How Ready Are the High School Female Students to Reduce Dietary Fat? The Transtheoretical Model of Change as a Theoretical Framework

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Abstract

This study is to investigate the effectiveness of a stage-matched intervention based on female pupils in intermediate schools. following a nutritious diet 16–18-year-old female high school students participated in the study. This investigation was conducted using a randomized controlled trial experimental methodology. 144 female high school students were enrolled in the study using a simple random sampling, 72 of them were in the study groups and the remaining 72 in the control group. Participants' age and family socioeconomic level are among the sociodemographic features included in the study instrument. Other items include the 32-item Situational Temptation Questionnaire, the Decisional Balance Questionnaire, the Processes of Change Questionnaire, and the Revised 1-item Stage of Change Algorithm. A self-reported instrument was used to gather data. for the month of November 2021 to April 10th, 2022.

The statistical package for social science for Windows, version 26, was used to analyze the data. The frequency, percent, mean, standard deviation, one-way analysis of variance, and repeated measures analysis of variance were employed as statistical measures.According to the study's findings, participants were moved from lower to higher Stages of Change by the Transtheoretical Model of Change-Stage-matched intervention that was given. The research group's average age is 17.32 ± 1.56, while the control group's average age is 17.27 ± 1.09. Over 33% of the study group's participants were in the Action Stage of Change due to eating high-fat foods in the pretest and posttest I. Less than half of the participants in the posttest II were in the preparation stage of change.

An omnibus effect of.789 indicated a significant change in the research group members' self-efficacy over time. The study group's Self-Efficacy of lowering dietary fat was dramatically improved by the stages-matched intervention based on the Transtheoretical Model of Change.

Keywords: Adolescents, Dietary Fat, Health Behavior, Transtheoretical Model of Change,

الخلاصة

تهدف هذه الدراسة إلى التحقق من فعالية التدخل المطابق للمرحلة على أساس التلميذات في المدارس المتوسطة. بعد اتباع نظام غذائي مغذي، شاركت طالبات المدارس الثانوية البالغة من العمر 16–18 عامًا في الدراسة. تم إجراء هذا التحقيق باستخدام منهجية تجريبية عشوائية محكومة. تم تسجيل 144 طالبة من طالبات المدارس الثانوية في الدراسة باستخدام عينة عشوائية بسيطة، 72 منهن في مجموعات الدراسة والباقي 72 في المجموعة الضابطة. يعد عمر المشاركين والمستوى الاجتماعي والاقتصادي للأسرة من بين السمات الاجتماعية والديموغرافية المضمنة في أداة الدراسة. تشمل العناصر الأخرى استبيان الإغراءات الظرفية المكون من 32 عنصرًا، واستبيان توازن القرار، واستبيان عمليات التغيير، وخوارزمية مرحلة التغيير المنقحة المكونة من عنصر واحد. تم استخدام أداة المبلغ عنها ذاتيا لجمع البيانات. لشهر نوفمبر 2021 إلى 10 أبريل 2022. تم استخدام الحزمة الإحصائية للعلوم الاجتماعية لنظام التشغيل Windows الإصدار 26 لتحليل البيانات. تم استخدام التكرار، النسبة المئوية، المتوسط، الانحراف المعياري، تحليل التباين أحادي الاتجاه، وتحليل المقاييس المتكررة للتباين كمقاييس إحصائية. وفقًا لنتائج الدراسة، تم نقل المشاركين من مراحل التغيير الأدنى إلى الأعلى بواسطة نموذج Transtheoretical Model التدخل المطابق لمرحلة التغيير الذي تم تقديمه. يبلغ متوسط عمر المجموعة البحثية 17.32 ± 1.56، بينما يبلغ متوسط عمر المجموعة الضابطة 17.27 ± 1.09. أكثر من 33% من المشاركين في مجموعة الدراسة كانوا في مرحلة العمل للتغيير بسبب تناول الأطعمة الغنية بالدهون في الاختبار القبلي والاختبار البعدي الأول. وكان أقل من نصف المشاركين في الاختبار البعدي الثاني في مرحلة الإعداد للتغيير. أشار التأثير الشامل البالغ 789 إلى حدوث تغيير كبير في الكفاءة الذاتية لأعضاء مجموعة البحث مع مرور الوقت. تم تحسين الكفاءة الذاتية

لمجموعة الدراسة في خفض الدهون الغذائية بشكل كبير من خلال التدخل المطابق للمراحل بناءً على نموذج التغيير النظري.

الكلمات المفتاحية: اليافعين , الدهون العذائية ,السلوك الصحي , نموذج التغيير عبر النظريات

Introduction

Maintaining a diet low in foods high in sugar and saturated fat and high in fruits and vegetables is crucial for keeping the general public healthy and preventing non-communicable diseases. Diets high in fat and low in carbs are lacking in vitamins E and A, thiamin, B6, folate, calcium, magnesium, iron, and potassium. They also have a low dietary fiber content. Eating meals high in fat results in the production of more chylomicrons and remnants [(1)]. A diet high in fat affects the absorption of dopamine, reduces the quantity of rapid eye movement (REM) sleep, which may also be connected to the release of cholecystokinin [(2)], and increases the intake of calories excessively [(3)].Consuming a diet high in fat has been demonstrated to negatively impact high-intensity exercise performance, despite the implementation of carbohydrate loading prior to engaging in high-intensity activities [(4)].

