control Groups

	Exp.		*Con.*	
Dependent Variable	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
PA pre-test (steps)	3905.258	483.7332	4136.379	631.5427
PA post-test1 (steps)	10730.98	745.5333	3898.652	616.4632
PA post-test2 (steps)	12912.97	605.9001	3750.061	588.9586

Effect of the interventions on Physical Activity in Experimental and Control Group

In order to evaluate the differences in the mean of PA scores within the three stages of pre-test, post-test1 and post-test2 for both groups (i.e. experimental and control), a mixed between-within repeated measures ANOVA was conducted to assess whether there were group and test differences in PA.

Table 9 shows that the significant values for all variables are greater than alpha value of 0.05, which indicates that the data is acceptable and can be used with high reliability in the research for homogeneity of variances between the two groups.

Table 9: Levene's Test of Equality of Error Variances

	F	**df1**	**df2**	**Sig.**
Pre-test	2.299	1	42	0.137
Post-test1	0.452	1	42	0.505
Post-test2	0.061	1	42	0.807

The sphericity assumption is the assumption that the difference scores of paired levels of the repeated measures factor have equal population variance. Like other ANOVA assumptions of normality and homogeneity of variance, it is important to note that the sphericity assumption refers to population parameters rather than sample statistics. Mauchly's Test was used to evaluate the sphericity assumption and the result showed that the sphericity assumption for PA was not violated (χ^2 =4.218, p=0.121). The results of repeated measures ANOVA on PA showed that the interaction between group and test was statistically significant (F (2, 84) =731.01, P<0.05, η2=0.944). Therefore, post hoc test (Bonferroni) was used to compare the mean scores. The result of Bonferroni test revealed that the PA between control and experimental groups in pre-test was not significant (p=0.180) while the differences between experimental and control groups was significant for PA in post-test1 (p<0.05, η^2=0.963) and post-test2 (p<0.001, η^2=0.984). Therefore, it can be concluded that the home-based intervention was effective in the improvement in PA among undergraduate female students, as shown in Table 10.

International Journal of Academic Research in Business and Social Sciences
Vol. 7, Special Issue - 4th International Conference on Educational Research and Practice 2017
ISSN: 2222-6990

Table 10: Physical Activity Difference between Experimental and Control Groups in Pre-Test, Post-Test1 and Post-Test2

Time	(I) Group	(J) Group	Mean Difference (I-J)	SE	P value	η^2
Pre-test	EXP	CON	-231.121	169.604	0.180	0.042
Post-test1	EXP	CON	6832.333*	206.249	0.001	0.963
Post-test2	EXP	CON	9162.909*	180.150	0.001	0.984

- Based on estimated marginal means
- The mean difference is significant at .05 level
- Adjustment for multiple comparisons: Bonferroni

In order to show the efficacy of home-based intervention, pre, post1 and post-test2 in both the experimental and control groups were compared. The result of post hoc test (Bonferroni) revealed that the difference between pre-test and post-test1 in PA score among experimental group was significant ($p<0.05$). The mean score of PA in experimental group increased 9007.7 steps. Moreover, there was a significant difference between post-test1 and post-test2 ($p<0.05$). Meanwhile, the result of the control group showed not significant result ($p>0.05$). The mean scores of the control group increased 386.3 steps, and there was no significant difference in PA between post-test1 and post-test2 ($p>0.05$) in control group, as shown in Table 11.

