Kufa Journal for Nursing Sciences
Open Access Full Text Article

Publisher
University of Kufa, Faculty of Nursing

Received: 09 March, 2023
Accepted: 08 February, 2023
Published: 11 January, 2023
Vol. 13(1), 2023: 46 – 53

https://doi.org/10.36321/kjns.vi20231.11444

ORIGINAL RESEARCH

Using the Trans Theoretical Model of Change to Understand Collegians' Whole Grains Consumption

Mohammed Baqer Habeeb Abd Ali

Community Health Nursing Department, College of Nursing, University of Baghdad, Iraq.

ABSTRACT

Background: Young people who develop good habits will find it simpler to keep them than to subsequently change their ways. Despite their great importance to human-beings' health, large number still do not consume the recommended amount of whole grains.

Objectives: This study aims to (1) identify university students' readiness to consume whole grains and (2) investigate the differences in students' Pros, Cons, and Self-Efficacy for consuming whole grains between the groups of gender, living arrangement, and body mass index categories.

Methodology: A descriptive design was used to guide this study. Data were collected for the period from October 10th, 2022 to December 20th, 2022. The study included a convenience sample of 540 undergraduate students who were recruited from humanistic colleges from four public universities in Baghdad City. The study instrument includes participants' sociodemographic characteristics and body mass index, The Stages of Change Scale for Whole Grain Consumption, and The Self-Efficacy Scale for Whole Grain Consumption. Data were analyzed using the statistical package for social science for windows, version 26.

Results: The study results revealed that more than a half are in the Contemplation Stage of Change for whole grains consumption, followed by those who are in the Preparation Stage, and those who are in the Maintenance Stage. There is a statistically significant difference in the Self-Efficacy of whole grains consumption between gender groups. There is a statistically significant difference in the Pros of whole grains consumption among the body mass index groups.

Conclusion: More than a half still do not intend to consume whole grains. The higher the body mass index, the greater the Pros of whole grains consumption.

CORRESPONDING AUTHOR: Mohammed Baqer Habeeb Abd Ali, Community Health Nursing Department, College of Nursing, University of Baghdad, Iraq. Email: **mohammed.b@conursing.uobaghdad.edu.iq.**

Keywords: Transtheoretical Model of Change, Whole Grains Consumption.

How to Cite: Abd Ali, M. B. (2023). Using the transtheoretical model of change to understand collegians' whole grains consumption. *Kufa Journal for Nursing Sciences, 13*(1), pp: 46 - 54. doi.10.36321/kjns.vi20231.11444

INTRODUCTION

Dietary recommendations in a number of countries advise people to eat more whole grains (WCGs) (Mckeown et al., 2013). Whole grain consumption has consistently been related to reductions in metabolic syndrome (MetS), a collection of various metabolic illnesses including obesity, dyslipidemia, hypertension, and hyperglycemia or Type 2 diabetes, for which an epidemic is emerging globally (Rebello, Greenway, & Finley, 2014). The benefits of consuming whole grains can be mediated by one or more processes, making it difficult to prove causality in this area. Whole cereal diets can prevent or minimize metabolic syndrome in people and animal models (Rebello et al., 2014).

When compared to processed cereal grains, WCGs are higher in a number of potentially beneficial chemicals that are existed in the bran, the grain's outer layer (Liu, 2007; Vrieze et al., 2012). Dietary fibers, minerals, polyphenols, phytosterols, and vitamins found in whole grains may work together in a synergistic manner to mediate the protective effects of several processes (Rosa-Sibakov, Poutanen, & Micard, 2015).