Health is a process which can be changed sophistically and dynamically. Indeed, health can be affected by person's lifestyle. As a result; stated that to maintain health, individuals should practice health promoting lifestyle behaviors [(5)]

According to the World Health Organization's (WHO) most recent report from 2017, there were 14,315 stroke-related fatalities in Iraq, accounting for 8.13% of all deaths in the nation [(6)]. The state of health is a process that is dynamic and sensitive to change. Indeed, a person's lifestyle can have an impact on their health. Consequently, it was said that adopting healthy lifestyle practices is important for maintaining one's health [(7)] .According to the World Health Organization's (WHO) most recent report from 2017, there were 14,315 stroke-related fatalities in Iraq, accounting for 8.13% of all deaths in the nation [(8)]. The American Heart Association (AHA) advised that following PCI, patients with congestive heart failure (CHD) should adhere to strict secondary preventive measures, such as leading a balanced lifestyle. an increase in a diet high in fruits and vegetables, keeping a healthy weight, giving up smoking, and continuing to follow up on a regular basis. diabetes mellitus and blood pressure under control [(9)] .Adults 20 years of age or older had a 11.4% prevalence of high total cholesterol between 2015 and 2018. It's noteworthy to observe that there was no discernible difference in prevalence between women (12.1%) and men (10.5%). With a frequency of 15.7%, those 40–59 years old had the highest

frequency. The next group was those who were 60 years of age or older, with a 11.4% prevalence rate. However, the group with the lowest prevalence—those in the 20–39 age range—was identified at 7.5% [10] .

A diet heavy in fat and low in carbohydrates, according to Mayo Clinic physician Dr. Russell Wilde, may mimic the effects of fasting and cause ketosis [9–10] .People can improve their quality of life and lower their chance of developing chronic illnesses by forming healthy behaviors [11] .Preconception treatment is appropriate for every woman of reproductive age who is able to conceive. Since the 1980s, childbearing-related health care in North America has been referred to as PCC, or the pre-pregnancy period [12] .

Chronic diseases, commonly referred to as "aging diseases," are the culmination of several changes that begin in early adulthood and manifest years later. Different changes may happen more quickly or more slowly over time, depending on the individual's immune system function, gastrointestinal health, food consumption, and genetic makeup [1] .The majority of people in the world place a high value on their health and work to avoid diseases and impairments. Nevertheless, a lot of people have habits that are detrimental to their general health despite this tendency[13].Studies including cross-cultural investigations, prospective cohort studies, and trials introducing dietary and lifestyle interventions have shown that the risk of cardiovascular morbidity and death can be decreased by upholding a healthy body weight, eating pattern, and lifestyle [14]. A ten percent reduction in cardiovascular disease incidence and deaths was associated with adherence to the Mediterranean diet, which places a strong emphasis on fruits, vegetables, grains, legumes, and fish[15].Because diet, lifestyle, and lipoprotein metabolism interact in the development of atherosclerosis and its sequelae, there are clinical guidelines for high-risk individuals and those with apparent cardiovascular diseases, as well as recommendations for the general population. Eating at a restaurant, celebrating with friends, and having fun at parties are all common venues for positive social interactions. Three of the five eating behaviors in these situations were found to be significantly predicted by self-efficacy in upholding healthy habits. Matarazzo et al. coined the phrase "behavioral health" first. It explains how conduct, whether it is excessive eating, indolence, dirty habits, unprotected sex, smoking, violence, or participation in community, educational, or religious activities, has a pervasive impact on one's health. This has consequences for where the teenager falls on the spectrum of successful, typical, or even healthy development [16] .Typically, behavior-change theories focus on cognitive variables, such as attitudes, beliefs, and expectations, as well as factors that affect how people explain and predict their health-related decisions, such as public participation in screening, vaccination, and other preventive health initiatives [17] .

Maintaining a healthy body weight, eating habits, and lifestyle have been shown to lower the risk of cardiovascular morbidity and mortality. This has been supported by research from prospective cohort studies, cross-cultural studies, and trials applying nutritional and lifestyle treatments [8] .The WHO estimates that the prevalence of hypertension is 40% in underdeveloped nations and approximately 35% in industrialized nations [18]. Both CAD and CVD risk factors can generally be categorized into two types. Non-adjusted risk factors include things like age, sex, race, and family history in the first group. The second category consists of modifiable risk factors, which include smoking, dyslipidemia, diabetes mellitus (DM), hypertension, and overweight [19]. People who suffer from binge eating disorder eat unusually large amounts of food in short periods of time and feel responsible and out of control for their bingeing episodes. According to research, women make up as much as 60% of those who struggle with BED [20].

stronger self-efficacy individuals showed a stronger propensity to swap out high-fat items for low-fat ones, modify their meat intake to consume less fat, and swap out high-fat foods for fruits and vegetables. While some of the findings are consistent with previous studies, there are indications of possible socioeconomic or cultural factors. White American moms were anticipated to replace high-fat foods with low-fat foods and fat foods with fruits and vegetables in a similar way, but African-American mothers were predicted to avoid eating fried foods and spreading fat on foods (which was not the case in our study) [21]. It costs more to buy fruits, vegetables, and low-fat foods than it does to buy fatty items.

There are several long-term health problems associated with obesity. Even though decreasing weight has many benefits, a sizable portion of people do not actively seek therapy. After tobacco use, obesity is thought to be the second most preventable cause of mortality due to its significant negative health effects .One prominent setting where attempts to treat obesity might be done is during primary care appointments. It is evident that investments are made in public and private initiatives in nations like the United States where obesity affects a significant portion of the population in an effort to prevent obesity among young people through specific nutrition programs, interventions, programs, and actions that promote healthy eating [22] .