Table 11: The Difference of Physical Activity Scores between the Tests in Experimental and Control Groups

Group	(I) time	(J) time	Mean Difference (I-J)	SE	P value	η^2
EXP	Pre	Post1	-6825.727*	156.530	0.001	
	Pre	Post2	-9007.712*	183.040	0.001	0.988
	Post1	Post2	-2181.985*	206.581	0.001	
CON	Pre	Post1	237.727	156.530	0.409	
	Pre	Post2	386.318	183.040	0.122	0.115
	Post1	Post2	148.591	206.581	1.000	

- Based on estimated marginal means
- The mean difference is significant at .05 level

- Adjustment for multiple comparisons: Bonferroni

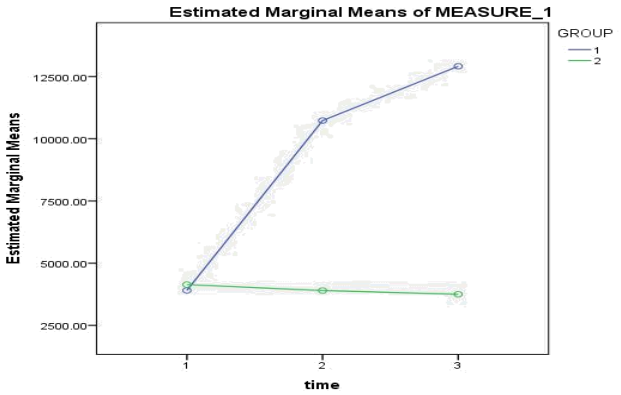

Figure 1: Plot of physical activity score in both experimental (1) and control (2) groups

As can be seen in Figure 1, in the experimental group, the scores of PA increased in post-test1 and post-test2. However, in the control group, it did not increase in post-test1 and post-test2, which shows that home-based intervention has a positive effect PA.

Discussion

The results of the analysis indicated that the students in the experimental group significantly improved their PA scores more than those in the control group at post-test1 and post-test2. In addition, the change in pre-test, post-test1, post-test2 mean scores indicated an increase in PA in the experimental group. In order to determine the degree of improvement, Cohen's effect size was calculated. It was found that the magnitude of the differences was large (d= 18.148).

The findings of the present study indicated that the students who have completed the home-based intervention could increase PA and are expected to improve their health in the future. The possible explanation for the effectiveness of the home-based intervention could be related to the techniques used in the home-based intervention programme. In this study, the intervention comprised various simple exercises to improve students' physical. For example, an increase in PA can be achieved through exercising at home. Simply and easily applied activities involving more physical movements at home were designed to help the subject to improve the PA level based on step counts recorded by the pedometer. From another perspective, using simple and inexpensive interventions can increase PA, which is demonstrated by the results of this study which used a series of simple exercises applied at home without the need for an expensive sports equipment. The findings showed that there was a significant improvement in their PA level between baseline and post-test2 when they started to move more at home and which was recorded by the pedometer. Significant health benefits can be obtained by including moderate amount of PA and additional health benefits can be gained through greater amounts with longer duration of PA (U. S. D. o. H. a. H. Services, 1996). Uusitupa et al. (2000) examined the effect of lifestyle intervention (PA). The intervention produced long-term beneficial

changes, PA for 522 overweight middle-aged participants with impaired glucose tolerance additionally. The results showed that the proportion of sedentary participants decreased to 30% in year one, with a statistically significant differences between experimental and control groups ($p< 0.0001$), and 29% in year three ($p<0.0028$). The results showed that moderate to vigorous PA increased the PA level in the experimental group compared with the control group. On the other hand, Ferreira et al. (2005) found that physically active woman significantly increased their PA level after engaging in PA intervention programme for 12 weeks. They found that a nutritional and PA intervention programme improved PA significantly. The same results have somehow repeated in this study in which a significant difference was found between the experimental and control groups after 12 weeks home-based PA in post-test1 and post-test2 ($p<0.05$, $\eta2=0.963$), ($p<0.001$, $\eta2=0.984$), respectively. Regarding the duration of the PA intervention programme, it can be concluded that an intervention programme, whether short or long-term will lead to an increase and improvement in PA level. In addition, the combined PA would positively affect an individual's PA level regardless of whether the participants are patients or physically active (Macera, 2003).

