EFFECTS OF A HOME-BASED PROGRAMME ON PHYSIOLOGICAL VARIABLES, PHYSICAL ACTIVITY, PSYCHOLOGICAL DISTRESS AND ENERGY INTAKE AMONG UNDERGRADUATE FEMALE STUDENTS IN IRAQ

JIAN ABDULLAH NOORI

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By

JIAN ABDULLAH NOORI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

May 2016

DEDICATED

To

The person who encouraged and supported me by all means

“Omar”

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the Degree of Doctor of Philosophy

EFFECTS OF A HOME-BASED PROGRAMME ON PHYSIOLOGICAL VARIABLES, PHYSICAL ACTIVITY, PSYCHOLOGICAL DISTRESS AND ENERGY INTAKE AMONG UNDERGRADUATE FEMALE STUDENTS IN IRAQ

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Chairman : Associate Professor Soh Kim Geok, PhD
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The study aimed to evaluate the effect of home-based programme to improve physiological variables, physical activity (PA), psychological distress (PD), and energy intake (EI) among undergraduate female students in Iraq. Besides**,** aimed to evaluate which variable was the most affected by the home based intervention programme. 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 and dietary awareness), 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). Mixed between-within subjects analysis of variance was used to analyse physiological variables and PA, while, two way repeated measure of ANOVA was used to analyse PD and EI. In addition, Cohen's d was used to converting the Eta squared to evaluate which of the variables was more affected by the intervention programme.

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 certain physiological variables and PA in the experimental group. The variables were diastolic blood pressure: $F(2, 84) = 3.507$, $p<0.05$, blood glucose: $F(2, 84) = .917$, $p<0.05$, body fat: $F(2, 84) = 6.246$, $p<0.05$, VO_2max: $F(2, 84) = 57.277$, $p<0.05$, and vital capacity: $F(1.654, 69.485) = 16.839$, $p<0.05$, and PA: $F(2, 84) = 731.01$, $p<0.05$) respectively. Two way repeated measures of ANOVA shows a statistically significant between the mean test scores in the pre-test and post-test measurements of participants' PD and EI in the experimental group (i.e. total PD: $F(1,42)=80.838$, $p<0.05$, depression: $F(1,42)=61.105$, $p<0.05$, anxiety: $F(1,42)=39.613$, $p<0.05$, stress: $F(1,42)=91.271$, $P<0.05$, EI: ($F(1,42)=88.332$, $p<0.05$) respectively.

Analysis of the post-test2 scores of the experimental and control groups revealed that the difference between the mean scores of the two groups is statistically significant in certain physiological variables: diastolic blood pressure: $F(1, 42)=4.948$, $p<0.05$, blood glucose: $F(1,42)=8.783$, $p<0.05$, VO_2max: $F(1, 42)=52.034$, $p<0.005$, vital capacity: $F(1, 42)=14.047$, $p<0.05$, and PA $F (2, 42)=2260.951$, $p<0.05$ respectively. Meanwhile, the analysis of the post-test scores of the experimental and control groups revealed that the difference between the mean scores of the two groups is statistically significant in PD: total PD: $F(1,42)=47.452$, $p<0.05$, depression: $F(1, 42)=27.722$, $p<0.05$, anxiety: $F(1, 42)= 33.156$, $p<0.05$, stress: $F(1, 42)=37,310$, <0.05), and EI ($F(1, 42)= 40.289$, $p<0.05$) respectively. Finally, the Eta squared showed that certain physiological variables were the more effected by the intervention programme blood cholesterol=18.147 and VO_2max=4.467 follow by PA= 18.147, then EI =3.701. While PD =2.774 was the lowest effected by the home based intervention programme.