There is a definite link between weight gain and death risk. For every 0.5 kg increase in weight, the chance of death rises by 1% for people between the ages of 30 and 42. For people who are 50–62 years old, this percentage increases by 2% for every 0.5 kg increase in weight [23]. It has been discovered that the way hypertension patients view their illness affects how closely they comply to their treatment plans and lifestyle choices. This has a major impact

on how well their condition is managed and controlled as well as how well their quality of life is affected [24]. Descriptive study, using the evaluation approach, is carried out to evaluate youth's health risk behaviors in Baghdad City sample of (160) University students study depicts that most of the students have experienced health risk behaviors of unhealthy dietary behavior, inadequate physical activity and health related behavior regardless of their colleges' classification [25]. In agreement with the numerous data on the obesogenic diet, the combination of fat and sugars in snack foods triggered more profound overeating response compared with either fat or sugars or standard chow [26]. One of the most common consequences of obesity is hypertension [27] .investigated the opposite link and found that an antihypertensive vasodilatory drug Losartan prevented obesity of rats fed on the obesogenic diet, perhaps via an increase in energy expenditure due to thermal dissipation through the skin. Diet-induced obesity, human binge eating behavior and the
mesolimbic pathway were analyzed by Perello [28]. They discussed the integration of neuronal inputs from the hypothalamus with peripheral hormones and visceral sensory information in the arcuate hypothalamic neurons [29]
reviewed the role of hypothalamic neurons, both excited and inhibited by glucose, and their interaction with Orexin-A in coordination of such processes as feeding, sleep-wakefulness, neuroendocrine function, vascular, and metabolic reactions. In the review discussing the obesity-depression relationship [30].described the coexisting pathways for energy homeostasis and mood balance and suggested that obesity might be considered a risk factor for depression but most likely it happens in the cases of either binge eating or metabolically precarious, abdominal adiposity. Ample evidence suggests that diet and physical activity (PA) play a major role in preventing and developing many conditions including cancer, diabetes, and cardiovascular disease([31-32]. The World Health Organization recommends that
adults aged 18-64 do at least 150 minutes of moderate exercise or 75 minutes of vigorous aerobic exercise weekly, in which aerobic exercise should be performed in intervals of at least 10 minutes ([33]. There are studies on violent behavior, addiction, the use of the smartphone and its effect on academic performance, and the use of social networking sites and its effect on the mental health of adolescents in schools. Therefore, exercise must be made a part of adolescents' lives to reduce these harmful habits([34-35-36-37]

Method

Design: This study was conducted using a real experimental design known as a "randomized controlled trial." High levels of internal validity are guaranteed by experimental designs. To provide conclusive evidence for an intervention, randomized controlled trials (RCTs) are carried out (Gray et al, 2017). Sample

& Sampling: Al-Adl High School for Females in Al-Baghdadi County, Anbar Governorate, Iraq was the source of a simple random sample of female high school students for the study. The names of all the female high schools in the aforementioned county are written on similar pieces of paper, and this school is chosen using a basic random selection procedure.

Each of these pieces was folded identically, placed inside a container, and thoroughly mixed by a coworker who drew one piece, revealing the previously specified school. Every kid in every class at this school had their name written on the same piece of paper. These pieces were all folded identically, placed in a container, and thoroughly swirled by a colleague who drew one piece for each group—the study group, the control group, and so on—while stirring vigorously to achieve the required sample size. A random selection of twenty-four pupils was made from each grade (10th, 11th, and 12th).

The G*Power program 3.1.9.2 was used to determine the sample size. The suggested sample size would be 142 with a modest effect size of (0.25), an alpha error probability of (0.05), a power of 0.95, and three measurements. There are 144 samples in all.

Study Procedure

Participants in the study and control groups were given instructions to affirm that they were aware that participation is completely voluntary and that they can discontinue it whenever they wish, and the researchers simultaneously turned in the study instrument to each group. The student researcher gave participants the assurance that the information they provided would be secure and kept private, both before and after the study. Between October 1st and October 4th, 2023, was when the pretest was held. The researchers categorized the study group members according to their Stages of Change after gathering copies of the survey instrument from both groups. After that, only study group participants received the Stage-matched intervention in person during the duration of October 5, 2023, to October 8, 2023.There were five sessions in the study intervention, with two sessions for each Stage of Change. 40–45 minutes were allotted for each session. Twelve weeks passed between December 24, 2023, when the study intervention was administered, and the same amount of time passed between Posttest I and Posttest II. Posttest I was administered by the researcher to every study participant. After that, on March 17, 2024, ten weeks later, the researcher conducted posttest-II.The Stage-Matched approach, in which each Stage of Change is matched by a number of Processes of Change, was taken into consideration for the study intervention.

Results

The study group's average age is 17.32 ± 1.56 years old. The age mean for the control group is 17.27 ± 1.09. The majority of study participants (n = 39; 54.2%) have a normal weight-to-height ratio. Overweight persons (n = 32; 44.4%) and one person with obesity class I (n = 1; 1.4%), round out the top three participant categories. The majority of control group participants (n = 48; 66.7%) have normal weight-to-height ratios, followed by overweight individuals (n = 22; 30.6%) and one person with obesity class I (n = 1; 1.4%).