The results of the current study regarding an increase in individual's PA level also support earlier finding by Burke et al. (2013), who confirmed that PA level increased during changes in daily life behaviour adopting a low-cost, accessible, PA and nutrition homebased intervention programme. The results showed that both groups have significant difference in PA level which was also observed between experimental and control groups in this study as a result of engaging with home-based simple PA intervention programme after 12 weeks. The increase in PA level suggests that homebased PA programme and its strategy was an appropriate means of improving individual's PA and developing the inactive lifestyle.

The results of present study is in contrast with those of Mostert and Kesselring (2002) who reported that the PA level did not improve during short-term intervention exercise training programme consisting of 30 min sessions, 5 days per week over 3–4 weeks of bicycle exercise with individualised intensity. Mostert and Kesselring (2002) attributed these findings for two reasons. First, the intervention strategies such as the compliance to the training programme were quite low, which affects the result of the research. Second, the level of PA was lower than that was expected due to the short period of training represented by four weeks. Panel of researchers emphasized that when intervention programmes were conducted for longer duration, it would show positive results regarding PA despite the difference in the type of the intervention programme (Calfas et al., 2000, Wing et al., 1980; Lock, 1990; Sallis et al., 1999). This study also indicated that significant difference in PA between pre-test, post-test1, and post-test 2 after 12 week home-based intervention for the experimental group ($p<0.001$) as well as a significant difference in PA between experimental and control groups ($p<0.001$).

The results of this study is also in contrast with those of the study by Jaggers et al. (2014), who hypothesized that PA changes would be more positive as a result of home-based exercise approach with telephone-based coaching. The intervention group made no significant

improvement in PA from baseline to follow-up test. According to Jaggers et al. (2014), lack of significant differences between the groups in PA was due to that fact that home-based exercise approach with telephone-based coaching may not be a feasible method for increasing the amount of moderate PA among the participants. The strategy used were not effective in becoming self-reliant in performance without direct supervision, emphasizing the need for direct supervision to raise and increase participants' performance in PA. According to this study, the 12 weeks (3 months) duration of intervention programme showed a significant improvement in PA level, Whereas, the long duration of Jaggers et al. (2014)'s study may have affected the results. In other words, nine months is a long duration for training alone without being in groups. Some felt bored with continuing to conduct the intervention, especially PA (Sherwood & Jeffery, 2000).

Recommendation for Future Studies

The purpose of the present study was to evaluate the effect of home-based intervention programme on sedentary undergraduate female students in Iraqi universities. The findings of this study demonstrated that the home-based intervention programme with PA was effective on assisting undergraduate female students to be more active. According to the findings of the study, several recommendations for the future possible studies can be made here.

The present study investigated the effectiveness of home-based intervention programme on PA of undergraduate female students which can limit the generalizability of the results on male. Future home-based research should consider conducting similar studies on undergraduate male students in order to examine whether intervention's influence differ between genders. This study evaluated the effectiveness of home-based intervention programme among undergraduate female students aged 18 years of old. Also, a similar study can be conducted on non-undergraduate age to find the impact of home-based intervention programme on younger and older sedentary individuals.

The findings of this study demonstrate the effectiveness of home-based intervention programme on PA. However, longer duration studies will inform future interventions about the most effective construct on which to focus. Some studies were conducted in longer time to see the effect on variables to provide a deeper understanding of the dynamics of intervention programmes, or examine its effect on individual's life.

Conclusion

PA has been recognized as one of the factors of healthy lifestyle for individuals in all age levels, including young female adults. The finding of this study shows that home-based intervention by enhancing the PA among female students has led to the enhancement of PA. Home-based PA was first originally developed for patients and the elderly people who suffer from diabetes, hypertension, and heart disease, but are not widely used for PA for healthy and normal people. This study used a home-based PA intervention programme to improve PA in the future among undergraduate female students. The results of this study revealed that the programme is

effective in improving female's health. The study concluded a significant increase in PA compared to control group while at the same time confirmed the significant effect of the 12 week home-based intervention programme to improve the PA among undergraduate female students in Iraq.

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