This study provided evidence that home-based intervention programme which focused on PA and dietary awareness had a significant effect on improving physiological variables, PA, PD, and EI. However, to achieve these benefits, exercise and dietary programme need to be carried out regularly as a life routine.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

KESAN PROGRAM BERASA DI RUMAH TERHADAP PEMBOLEH UBAH PSIKOLOGIKAL, AKTIVITI FIZIKAL, DISTRES PIKOLOGIKAL DAN DAPATAN TENAGA DALAM KALANGAN PELAJAR PEREMPUAN DI IRAQ

Oleh

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Pengerusi : Profesor Madya Soh Kim Geok, PhD
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Kajian ini bertujuan untuk menilai keberkesanan program intervensi berasas di rumah untuk meningkatkan pemboleh ubah fisiologi, aktiviti fizikal (PA), distress psikologikal (PD) dan daoatan tenaga (EI) dalam kalangan pelajar perempuan di Iraq. Selain itu, bertujuan untuk menilai pemboleh ubah yang paling dipengaruhi oleh program intervensi berasas di rumah. Peserta adalah pelajar perempuan yang mengamalkan gaya hidup sendentari di Iraq (N = 44) yang dibahagikan kepada kumpulan eksperimen (N=22) dan kumpulan kawalan (N=22). Kumpulan eksperimen mengikuti program intervensi berasas di rumah selama 12 minggu berfokus kepada (aktiviti fizikal dan kesedaran pemakanan), manakala kumpulan kawalan mengamalkan gaya hidup yang normal. Pengukuran terhadap pemboleh ubah dilakukan sebelum intervensi (Ujian pra), minggu ke 6 (Ujian pasca 1) dan selepas minggu ke 12 (Ujian pasca 2). Mixed Between-within Subjects Analysis of Variance digunakan untuk menganalisis pemboleh ubah fisiologi dan PA, manakala Two Way Repeated Measure of ANOVA digunakan untuk menganalisis PD dan EI. Selain itu, Cohen d digunakan untuk menukarkan kuasa dua Eta bagi menilai pemboleh ubah yang lebih dipengaruhi oleh program intervensi.

Keputusan analisis Mixed Between-within Subjects Analysis of Variance menunjukkan terdapat keputusan yang signifikan secara statistik di antara skor ujian min dalam Ujian pra, Ujian pasca 1 dan Ujian pasca 2 bagi pemboleh ubah fisiologi tertentu dan aktiviti fizikal dalam kumpulan eksperimen. Pemboleh ubah-pemboleh ubah berkenaan adalah tekanan darah diastolik : $F (2, 84) = 3.507$, $p<0.05$, glukosa darah : $F (2, 84) = .917$, $p<0.05$, lemak badan : $F (2, 84) = 6.246$, $p<0.05$, VO_2max : $F (2, 84) = 57.277$, $p<0.05$, dan vital capacity : $F (1.654, 69.485) = 16.839$, $p<0.05$, dan PA : $F (2, 84) = 731.01$, $p<0.05$). Two way repeated measures of ANOVA menunjukkan terdapat signifikan secara statistik min skor Ujian pra dan Ujian pasca PD dan EI peserta kumpulan eksperimen (iaitu jumlah PD : $F (1,42) = 80.838$, $p<0.05$, kemurungan : $F (1,42) = 61.105$, $p<0.05$, kebimbangan : $F (1,42) = 39.613$, $p<0.05$, tekanan : $F (1,42) = 91.271$, $p<0.05$, EI : $(1,42) = 88.332$, $p<0.05$).

Analisis skor Ujian pasca 2 bagi kumpulan eksperimen dan kumpulan kawalan menunjukkan terdapat perbezaan statistik yang signifikan skor min kedua-dua kumpulan terhadap pemboleh ubah fisiologi yang tertentu : tekanan darah diastolik: $F(1, 42) = 4.948$, $p<0.05$, glukosa darah: $F(1,42) = 8.783$, $p<0.05$, VO_2max: $F(1, 42) = 52.034$, $p<0.05$, kapasiti vital: $F(1, 42) = 14.047$, $p<0.05$ dan PA: $F(2, 42) = 2260.951$, $p<0.05$. Manakala, analisis skor Ujian pasca kumpulan eksperimen dan kumpulan kawalan menunjukkan bahawa terdapat perbezaan yang signifikan di antara skor min PD bagi kedua-dua kumpulan (PD keseluruhan: $F(1,42) = 47.452$, $p<0.05$, kemurungan: $F(1, 42) = 27.722$, $p<0.05$, kebimbangan: $F(1,42) = 33.156$, $p<0.05$, tekanan: $F(1,42) = 37.310$, $p<0.05$ dan EI ($F(1, 42) = 40.289$, $p<0.05$). Akhir sekali, kuasa dua Eta menunjukkan bahawa pemboleh ubah fisiologi yang tertentu adalah lebih dipengaruhi oleh program intervensi bagi kolesterol dalam darah = 18.147 dan VO_2max = 4.467 diikuti oleh PA = 18.147 dan seterusnya EI = 3.701. Manakala, PD (2.774) adalah kurang dipengaruhi oleh program intervensi berasas di rumah.