Table 2. *Participants' distribution according to their Stages of Change for eating high-fat food (study group, n = 72)*

Time	**Precontemplation**	**Contemplation**	**Preparation**	**Action**	**Maintenance**
	f (%)	**f (%)**	**f (%)**	**f (%)**	**f (%)**
Pretest	1 (1.4)	15 (20.8%)	22 (30.6%)	26 (36.1%)	8 (11.1%)
Posttest I	1 (1.4%)	15 (20.8%)	22 (30.6%)	26 (36.1%)	8 (11.1%)
Posttest II	0 (0.0%)	1 (1.4%)	34 (47.2%)	24 (33.3%)	13 (18.1%)

f: Frequency; %: Percent

As a result of eating high-fat food, more than a third of study group participants (n = 26; 36.1%) were in the Action Stage of Change on the pretest and posttest I. These participants were followed by those in the Preparation Stage of Change (n = 22; 30.6%), the Contemplation Stage of Change (n = 15; 20.8%), the Maintenance Stage of Change (n = 8; 11.1%), and one participant in the Precontemplation Stage of Change (n = 1; 1.4%). After taking the posttest II, less than half of the participants were in the Preparation Stage of Change (n = 34; 47.2%), Action Stage of Change (n = 24; 33.3%), Maintenance Stage of Change (n = 13; 18.1%), and Contemplation Stage of Change (n = 1; 1.4%)

Table 3. *Participants' distribution according to their Stages of Change for eating high-fat food (control group, n = 72)*

Time	**Precontemplation**	**Contemplation**	**Preparation**	**Action**	**Maintenance**
	f (%)	**f (%)**	**f (%)**	**f (%)**	**f (%)**
Pretest	52 (72.2)	12 (16.7%)	15 (20.8%)	7 (9.7%)	4 (5.6%)
Posttest I	45 (62.5%)	8 (11.1%)	16 (22.2%)	3 (4.2%)	0 (0.0%)
Posttest II	40 (55.6%)	5 (6.9%)	7 (9.7%)	16 (22.2%)	4 (5.6%)

f: Frequency; %: Percent

The study results display that Precontemplation (n = 52; 72.2%) was the stage of change that participants in the control group were in during the pretest. This was followed by the preparation stage (20.8%) of change (n = 15; 16.7%), contemplation stage (16.7%), and action stage (n = 7; 9.7%). The majority of respondents to posttest I (n = 45; 62.5%) were in the Precontemplation Stage of Change, followed by those in the Preparation Stage of Change (n = 16; 22.2%), Contemplation Stage of Change (n = 8; 11.1%), and Action Stage of Change (n = 3; 4.2%).

More than half of participants in the posttest II were in the Precontemplation Stage of Change (n = 40; 55.6%), with the next highest percentages being in the Action Stage of Change (n = 16; 22.2%), Preparation Stage of Change (n = 7; 9.7%), Contemplation Stage of Change (n = 5; 5.9%), and Maintenance Stage of Change (n = 4; 5.6%).

Table3. *Descriptive statistics of Processes of Change over time*

Processes of Change	Mean	Std. Deviation	N
Study Pretest	190.72	34.77	72
Study Posttest I	222.91	20.81	72
Study Posttest II	238.90	7.09	72
Control Pretest	195.98	43.44	72
Control Posttest I	180.16	9.15	72
Control Posttest II	195.93	13.48	72

N: Number, Std. Deviation: Standard Deviation

The study's findings show that the Processes of Change for the study group's participants have increased significantly and consistently (Pretest = 190.72, Posttest II = 222.91, Posttest II = 238.90, respectively). In contrast, there was a change in the control group participants' scores over time (Pretest = 195.98, Posttest II = 180.16, Posttest II = 195.93)

Table 4. *Multivariate Tests of the Within-subjects for the Processes of Change*

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
POC Study	Pillai's Trace	.716	88.316[b]	2.000	70.000	.000	.716
	Wilks' Lambda	.284	88.316[b]	2.000	70.000	.000	.716
	Hotelling's Trace	2.523	88.316[b]	2.000	70.000	.000	.716
	Roy's Largest Root	2.523	88.316[b]	2.000	70.000	.000	.716
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared

POC Control	Pillai's Trace	.472	31.309[b]	2.000	70.000	.000	.472
	Wilks' Lambda	.528	31.309[b]	2.000	70.000	.000	.472
	Hotelling's Trace	.895	31.309[b]	2.000	70.000	.000	.472
	Roy's Largest Root	.895	31.309[b]	2.000	70.000	.000	.472

a. Design: Intercept
Within Subjects Design: Processes of Change
b. Exact statistic
c. Computed using alpha = .05

The research and control groups' participants' values of the Processes of Change over time differ significantly (F = 88.316, df = 2, p <.05 vs. F = 31.309, df = 2, p <.05).

Table5. *Mauchly's Test of Sphericity for the Processes of Change*

Mauchly's Test of Sphericity[a]							
Measure: MEASURE_1							
Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
POC Study	.426	59.785	2	.000	.635	.642	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept
Within Subjects Design: POC Study
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

The sphericity assumption of the univariate approach to repeated-measures ANOVA is not violated by these data, as indicated by the significant results of the Mauchly's Test of Sphericity (p <.05. Therefore, we agree to the premise that there is equality in the variances of the level-to-level differences

Table 6. *Tests of within-subjects effects for the Processes of Change*

Measure: MEASURE_1						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared

POC Study	Sphericity Assumed	86721.694	2	43360.847	121.232	.000	.631
	Greenhouse-Geisser	86721.694	1.270	68264.004	121.232	.000	.631
	Huynh-Feldt	86721.694	1.283	67589.306	121.232	.000	.631
	Lower-bound	86721.694	1.000	86721.694	121.232	.000	.631
Error (POC Study)	Sphericity Assumed	50788.972	142	357.669			
	Greenhouse-Geisser	50788.972	90.197	563.086			
	Huynh-Feldt	50788.972	91.098	557.521			
	Lower-bound	50788.972	71.000	715.338			
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
POC Control	Sphericity Assumed	11970.194	2	5985.097	8.382	.000	.106
	Greenhouse-Geisser	11970.194	1.225	9767.999	8.382	.003	.106
	Huynh-Feldt	11970.194	1.236	9685.628	8.382	.003	.106
	Lower-bound	11970.194	1.000	11970.194	8.382	.005	.106
Error (POC Control)	Sphericity Assumed	101389.139	142	714.008			
	Greenhouse-Geisser	101389.139	87.007	1165.299			
	Huynh-Feldt	101389.139	87.747	1155.473			
	Lower-bound	101389.139	71.000	1428.016			

a. Computed using alpha = .05

For research group members, there was a significant difference (a priori p = 0.01) in the Processes of Change across time (F (1.270, 90.197) = 121.232, p = 0.01). For this study, the omnibus effect (measure of association) is.631, meaning that the variation in the administered intervention accounts for around 63% of the overall variance in the Processes of Change values. The Processes of Change over time showed a significant difference (a priori p = 0.01) for the control group (F (1.225, 87.007) = 8.382, p = 0.01). For this analysis, the omnibus effect (measure of association) is.106, meaning that chance accounts for around 10% of the total variance in the Processes of Change values.

Table7. *Descriptive statistics of Decisional Balance over time*

Decisional Balance	Mean	Std. Deviation	N
Study Pretest	50.50	8.43	72
Study Posttest I	59.50	5.31	72
Study Posttest II	90.63	9.56	72
Control Pretest	63.30	16.56	72
Control Posttest I	72.38	4.85	72
Control Posttest II	65.95	6.10	72

N: Number, Std. Deviation: Standard Deviation

The study's findings show that participants in the study group had Decisional Balance values (Pretest = 50.50, Posttest II = 59.50, Posttest II = 90.63) that were noticeably and consistently higher. However, these values fluctuated over time for participants in the control group (Pretest = 63.30, Posttest II = 72.38, Posttest II = 65.95), respectively.

Table 8. *Multivariate Tests of the Within-subjects for the Decisional Balance*

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
DB Study	Pillai's Trace	.910	355.253[b]	2.000	70.000	.000	.910
	Wilks' Lambda	.090	355.253[b]	2.000	70.000	.000	.910
	Hotelling's Trace	10.150	355.253[b]	2.000	70.000	.000	.910
	Roy's Largest Root	10.150	355.253[b]	2.000	70.000	.000	.910
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
DB Control	Pillai's Trace	.540	41.116[b]	2.000	70.000	.000	.540
	Wilks' Lambda	.460	41.116[b]	2.000	70.000	.000	.540
	Hotelling's Trace	1.175	41.116[b]	2.000	70.000	.000	.540
	Roy's Largest Root	1.175	41.116[b]	2.000	70.000	.000	.540

a. Design: Intercept
Within Subjects Design: Decisional Balance
b. Exact statistic
c. Computed using alpha = .05
DB: Decisional Balance

The Decisional Balance values for participants in the research and control groups show substantial variations over time ($F = 355.253$, $df = 2$, $p < .05$ vs. $F = 41.116$, $df = 2$, $p < .05$).

Table 9. *Pairwise comparison of the Decisional Balance values between study and control groups*

Pairwise Comparisons						
Measure: MEASURE_1						
(I) DB Study	(J) DB Study	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-9.000*	1.182	.000	-11.898	-6.102
	3	-40.139*	1.564	.000	-43.973	-36.305
2	1	9.000*	1.182	.000	6.102	11.898
	3	-31.139*	1.342	.000	-34.431	-27.847
3	1	40.139*	1.564	.000	36.305	43.973
	2	31.139*	1.342	.000	27.847	34.431
Measure: MEASURE_1						
(I) DB Control	(J) DB Control	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-9.083*	2.042	.000	-14.090	-4.077
	3	-2.653	2.194	.692	-8.031	2.726
2	1	9.083*	2.042	.000	4.077	14.090
	3	6.431*	.805	.000	4.456	8.405
3	1	2.653	2.194	.692	-2.726	8.031
	2	-6.431*	.805	.000	-8.405	-4.456

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

In both the posttest I (p =.000) and posttest II (p =.000), the participants' Decisional Balance in the study group during the pretest period is significantly different from such a DB. There is a statistically significant difference in the

DB in the posttest I and II (p =.000) compared to the pretest period (p =.000). A similar DB in the posttest II deviates significantly from those in the pretest period and the posttest I (p =.000 and p =.000), respectively.

In the case of the control group, the difference between the DB in the pretest period and that in the posttest I (p =.011) is statistically significant, but it is not different from that in the posttest II (p = 0.692). A statistical difference of p =.000 is observed between the DB in the posttest and that in the pretest time and posttest II. In the end, a DB like this in the posttest II differs from that in the posttest I (p =.000) but does not statistically differ from that in the pretest time (p = 0.692).

Table 10. *Descriptive statistics of Self-Efficacy over time*

Decisional Balance	Mean	Std. Deviation	N
Study Pretest	63.66	15.36	72
Study Posttest I	96.09	20.92	72
Study Posttest II	122.97	12.11	72
Control Pretest	90.37	22.50	72
Control Posttest I	96.84	7.17	72
Control Posttest II	100.00	6.62	72

N: Number, Std. Deviation: Standard Deviation

According to the study's findings, participants in the study group had significantly and consistently higher levels of self-efficacy (pretest = 63.66, posttest II = 96.06, posttest II = 122.97). Whereas these values (Pretest = 90.37, Posttest II = 96.84, Posttest II = 100.00) varied with time for participants in the control group.