The amount of data that is currently available on the composition and functions of the gut microbiota has expanded enormously over the last ten to fifteen years as a result of recent developments in "omic" technologies. A growing body of research has demonstrated that certain MetS in humans, such as diabetes, obesity, and insulin resistance, are correlated with the diversity and composition of the gut microbiota. Those with low taxonomic richness (23%–40% of the population), for instance, differ from those with high bacterial richness in that they have more significant general obesity, insulin resistance, dyslipidemia, and an increased inflammatory phenotype (Le Chatelier et al., 2013). In addition, alterations in the Firmicutes to Bacteroidetes ratio, which are transmissible, may occur in the composition of the human gut microbiota in obese people compared to lean ones. Turnbaugh et al. (2006) and Turnbaugh, Bäckhed, Fulton, and Gordon (2008) revealed that colonization of germ-free mice with gut microbiota from donors with obesity resulted in a significant rise in body fat content and insulin resistance. They also discovered that the microbiome of fat people was better able to use the diet's energy sources.

On the other hand, the low gene count participants' gene richness increased after a 6-week energy-restricted, high-protein diet. Importantly, the improvement in systemic metabolic status was linked to an increase in gene richness, which included a significant reduction in hip circumference, total body fat mass, circulating cholesterol, and a trend toward a reduction in highly sensitive C-reactive protein (Cotillard et al., 2013).

Transplanting the gut microbiota of healthy donors into human volunteers with obesity could increase their systemic insulin sensitivity in just six weeks (Vrieze et al., 2012). These findings imply that host metabolism and related diseases are correlated with the composition and activity of the gut microbiota. Thus, methods that emphasize the gut microbiome provide potential new options for therapeutic interventions.

In order to help people choose nutritious foods and lower their risk of developing chronic diseases, the United States Departments of Agriculture (USDA) and Health and Human Services (DHHS) together support the interactive website MyPlate (U.S. Department of Agriculture: Food and Nutrition Service, 2021). This website lists 12 meal plans with daily caloric intakes between 1,200 and 3,200, enabling users to match their energy intake to their degree of physical activity. The five food groups—grain/cereal, dairy, meat/meat alternatives, fruit/juice, vegetable/juice—as well as the fats/oils/sweets group—all come with recommended serving sizes

(referred to as discretionary calories). These dosages are suggested based on the chosen eating strategy.

The Dietary Reference Intake (DRI) is an umbrella of nutrient guidelines that was introduced jointly by the United States Institute of Medicine (IOM) and Health Canada at 1998 instead of the recommended daily allowance (Raymond & Morrow, 2021). The DRI focuses on risk reduction rather than disease management, similar to the MyPylate/MyPlat website. The Transtheoretical Model of Change (TTM) is one theoretical framework that has been utilized frequently to pinpoint psychosocial variables linked to dietary compliance (Glanz, Rimer, & Viswanath, 2015).

The Transtheoretical Model of Change is a framework for understanding intentional behavior change that outlines the stages people go through or readiness to take action (Stages of Change) and the strategies they employ Decisional Balance (benefits to and detractors from changing a behavior), Self-Efficacy (personal confidence in making a change), and Processes of Change (cognitive, affective, and behavioral activities facilitating change) (Edelman & Kudzma, 2018). This model describes how individuals alter their behavior (DiClemente, Salazar, & Crosby, 2019). This study is the first both in Iraq and Middle East region that seeks to employ the TTM to understand university students' readiness to consume whole grains.

AIMS OF THE STUDY

This study aims to (1) identify university students' readiness to consume whole grains and (2) investigate the differences in students' Pros, Cons, and Self-Efficacy for consuming whole grains between the groups of gender, living arrangement, and body mass index categories.

METHODOLOGY

Study Design: A descriptive design was used to guide this study.

Setting: This study was conducted in the public universities in Baghdad City.

Data Collection: Data were collected using an in-hand, self-reported study instrument for the period from October 10th, 2022 to December 20th, 2022.

Sample and Sampling: The study included a convenience sample of undergraduate students who were recruited from humanistic colleges from four public universities in Baghdad City. The sample size was calculated using the G*Power software.

Measures: The study instrument includes participants' age, gender, living arrangement, and body mass index.