Kajian ini menunjukkan program intervensi berasas di rumah mempunyai kesan signifikan untuk meningkatkan pemboleh ubah fisiologi, PA, PD dan EI. Walau bagaimanapun, manfaat ini boleh dicapai dengan senaman dan program pemakanan yang perlu dilakukan secara kerap sebagai rutin kehidupan.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

WHO	World Health Organization
UN	United nation
MOHERS	Ministry of Higher Education and Scientific Research
BP	Blood Pressure
DIA.BP	Diastolic Blood Pressure
SYS.BP	Systolic Blood Pressure
BCH	Blood Cholesterol
BG	Blood Glucose
BMI	Body Mass Index
BF	Body Fat
WHR	Waist Hip Ratio
VO_2max	Maximal Oxygen Consumption
VC	Vital Capacity
PA	Physical Activity
PD	Psychological Distress
DEP.	Depression
ANX	Anxiety
STR	Stress
DASSQ	Depression, Anxiety, and Stress Questionnaire
EI	Energy Intake

CHAPTER 1

INTRODUCTION

1.1 Overview

The first chapter introduces the background and the nature of the present study. In particular, the role of physical activity (PA) and dietary knowledge related to the condition of Iraqis' daily life and its effect on females, especially on those who are attending Iraqi universities are presented. The chapter starts with a detailed description of obstacles and restrictions in Iraqi society in the light of the current situation and their impact on the decline in PA and dietary awareness in the stage of university, which leads to the establishment of an active and healthy society. Therefore, the problem statement, significance, limitation and delimitation of the study are also presented. The last part of this chapter presents the operational definitions of key terms used in this study.

1.2 Background of the Study

Iraq is going through a critical period in the present time in which terrorist attacks continue to occur on an almost daily basis, which have directly affected most aspects of life around the country. This situation has led to further deterioration of the security situation, especially in the capital Baghdad, through repeated security breaches of terrorist bombings, improvised explosive devices and car bombs and assassinations that have continued until the present time and the majority of these attacks were directed at civilians (Habib, 2007). Women and other vulnerable groups in Iraq still suffer from discrimination, economic and social barriers, and the attacks against them. According to the latest report by the United Nation (UN) in 2013, the human rights situation in Iraq, despite some progress, is threatened by the rise of armed violence, which has killed at least 3,238 civilians and injured 10,379 others in 2012 (UN, 2013). While the number of civilians wounded or killed reached to 55,856 during the years 2014 to 2015 (Kubiš & Al Hussein, 2016).

All of these conditions have directly influenced the lifestyle and daily behaviour of the people. The unsuitable conditions which Iraq is currently facing have made it difficult to provide the most basic means to improve the quality of life in general. Especially, women are not able to enjoy their freedom, economical independence and social activity. They are not only under oppression from the government, but they are also being oppressed and discriminated against by the community and men in particular (Madi, 2007). The new civil constitution of Iraq still lacks the women's basic rights to enhance the poor state being currently faced by Iraqi women. They are not only confined to the house, and kitchen and cloak, but they are also trapped mostly by male terrorists when they are out of the house. Most Iraqi women must suffer from great ignorance and misconceptions due to religious beliefs and the law by males against their freedom. For example, there is a fear of taking part in sports activities among young women since they believe that physical exercise would turn their bodies into more masculine bodies, and the society would view them as more masculine individuals (Habib, 2007). All this shows an actual decline in the role of

women in society, cultural events, sports, and intellectual life as well as the positive impact of this involvement. This concern is confirmed by the World Health Organization (WHO)'s reports indicating that the percentage of physically inactive and overweight females in Iraq is 51.3% and 65.1%, respectively (Al-Tamimi, Armstrong, Cowan, & Riley, 2011).