Table 11. *Pairwise comparison of the Self-Efficacy values between study and control groups*

Pairwise Comparisons						
Measure: MEASURE_1						
(I) SE Study	(J) SE Study	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-32.431*	3.200	.000	-40.277	-24.584
	3	-59.306*	2.438	.000	-65.284	-53.327
2	1	32.431*	3.200	.000	24.584	40.277
	3	-26.875*	1.926	.000	-31.598	-22.152
3	1	59.306*	2.438	.000	53.327	65.284
	2	26.875*	1.926	.000	22.152	31.598
Measure: MEASURE_1						

(I) SE Control	(J) SE Control	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	-6.472	2.697	.057	-13.085	.140
	3	-9.625*	2.810	.003	-16.516	-2.734
2	1	6.472	2.697	.057	-.140	13.085
	3	-3.153*	.908	.003	-5.380	-.926
3	1	9.625*	2.810	.003	2.734	16.516
	2	3.153*	.908	.003	.926	5.380

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

In both posttest I (p =.000) and posttest II (p =.000), participants' self-efficacy in the study group during the pretest period is statistically different from such a SE. A statistical difference is observed between the SE in the posttest I and that in the pretest time (p =.000 and posttest II, p =.000). A SE like this in the posttest II deviates statistically from those in the pretest period and the posttest I (p =.000 and p =.000).

In the case of the control group, the difference between the SE in the pretest period and that in the posttest I (p =.057) is not statistically significant, but it is in the posttest II (p = 0.003). A SE like this in the posttest is different from that in posttest II (p =.003) but not from that in the pretest time (p =.057). In the end, there is a statistical difference between the SE in the posttest II and the pretest period (p = 0.003) and the posttest I (p =.003).

Discussion

The purpose of this experimental, randomized controlled study is to evaluate the effectiveness of a stage-matched intervention based on female pupils in intermediate schools. adherence to a nutritious diet The study's findings show that, in the control group during the pretest period, the majority of participants were in the Precontemplation Stage of Change, fewer than 25% were in the Preparation Stage of Change, and the remaining participants were

divided into three categories: Contemplation, Action, and Maintenance Stages of Change.

The results of the posttest I showed that over half of the participants were in the Precontemplation Stage of Change, less than 25% were in the Preparation Stage of Change, and then there were those in the Contemplation Stage of Change, those in the Action Stage of Change, and none in the Maintenance Stage of Change. More than half of the participants in the posttest II were in the Precontemplation Stage of Change, fewer than 25% were in the Action Stage of Change, and the remaining participants were in the Preparation, Contemplation, and Maintenance Stages of Change.

Around one-third of the participants were in the Action Stage of Change for consuming high-fat foods during the pretest and posttest I, according to the study results for the study group. This was followed by one person in the Precontemplation Stage of Change, one participant in the Maintenance Stage of Change, and a third participant in the Preparation Stage of Change. In the second posttest, less than half of the participants were in the preparation stage, third were in the action stage, fourth were in the maintenance stage, and one was still in the contemplation stage

The study's findings showed that, over time, the proportion of participants in the study group who were in the Precontemplation Stage for consuming high-fat foods decreased by 19.4%. Additionally, the proportion of research group members in the Preparation Stage of Change for consuming high-fat meals over time decreased by 16.6%. Over time, there was a 16.7% increase in the proportion of study participants who were in the Maintenance Stage for consuming high-fat foods. These results demonstrate the effectiveness of the Stage-matched intervention that was implemented.

These results conflict with those of Rossi (1994), who found that for dietary fat reduction, over half of the female participants were in the Maintenance Stage of Change (n = 74; 57.8%), followed by those in the Precontemplation Stage of Change (n = 27; 21.1%),

Contemplation Stage of Change (n = 24; 18.8%), and Action Stage of Change (n = 3; 2.3%).

Descriptive data of the Processes of Change for the study group's participants (Pretest = 190.72, Posttest II = 222.91, Posttest II = 238.90) indicate a significant and consistent growth over time. The control group participants' scores, on the other hand, changed with time (Pretest = 195.98, Posttest II = 180.16, Posttest II = 195.93). The research and control groups' participants' values of the Processes of Change over time differ significantly ($F = 88.316$, $df = 2$, $p < .05$ vs. $F = 31.309$, $df = 2$, $p < .05$).

The study group participants exhibited a noteworthy variation in their Processes of Change over a prolonged period. For this study, the omnibus effect (measure of association) is.631, meaning that the variation in the administered intervention accounts for around 63% of the overall variance in the Processes of Change values. The Processes of Change over Time differed significantly for the control group. For this analysis, the omnibus effect (measure of association) is.106, meaning that chance accounts for around 10% of the total variance in the Processes of Change values.

Pairwise comparison of the Change Value Processes of the Study and Control Groups In the pretest phase, the study group's Processes of Change in Posttest I ($p = .001$) and Posttest II ($p = .000$) demonstrated a statistically significant difference from these POC. These POC statistically differ from those in the posttest I in the pretest period ($p = .001$) and posttest II ($p = .000$). The POC from the posttest II and the pretest period and the posttest I varied statistically significantly ($p = .000$).

POC in the control group did not significantly vary from these POC in the posttest I ($p = .011$), but they did in the posttest II ($p = 1.000$) during the pretest period. Between these POC, there is a statistically significant difference in the pretest time ($p = .000$) and posttest ($p = .011$). Ultimately, the POC in the posttest II show a statistically significant difference from those in the posttest I ($p = .000$), but not from those in the pretest time ($p = 1.000$).

There was a noticeable difference in the Processes of Change over Time for the study group members. This study's omnibus effect is.631, which indicates that almost 63% of the variance in the Processes of Change values can be attributed to variations in the intervention that was given. Pairwise comparison analysis showed that there were temporal fluctuations in their values. These findings demonstrate that the effects of the TTM-based Stage-matched intervention remained stable over time.