The Stages of Change Scale for Whole Grain Consumption:

The Stages of Change Scale for Whole Grain Consumption (Maina, 1994) measures individuals' distribution according to the Stages of Change for whole grains consumption namely Precontemplation, Contemplation, Preparation, Action, Maintenance). This scale asks participants to select one answer only which represents one of the aforementioned stages. It also includes the Decisional Balance Scale for Whole Grain Consumption which falls into the Pros (benefits) and Cons (cost) of for whole grain consumption (Maina, 1994). The Pros (10 items) and Cons (10 items) highlighted respondents' perceptions of barriers and benefits important in their decision to increase consumption of fruits, vegetables, and grain products.

These items were measured using a on a five-point Likert type scale ranging from one for (not important at all) to five for (very important). The scores of Cons range from 10 to 50. Higher scores indicate greater Cons of the whole grains. The scores of Pros range from 10 to 50. Higher scores indicate greater Pros of the whole grains. The Decisional Balance Scale has demonstrated good internal consistency reliability where the Cronbach's alpha for the Con scale for whole grain products was 0.73 (Maina, 1994). The Decisional Balance Scale has

demonstrated good content validity and concurrent validity.

The Self-Efficacy Scale for Whole Grain Consumption: Self-Efficacy is situation-specific confidence that young adults can consume the recommended amounts of grain products. The Self-Efficacy Scale for Whole Grain Consumption (Maina, 1994). includes 20 items that are measured on a visual analog scale that ranges from one for (not confident at all) to nine for (very confident). The scores of Self-Efficacy range from 20 to 180. Higher scores indicate greater self-confidence for consuming the aforementioned foods.

The Self-Efficacy Scale has demonstrated a high internal consistency reliability where the Cronbach's alpha was 90.33 and good content validity and concurrent validity (Maina, 1994).

A pilot study was conducted among (50) students for the period from October 2nd, 2022 to October 4th, 2022. The sample of the pilot study was later excluded from the original sample of the study.

Ethical considerations: This study was approved by the Ethical Committee for Scientific Research at the University of Baghdad, College of Nursing. The researcher obtained the participants' agreement to enroll in this study using an informed consent form.

Statistical Analyses: Data were analyzed using the statistical package for social science (SPSS) for windows, version 26. The statistical measures of frequency, percent, mean, standard deviation, Independent-Sample T-Test, one-way analysis of variance (ANOVA) were used.

RESULTS

Table (1): Participants' sociodemographic characteristics (N=540)

Variable	Frequency	Percent
Age (Years)		
18-21	222	41.1
22-25	244	45.2
26-30	74	13.7
Mean (SD): 22.46 ± 2.88		
Gender		
Male	184	34.1
Female	356	65.9
Grade		
First	166	30.7
Second	74	13.7
Third	111	20.6
Fourth	123	22.8
Fifth	43	8.0
Sixth	23	4.3
Residency		
Urban	336	62.2
Rural	83	15.4
Suburban	121	22.4

SD: Standard deviation

The study results display that the mean age is 22.46 ± 2.88; less than a half age 22-25-years (n = 244; 45.2%), followed by those who age 18-21-years (n = 222; 41.1%), and those who age 26-30-years (n = 74; 13.7%). Concerning the students' gender, most are females (n = 356; 65.9%) compared to males (n = 184; 34.1%).

Regarding the grade, less than a third are third graders (n = 166; 30.7%), followed by those who are fourth graders (n = 123; 22.8%), those who are third graders (n = 111; 20.7%), those who are second graders (n = 74; 13.7%), those who are fifth graders (n = 43; 8.0%), and those who are sixth graders (n = 23; 4.3%). As per the living arrangement, most reported that they live with their parents (n = 412; 76.3%), followed by those who both live with their mothers and relatives (n = 59; 10.9%) for each of them, and those who live with their father (n = 10; 1.9%). With respect to the residency, most reported that they have been living in urban areas (n = 336; 62.2%), followed by those who have been living in suburban areas (n = 121; 22.4%), and those who have been living in rural areas (n = 83; 15.4%).