School system at the forefront of educational institutions has also deteriorated. Approximately 80% of schools in the capital city of Baghdad are neglected by the authorities (ARFAD, 2008). Higher Education offered in universities and colleges has also faced the same fate. Iraqi universities in the current stage suffer from the lack of development, still following the traditional rules which does not fit the principles of modern education and theories. Especially after the change of the former regime in April, 2003, due to the destruction of the most educational institutions, the poor infrastructure of universities negatively impact the involvement of women in PA and sports (Al-Haidari, 2011).

Lifestyle and behavioural factors such as daily PA play a key role in the prevention of chronic diseases including cardiovascular disease, diabetes, and obesity (Cooper & Hancock, 2011; Hardin, Hebert, Bayden, Dehart, & Mazur, 1997; Rowlands, Eston, & Ingledew, 1999; Strong et al., 2005). PA promotes many values such as self-confidence and community spirit, communication and integration, discipline and respect, in addition to the psychological gains and disposal of depression and improving concentration (Al-Tamimi, 2007). Hence, being physically active plays an essential role in increasing health and well-being. A large number of researchers investigated the benefits of PA on many parts of the body such as heart, skeletal muscles, bones, blood (i.e. cholesterol levels), the immune system and the nervous system (Cooper & Hancock, 2011; Soroush et al., 2013; Stefanick et al., 1998; Stone, McKenzie, Welk, & Booth, 1998; Strong et al., 2005). However, to achieve all of these benefits, specific guidelines were recommended to improve physiological variables, PA, PD, and EI for adults starting from the minimum amount of PA and increasing dietary knowledge (Agriculture & Services, 2010; P. A. G. A. Committee, 2008b).

Specifically, the 2008 PA Guidelines recommend 150 minutes of moderate and/or 75 minutes of vigorous PA per week to reduce the risk of obesity, cardiovascular diseases (CVD) and type 2 diabetes (Hamilton, Healy, Dunstan, Zderic, & Owen, 2008). Moreover, moderate intensity PA includes walking which is a popular, accessible and acceptable form of activity, particularly among populations who are the most physically inactive. Walking programmes are considered a safe and effective way to increase the physical fitness. Also, walking does not require special equipment and has a low risk of injuries. Furthermore, relevant research found that increased walking leads to increased fitness, decreased body weight, body mass index, and percentage of body fat and resting diastolic blood pressure in previously sedentary adults (P. A. G. A. Committee, 2008b; Cooper & Hancock, 2011; Kassavou, Turner, & French, 2013). Fitness is important in daily life, and low levels of PA and less physical fitness are independent risk factors for chronic diseases and premature mortality among adults (Katzmarzyk, 2010). Therefore, introducing walking as an important and easily accessible fitness activity to the

individuals' daily activities seems to be necessary and helpful in improving the overall fitness and health of an individual.

There are considerable published data to strongly support the benefits of the intervention programmes which consist of PA and dietary changes as a means to decrease the morbidity and mortality from cardiovascular disease and stroke in adults (Artinian et al., 2010; Blumenthal et al., 2010; T. Brown & Summerbell, 2009; Burke et al., 2013; Butler, Black, Blue, & Gretebeck, 2004). Moreover, there is a strong evidence that obesity is related to energy content of diet and an increasingly sedentary lifestyle because obesity in childhood is known to be an independent risk factor for adult obesity (Flegal, Carroll, Ogden, & Curtin, 2010; Ogden & Carroll, 2010). Therefore, there is a need to develop interventions to reduce the prevalence of obesity among the youth. These interventions should focus on changing these behaviours. The effectiveness of interventions that focus on improving diet and PA on the individuals' health has been shown in different studies (T. Brown & Summerbell, 2009; Coghill & Cooper, 2008; Collins et al., 2011; Danielsen, Svendsen, Mæhlum, & Sundgot-Borgen, 2013). However, there is still a need for further investigations to determine the effects of such interventions on the physical and PD of the individuals, especially among young people in Iraq.