For the control group, the processes of change over time were very different. This study's omnibus effect is.106, which indicates that roughly 10% of the variance in the Processes of Change values can be attributed to chance.

Statistics on descriptive self-efficacy The Self-Efficacy scores of the study group's participants (Pretest = 63.66, Posttest II = 96.06, Posttest II = 122.97) demonstrate a noticeable, progressive improvement over time. For individuals in the control group, these values did, however, change with time (Pretest = 90.37, Posttest II = 96.84, Posttest II = 100.00), respectively. Pairwise comparisons were made between the study and control groups' levels of self-efficacy. Participants' self-efficacy in the study group during the pretest period is significantly different from such a SE in both posttest I (p =.000) and posttest II (p =.000). There is a statistically significant difference between the SE in posttest I and posttest II (p =.000 and p =.000), compared to the SE in the pretest period.

A similar SE in the posttest II deviates statistically from those in the pretest period and the posttest I (p =.000 and p =.000),

For the control group, there is a statistically significant difference (p = 0.003) between the SE in the posttest II (p = 0.003) and that in the pretest period (p =.057). Similar SEs in the posttest and posttest II (p =.003) differ from one other, but not from the pretest period (p =.057). Ultimately, a statistical difference is observed between the SE in the posttest I (p =.003) and the posttest II and the pretest period (p = 0.003).

The study group's participants exhibited a noteworthy variation in their Self-Efficacy over time. The omnibus effect for

this analysis was.789, signifying that the administered intervention accounted for approximately 78% of the total variance in the Self-Efficacy values. An omnibus effect of.113 for the control group's self-efficacy analysis suggests that there was a significant difference in self-efficacy over time. This means that chance accounts for around 11% of the total variance in the self-efficacy values. These results demonstrate how effective the Stage-matched intervention was in boosting students' self-confidence in reducing dietary fat.

The study's theoretical implications suggest that this is the first study in the world to use the TTM as a foundation for delivering a dietary fat reduction intervention to a group of "female adolescents." The practical researchers believe that the current study can be replicated in several locations across the globe.

Reference

1. Raymond K, Morrow K. Krause and Mahan’s Food & The Nutrition Care Process. 15th ed. S.L.: Saunders; 2021.
2. Afaghi A, O’Connor H, Chow CM. Acute effects of the very low carbohydrate diet on sleep indices. Nutritional Neuroscience. 2008 Aug;11(4):146–54.Wu Q. Cancer care: What are the priorities? The Lancet Oncology. 2001 Oct 1;2(10):639.
3. Greene GW, Redding CA, Prochaska JO, Paiva AL, Rossi JS, Velicer WF, et al. Baseline transtheoretical and dietary behavioral predictors of dietary fat moderation over 12 and 24 months. Eating behaviors [Internet]. 2013 Jan 1 [cited 2024 Mar 21];14(3):255–62. Available from: https://search-ebscohost-com.ezproxy.okcu.edu/login
.aspx?direct=true&db=cgh&AN=CN-01122216&site=ehost-live
4. Mcardle WD, Katch FI, Katch VL. Exercise physiology: Nutrition, energy, and human performance. 8th ed. Philadelphia Etc.: Wolters Kluwer Health, Cop; 2015
5. Al-Mayahi AM, Al-Jubouri MB, Jaafar SA. Healthy lifestyle behaviors and risk of cardiovascular diseases among nursing faculty during COVID-19 Pandemic. Revista Brasileira de Enfermagem. 2023 Oct 9;76:e20220372.
6. Baktash MQ, Naji AB. Efficacy of health belief model in enhancing exercise behavior to preventing stroke among geriatrics homes residents in Baghdad city. Indian Journal of Public Health Research & Development. 2019 Feb;10(02):928-33.

7. U.S. Department of Health & Human Services. (2023, March 2).
8.Petersen KEN, Johnsen NF, Olsen A, Albieri V, Olsen LKH, Dragsted LO, et al. The combined impact of adherence to five lifestyle factors on all-cause, cancer and cardiovascular mortality: a prospective cohort study among Danish men and women. British Journal of Nutrition [Internet]. 2015 Mar 14 [cited 2024 Jun 13];113(5):849–58. Available from: https://search-ebscohost-com.ezproxy.okcu.edu/login.aspx?direct=true&db=cul&AN=103781598&site=ehost-live
9. Mousa AM, Mansour K. Effectiveness of an Instructional Program Concerning Healthy Lifestyle on Patients' Attitudes after Percutaneous Coronary Intervention at Cardiac Centers in Baghdad City. Iraqi National Journal of Nursing Specialties. 2020 Jun 30;33(1):1-1.
10. 8. U.S. Department of Health & Human Services. (2020, June 6). *NCHS: A Blog of the National Center for Health Statistics*. Retrieved May 11, 2024, from Centers for Disease Control and Prevention [CDC]: https://blogs.cdc.gov/nchs/2020/06/05/6971/
11. *National Center for Chronic Disease Prevention and Health Promotion: About the Center*. Retrieved May 11, 2024, from Centers for Disease Control and Prevention [CDC]: https://www.cdc.gov/chronicdisease/center/
12. Hameed RS, Faraj RK. Efficacy of A Theory-Based Health Education in Enhancing High School Female Student's Preconception Health Behaviors in Baghdad City. Indian Journal of Public Health Research & Development. 2018 Dec;9(12):895-900.
13. Brannon L, Feist J, Updegraff JA. Health psychology: An introduction to behavior and health. Vancouver, B.C.: Langara College; 2017.
13. Jimmy B, Jose J. Patient Medication Adherence: Measures in Daily Practice. Oman Medical Journal [Internet]. 2011;26(3):155–9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3191684/
14. Petersen KEN, Johnsen NF, Olsen A, Albieri V, Olsen LKH, Dragsted LO, et al. The combined impact of adherence to five lifestyle factors on all-cause, cancer and cardiovascular mortality: a prospective cohort study among Danish men and women. British Journal of Nutrition [Internet]. 2015 Mar 14 [cited 2024 Jun 13];113(5):849–58. Available from: https://search-ebscohost-com.ezproxy.okcu.edu/login.aspx?direct=true&db=cul&AN=103781598&site=ehost-live
15. Prochaska JO. Population Treatment for Addictions. Current Directions in Psychological Science. 2004 Dec;13(6):242–6.
16. Riekert KA, Ockene JK, Pbert L. The handbook of health behavior change, 4th Edition. Springer Publishing Company; 2013