Table (2): Participants distribution according to their body mass index (N = 540)

Variable	Frequency	Percent
Underweight	32	5.9
Within normal	353	65.4
Overweight	128	23.7
Obesity Class I	17	3.1
Obesity Class II	10	1.9

Most are within normal height-to-weight proportion (n = 353; 65.44%), followed by those who are overweight (n = 128; 23.7%), those who are underweight (n = 32; 5.9%), those who have obesity class I (n = 17; 3.1%), and those who have obesity class II (n = 10; 1.9%).

Table (3): Participants distribution according to their Stages of Change for consuming whole grains (N = 540)

Variable	Frequency	Percent
Contemplation	271	50.2
Preparation	137	25.4
Maintenance	132	24.4

More than a half are in the Contemplation Stage of Change for whole grains consumption (n = 271; 50.2%), followed by those who are in the Preparation Stage (n = 137; 25.4%), and those who are in the Maintenance Stage (n = 132; 24.4%).

Table (4): Differences in the Pros, Cons, and Self-Efficacy of whole grains consumption between gender groups

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pros	**Equal variances assumed**	1.319	.251	-.866	538	.387	-.58287	.67328	-1.90545	.73972
	Equal variances not assumed			-.843	344.258	.400	-.58287	.69134	-1.94266	.77692
Cons	**Equal variances assumed**	.122	.727	-.228	538	.820	-.11663	.51165	-1.12170	.88844

	Equal variances not assumed			-.222	344.859	.824	-.11663	.52503	-1.14930 .91603
Self-Efficacy	Equal variances assumed	2.383	.123	-2.158	538	.031	-6.13715	2.84435	-11.72454 -.54977
	Equal variances not assumed			-2.208	394.197	.028	-6.13715	2.78000	-11.60263 -.67168

df: Degree of freedom; F: F-statistics; Sig.: Significance; Std. Error Difference: Standard Error Difference.

The study results display that there is a statistically significant difference in the Self-Efficacy of whole grains consumption between gender groups (p-value = .031).

Table (5): Differences in the Pros and Cons of whole grains consumption among the grade groups.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Pros	Between Groups	194.133	5	38.827	.704	.620
	Within Groups	29430.821	534	55.114		
	Total	29624.954	539			
Cons	Between Groups	136.427	5	27.285	.860	.508
	Within Groups	16949.499	534	31.741		
	Total	17085.926	539			
Self-Efficacy	Between Groups	1765.427	5	353.085	.355	.879
	Within Groups	530788.121	534	993.985		
	Total	532553.548	539			

df: Degree of freedom; F: F-statistics; Sig.: Significance

The study results reveal that there is no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the grade groups.

Table (6): Differences in the Pros and Cons of whole grains consumption among the living arrangement groups

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Pros	Between Groups	279.055	3	93.018	1.699	.166
	Within Groups	29345.898	536	54.750		
	Total	29624.954	539			
Cons	Between Groups	57.040	3	19.013	.598	.616
	Within Groups	17028.886	536	31.770		
	Total	17085.926	539			
Self-Efficacy	Between Groups	1286.915	3	428.972	.433	.730
	Within Groups	531266.633	536	991.169		
	Total	532553.548	539			

df: Degree of freedom; F: F-statistics; Sig.: Significance

The study results reveal that there is no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the living arrangement groups.

Table (7): Differences in the Pros and Cons of whole grains consumption among the residency groups

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Pros	**Between Groups**	10.145	2	5.073	.092	.912
	Within Groups	29614.809	537	55.149		
	Total	29624.954	539			
Cons	**Between Groups**	112.745	2	56.373	1.784	.169
	Within Groups	16973.181	537	31.607		
	Total	17085.926	539			
Self-Efficacy	**Between Groups**	2692.011	2	1346.006	1.364	.256
	Within Groups	529861.537	537	986.707		
	Total	532553.548	539			

df: Degree of freedom; F: F-statistics; Sig.: Significance

The study results reveal that there is no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the residency groups.