It has become well acceptable that the type of environment and lifestyle of individuals have a strong influence on health. New evidence indicates that good dietary elements have a strong impact on the health of the body and mind. In particular, insufficient levels of dietary intake which is typical of our modern society can be considered as risk factors for several modern diseases and various mental diseases such as Alzheimer's disease, as well as psychiatric disorders such as depression (Gomez-Pinilla, 2011). Many researchers have shown that inactive lifestyle with unhealthy eating habits leads to overweight, obesity, and health problems (Bauer, Neumark-Sztainer, Fulkerson, Hannan, & Story, 2011; Blair, Kohl, & Barlow, 1993; Boyle, Jones, & Walters, 2010; Cecchini et al., 2010). According to Al-Tamimi (2007) the World Health Organization (WHO) indicated that the proportion of death from non-communicable diseases is 60% of the total death. The most important reasons are unhealthy and proper diets and lack of exercise.

Non-communicable diseases related with nutrition cause morbidity and mortality in most countries in the Eastern Mediterranean region, specifically cardiovascular disease, diabetes, and cancer. The key risk factors for non-communicable diseases include high blood pressure, high concentration of serum cholesterol, tobacco smoking, unhealthy eating habits, overweight or obesity, and physical inactivity (Musaiger & Al-Hazzaa, 2012). These facts clearly demonstrate the lack of dietary awareness of the majority of people which is reflected negatively on their EI in the daily life and shows that they are unlikely to follow healthy eating habits. Hence, intervention programme including dietary awareness along with PA was found to be more beneficial to prevent diseases and maintain life (Daubenmier et al., 2007; G. A. Kelley, Kelley, Roberts, & Haskell, 2012a, 2012b; S öderlund, Fischer, & Johansson, 2009).

1.3 Problem Statement

Physical inactivity and lack of dietary awareness have been identified as important public health concerns for the youth. According to WHO's reports, the lack of exercise and inadequate good diet cause an increase in the rate of global deaths from non-infectious diseases by an estimated 60% (Al-Tamimi, 2007). Poor physical inactivity and diet cause 310,000 to 580,000 deaths per year and are the major contributors to disabilities that result from diabetes, osteoporosis, obesity, and stroke (Pribis, Burtnack, McKenzie, & Thayer, 2010). This phenomenon has highlighted the importance of PA and dietary awareness in our daily life behaviour and how the lack of PA and dietary awareness 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

In addition, Humairi (2015) indicated the low level of nutrition and dietary awareness for Iraqi rural women with an average of 19.3 equivalent to 55%. Blood pressure, blood glucose and obesity rates among females aged 15 and above in Iraq are higher compared to their counterparts in the Eastern Mediterranean Region that (12.5 vs. 11.6 in BP, 28.7 vs. 29.1 in BG , and 36.2 vs. 26.5 in obesity) due to inactive lifestyle and bad EI (GHO, 2013). All those problems showed the need to increase dietary awareness and female knowledge to help prevent diseases as reported by WHO on Iraqi health profile.

Different studies conducted on PA among adolescents and adults show a significant decline in the rate of PA in adolescence (Caspersen, Pereira, & Curran, 2000; Malina, 2001). This rate continues to decline throughout adulthood (Dwyer, Wilson, Limarzi, Callaghan, & Croskery, 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, Fotheringham, Owen, & Bauman, 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, Deusinger, Strube, Highstein, and Deusinger (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 physiologically, physically and psychologically, 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 and dietary information.