17. Jimmy B, Jose J. Patient Medication Adherence: Measures in Daily Practice. Oman Medical Journal [Internet]. 2011;26(3):155–9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3191684/
18. Kader MM, Faraj RK. Health Belief Model Efficacy on improving hypertension control among old age at Kirkuk City, Iraq: A Randomized Controlled Trial. Rawal Medical Journal. 2023 Sep 10;48(3):770-.
19. Jasim AH, Majeed HM, Mohammed TR. Knowledge and protective health behaviors concerning risk factors for coronary heart disease among Baghdad University students. Medico Legal Update. 2020 Apr 1;20(2):234-9.
20.. Baji DM, Mohammed QQ. Eating Disorders and its Related Factors among Adolescents at Secondary Schools in Al-Basra City. Indian Journal of Forensic Medicine & Toxicology. 2019 Jul 1;13(3):313.
21. Jessor R, Springerlink (Online Service. Problem behavior theory and adolescent health: The Collected Works of Richard Jessor, Volume 2. Cham: Springer International Publishing; 2017.
22. Ali Basha AA, Naji AB. Processes of Change for Weight Control Behavior among Collegians. Indian Journal of Public Health Research & Development. 2019 Sep 1;10(9).
23. Baqer H. Obesity and Overweight among Employees of Medical Technical Institute/Baghdad. Iraqi National Journal of Nursing Specialties. 2008;21(1):66-73.
24. Kader MM, Faraj RK. Health Belief Model Efficacy on improving hypertension control among old age at Kirkuk City, Iraq: A Randomized Controlled Trial. Rawal Medical Journal. 2023 Sep 10;48(3):770-.
25. Khalifa, M. (2016). Evaluation of Youth's Health Risk Behaviors in Baghdad City. Iraqi National Journal of Nursing Specialties, 29(1), 119–128. https://doi.org/10.58897/injns.v29i1.248
26. Hoch, T., Pischetsrieder, M., and Hess, A. (2014). Snack food intake in ad libitum
fed rats is triggered by the combination of fat and carbohydrates. Front. Psychol.
5:250. doi: 10.3389/fpsyg.2014.00250
27. Smith, P. M., Hindmarch, C. C. T., Murphy, D., and Ferguson, A. V. (2014).
AT1 receptor blockade alters nutritional and biometric development in obesityresistant and obesity-prone rats submitted to a high fat diet. Front. Psychol.
5:832.doi: 10.3389/fpsyg.2014.00832
28.Perello, M., Valdivia, S., Garcia Romero, G., and Raingo, J. (2014). Considerations about rodent models of binge eating episodes. Front. Psychol. 5:372. doi:

10.3389/fpsyg.2014.00372.
29. Messina, G., Dalia, C., Tafuri, D., Monda, V., Palmieri, F., Dato, A., et al. (2014).
Orexin-A controls sympathetic activity and eating behavior. Front. Psychol. 5:997. doi: 10.3389/fpsyg.2014.00997
30. Rossetti, C., Halfon, O., and Boutrel, B. (2014). Controversies about a common etiology for eating and mood disorders. Front. Psychol. 5:1205. doi: 10.3389/fpsyg.2014.01205
31. McKenzie, F., Biessy, C., Ferrari, P., Freisling, H., Rinaldi, S., Chajès, V., et al. (2016). Healthy lifestyle and risk of cancer in the european prospective investigation into cancer and nutrition cohort study. Medicine, 95(16), e2850.
32. Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. Nature, 515(7528), 518-522.
33. World Health Organization (2010). Global recommendations on physical activity for health. Geneva, Switzerland: WHO Press. Retrieved from http://www.who.int/dietphysicalactivity/factsheet_adults/en/
34. Mohammed, Q. Q. (2023). Association between Parental Treatment and Aggressive Behaviors among Adolescent Students. *Iraqi National Journal of Nursing Specialties*, *36*(1), 36-42.
35.Najm, S. H., & Mousa, A. A. A. H. (2018). Knowledge of Paramedical Staff Regarding Drugs Addiction in Baghdad City/Iraq. *Iraqi National Journal of Nursing Specialties*, *31*(1).
36.Jalil, M., & Jabbar, W. (2020). Impact of Smartphones Addiction upon Primary School Pupil's Achievements at Al-Rusafa Educational Directorate in Baghdad City. *Iraqi National Journal of Nursing Specialties*, *33*(2), 85-97.
37.Kareem, H. N., & Ali, E. G. (2017). Impact of Using Social Media upon the Mental Health of Adolescent Students of preparatory Schools in Al-Diwanyah City. *Iraqi National Journal of Nursing Specialties*, *30*(2).