Meanwhile, parents do not usually encourage their children, especially their daughters to engage in sports teams and social clubs. Some parents do not allow their daughters to participate in sports activities due to the security situation which could endanger the lives of their children. This unwillingness is heightened by the wrong society's perception of sports, especially for girls as pointed out by a representative of the Olympic Committee in the province of Nineveh who said: *"Social conditions and the reluctance of families on the participation of their daughters in sports and increasing number of girls who wear hijab because of customs and traditions, formed all the straw that broke the women's sport"* explaining to the UNAMI (United Nations Assistance Mission for Iraq) in 2013. In addition, in several reports, UNAMI indicated that in terms of society's perception, women's sports involvement is an indecent phenomenon in the society (Aoda, 2013).

The above mentioned issues are the reasons behind the manifestation of potentially inactive and uneducated healthily generation of young people. Phenomenon of inactivity and nutrition illiteracy 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 and not receiving sufficient dietary awareness. 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, physically, and mentally as well as their EI. This intervention should include physical activities, simple exercises, and dietary awareness 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, physically, mentally or EI) is mostly affected by this intervention programme. Hopefully, this study will help to reduce obesity, cardiovascular diseases, and diabetes as well as increase physically active individuals and improve health in the society.

1.4 Objectives

The main objective for this research is to investigate the effect of a home-based intervention programme on the physiological variables, PA, PD and EI among undergraduate female students in Iraq. The specific objectives are presented as follows:

1. To investigate the effect of the 12 week home based intervention programme on the physiological variables (blood pressure, blood cholesterol, blood glucose, body mass index, waist hip ratio, body fat, VO_2max and vital capacity) among undergraduate female students in Iraq.

2. To investigate the effect of the 12 week home based intervention programme on the physical activity among undergraduate female students in Iraq.
3. To investigate the effect of the 12 week home based intervention programme on the psychological distress among undergraduate female students in Iraq.
4. To investigate the effect of the 12 week home based intervention programme on the energy intake undergraduate female students in Iraq.
5. To evaluate which variables (physiological variables, physical activity, psychological distress and energy intake) are the most affected by the intervention programme.

1.5 Hypotheses

In order to achieve the objectives of the study, the hypotheses are addressed based on the variables measured. However, for objective five, research question is posed to evaluate which variables are the most affected by the intervention programme. The specific hypotheses and research question based on research objectives are listed below:

1.5.1 Hypothesis 1-8 for Objective 1

H_O1 There are no significant differences in blood pressure across pre-test, post-test1, and posttest2 between experimental and control groups.

H_O2 There are no significant differences in blood cholesterol across pre-test, post-test1, and post-test2 between experimental and control groups.

H_O3 There are no significant differences in blood glucose across pre-test, post-test1, and post-test2 between experimental and control groups.

H_O4 There are no significant differences in body mass index across pre-test, post-test1, and post-test2 between experimental and control groups.

H_O5 There are no significant differences in waist hip ratio across pre-test, post-test1, and post-test2 between experimental and control groups.

H_O6 There are no significant differences in body fat across pre-test, post-test1, and post-test2 between experimental and control groups.

H_O7 There are no significant differences in VO_2max across pre-test, post-test1, and post-test2 between experimental and control groups.

H_O8 There are no significant differences in vital capacity across pre-test, post-test1, and post-test2 between experimental and control groups.

1.5.2 Hypothesis 9 for Objective 2

H_O9 There are no significant differences in physical activity across pre-test, post-test1, and post-test2 between experimental and control groups.

1.5.3 Hypothesis 10-13 for Objective 3

Ho10 There are no significant differences in psychological distress across pre-test and post-test between experimental and control groups.

Ho11 There are no significant differences in depression across pre-test and post-test between experimental and control groups.

Ho12 There are no significant differences in anxiety across pre-test and post-test between experimental and control groups.

Ho13 There are no significant differences in stress across pre-test and post-test between experimental and control groups.

1.5.4 Hypothesis 14 for Objective 4

Ho14 There are no significant differences in energy intake cross pre-test and post-test between experimental and control groups.

1.5.5 Research Question for Objective 5

Which variables (physiological variables, physical activity, psychological distress and energy intake) are the mostly affected by the intervention programme?

1.6 Significance of the Study

This study aimed to investigate the effect of a 12 week home-based intervention programme which focused on simple exercises and information on dietary awareness. The intervention is characterised by its easiness and availability to perform at home without the need for female students to participate in sports or physical activities outside of their homes. Considering society's negative perceptions and sensitivity towards female's engagement in sports events and physical activities in public, doing physical activities at home would provide sedentary young females with opportunities to become more physically active and improve their health. Moreover, it will be a safer way to stay healthy and active despite the current unstable security situation in Iraq.

Additionally, the current study will contribute to a better understanding of the practical application of PA and dietary awareness programme through utilization of an experimental design. The findings of this study could be considered by the Ministries of Education and Higher Education in the curriculum development process so that physical education courses are introduced to schools and university students in Iraq. Universities and colleges may use the intervention discussed in the current study to help overcome the phenomenon of physical inactivity among female university students and encourage them to engage in various physical activities at home. Indeed, this will lead to better health among young female students in Iraq.

The findings of this study will be a useful reference for educators, researchers, and lecturers in universities in terms of designing new methods to help sedentary female students become more physically active and more aware of their daily food intake culminating in a healthier generation. College administrators or health promoters may prefer to incorporate eating regulation skills into female programmes, teach information about food choices, and enhance social supports for healthy attitudes and behaviour during this critical developmental period due to the importance of increasing knowledge and awareness of good nutrients and EI that contribute to health maintenance. Moreover, the finding of this study will be a useful for the social counsellors in universities in terms of decreasing the PD phenomenon. Indeed, practising PA and improving daily diet habits will reduce depression, anxiety, and stress which is popular among female students at this age due to the conditions mentioned that Iraqi society going through, which led to increasing the negative sentiment for life.

1.7 Delimitation of the Study

The present study has a number of delimitations as mentioned below:

First, the study was conducted in the College of Education, Soran University, Erbil, in the Northern Region of Iraq due to the lack of security and stability in the capital city, Baghdad and southern areas of Iraq.

Although there are many physiological variables that can be adopted and tested, this study only selected nine physiological variables (blood pressure, blood cholesterol, blood glucose, BMI, body fat, WHR, VO_2max and vital capacity). Indeed, these variables are more related to general health (Danielsen et al., 2013; Daubenmier et al., 2007; Dunn et al., 1999; Esposito et al., 2003). Therefore, according to Goodpaster et al. (2010), Islam et al. (2013), and Järvelä et al. (2012), the selected variables are the most related variables that can show the relevance of this variables to the improvement in health.

1.8 Limitation of the Study

There are some limitations of the current study. The official age of the students for entering university is 18 years old in Iraq. However, due to the possibility that some students dropped out or left school year because of security problems in the country and restarted school after several years, Ministry of Higher Education in Iraq determined the appropriate age range of 18-22 for accepting the students in universities. As a result, the selection of a homogeneous sample regarding the students' age would not be possible in the current study.

Studies have showed that the laboratory test is the most reliable way to get the results. However, due to the insecurity situation, difficulty in mobility and to ensure the safety of the students in this research, the field tests were used. However, the selected field tests were reported to have high validity and reliability as compared to the lab test. Examples include using step test instead of the lab treadmill test to measure the VO_2max (Chatterjee,

Chatterjee, & Bandyopadhyay, 2005; Mcardle, Katch, Pechar, Jacobson, & Ruck, 1971). VO_2max step test with reliability score of .082 (Johnson & Nelson, 1969), using the caliper to measure body fat percentage instead of hydrostatic weighing test (Agarwal, Bills, & Light, 2010; Durnin & Womersley, 1974). Reliability for measuring body fat by Calipers were reported to be 0.79 to 0.91 (Kispert & Merrifield, 1987).

1.9 Definition of the Terms

The following definitions have been given to contribute to a better understanding of the basic terms used in the current study.

1.9.1 Physiological Variables

The physiological variables are the amount that can change frequently in the bodies of the human beings, animals or plants (Ting & Education, 2009). In this study, physiological variables include subjects' blood pressure, blood cholesterol, blood glucose, body fat, body mass index and waist hip ratio, VO_2max, vital capacity are the dependent variables and will be tested 3 times during the experiment. These variables are suggested because they are good indicators for health (Tjønna et al., 2013; Tudor-Locke, 2010; Wing, Venditti, Jakicic, Polley, & Lang, 1998).

1.9.2 Physical Activity (PA)

WHO (2004b) defined the physical activity as any bodily movement produced by skeletal muscles that requires EI. Regular moderate intensity PA such as walking, cycling, or participating in sports, which has positive effect on health. For instance, it can reduce the risk of cardiovascular diseases, diabetes, colon and breast cancer, and depression. Moreover, adequate levels of PA decreases the risk of a hip or vertebral fracture and help control weight (Kushi et al., 2012; Lakoski et al., 2011; Lee et al., 2012). In this study, PA includes simple exercises used in the intervention programme tailored to be done at home, which is measured by counting the steps average in three days by pedometer.

1.9.3 Psychological distress

PD is defined as a general term used to describe unpleasant feelings or emotions that impact your level of functioning. In other words, it is psychological discomfort that interferes with your activities of daily living. PD can result in negative views of the environment, others, and the self. Sadness, anxiety, distraction, and symptoms of mental illness are manifestations of PD (Karkhanis & Mathur, 2016; Tiwari, 2016). The focus should be on promoting PD throughout the lifespan to ensure a healthy start in life and to prevent mental disorder (WHO, 2007). In this study, PD of depression, anxiety, and stress signs were measured in two different times: before and at the end of the study using DASS Questionnaire. The DASS depression, anxiety, and stress scales were developed by researchers at the University of New South Wales-Australia. A 42-item questionnaire includes three self-report scales designed to measure the negative emotional states of

depression, anxiety and stress. Each of the three scales contains 14 items, divided into subscales of 2-5 items with similar content (Lovibond & Lovibond, 1995).

1.9.4 Energy Intake

According to Bender (2009), EI is the total energy cost of maintaining constant conditions in the body, i.e. homeostasis (basal metabolism, BMR) plus the energy cost of PA. The average total EI in Western countries is about 1.4 times BMR; a desirable level of PA is about 1.7 times BMR. Energy intake plays a significant role in the quality of life, health and longevity (Marmot et al., 2010). In this study, the EI was measured depending on the amount of kilocalories (Kcal) intake per day in two different times: before and at the end of the study by using 24-hours food record (Yang et al., 2010).

1.9.5 Iraqi Undergraduate Level

The undergraduate level is defined as the level which students are admitted after completing the secondary or high school, which generally lasts for four years. In order to pursue their studies at undergraduate level in Iraq. The applicants, who must be 18 years old or above, register in colleges and universities to pursue their studies in various field such as arts, sciences, medicine, engineering so on and so forth. .Bachelor's degrees in the fields of Education and Science are awarded upon the completion of four-year programmes (WES, 2004). In the current study, the first-year female students studying at the faculty of Education under a 4-year programme in the 18-22 age range were selected as the participants in the experiment.

1.9.6 Home Based Intervention Programme

An intervention programme should be a system that helps develop the individuals' skills, potentials, and capabilities, whether physical or psychological, and to reform their daily habits and lifestyle, and it may consist of different groups of programmes, tables, or schedules related to the type of target to be achieved (Guralnick & Bricker, 1987). In this study, the home-based intervention programme of contained PA combined with dietary awareness sessions in the form of a booklet including instructions and schedules for moderate and /or high intensity physical activities (5 days per week, 30 minutes per day) with paragraphs of nutrition knowledge and dietary awareness (2 days per week, 15 minutes per day), which it tailored to could be done easily at home. The study lasted for 12 weeks adapted from the 2008 Physical Activity Guidelines for Americans (P. A. G. A. Committee, 2008b) and from the Dietary Guidelines for Americans, 2010 (Agriculture & Services, 2010). The effects of the intervention on physiological, physical, PD and EI among undergraduate female students were measured through pre-test, post-test1 and post-test2.

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