Table (8): Differences in the Pros and Cons of whole grains consumption among the body mass index groups

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Pros	**Between Groups**	618.436	4	154.609	2.852	.023
	Within Groups	29006.517	535	54.218		
	Total	29624.954	539			
Cons	**Between Groups**	58.424	4	14.606	.459	.766
	Within Groups	17027.502	535	31.827		
	Total	17085.926	539			
Self-Efficacy	**Between Groups**	4645.901	4	1161.475	1.177	.320
	Within Groups	527907.647	535	986.743		
	Total	532553.548	539			

df: Degree of freedom; F: F-statistics; Sig.: Significance

The study results exhibit that there is a statistically significant difference in the Pros of whole grains consumption among the body mass index groups (p-value = .023).

Table (9): Differences in the Pros and Cons of whole grains consumption among the Stages of Change groups

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Pros	**Between Groups**	147.728	2	73.864	1.346	.261
	Within Groups	29477.226	537	54.892		
	Total	29624.954	539			
Cons	**Between Groups**	127.993	2	63.996	2.027	.133

	Within Groups	16957.933	537	31.579		
	Total	17085.926	539			
Self-Efficacy	**Between Groups**	1449.229	2	724.615	.733	.481
	Within Groups	531104.319	537	989.021		
	Total	532553.548	539			

df: Degree of freedom; F: F-statistics; Sig.: Significance

The study results reveal that there is no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the Stages of Change groups.

DISCUSSION

This study seeks to employ the TTM to understand university students' readiness to consume whole grains. The study findings revealed that more than a half are in the Contemplation Stage of Change for whole grains consumption, followed by those who are in the Preparation Stage, and those who are in the Maintenance Stage. These findings are almost is lesser than that reported De vet et al. (2005) who stated that (74.3% were in the Precontemplation Stage of Change for whole grain consumption; Maina, 1994) who reported that 47.8% of the study participants were in the Precontemplation Stage of Change for whole grain consumption, 53% were in the Contemplation Stage, 13.9% were in the Preparation Stage of Change, 10.4% were in the Action Stage of Change, and 22.6% were in the Maintenance Stages of Change. These finding reflect that the study participants do not considering change and are aware of but not considering change soon (Edelman & Kudzma, 2018).

The study results displayed that there was a statistically significant difference in the Self-Efficacy of whole grains consumption between gender groups. Further group statistics demonstrate that female students enjoy better Self-Efficacy of consuming whole grains than male students. This finding could be explained as that females take greater care for themselves possibly for aesthetic purposes and to have better preconception health.

The study results reveal that there was no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the grade groups. This finding reflects the reality that the theoretical knowledge they receive throughout their academic journey do not better their health awareness pertinent to the benefits of consuming whole grains. In other words, the academic courses that they take may not incorporate and emphasize the health education about the vital role of healthy diet including the regular consumption of whole rain.

The study results reveal that there was no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the residency groups. This finding could reflect the shift in dietary patterns in that individuals who were reside in rural areas in Iraq were devoting special attention to depend on the crops they gain from their farms including the grains within the last two decades.

The study results exhibit that there was a statistically significant difference in the Pros of whole grains consumption among the body mass index groups. Further post-hoc analysis displayed that students with obesity class I recognize greater Pros of whole grains consumption. This finding could be explained as that these students seek to manage their weight and consuming whole grain, from their perspective, whole grains can help them loss their weight.

The study results reveal that there is no statistically significant difference in the Pros and Cons, and Self-Efficacy of whole grains consumption among the Stages of Change groups.

RECOMMENDATIONS

The researcher recommends considering this study as a foundation for future empirical studies that need to establish theory-based intervention with the goal of bettering collegians' adherence to regular consumption of whole grains.

REFERENCES:

Cotillard, A., Kennedy, S. P., Kong, L. C., Prifti, E., Pons, N., Le Chatelier, E., ... Ehrlich, S. D. (2013). Dietary intervention impact on gut microbial gene richness. *Nature*, 500(7464), 585–588.

de Vet, E., de Nooijer, J., de Vries, N. K., & Brug, J. (2005). Stages of change in fruit intake: A longitudinal examination of stability, stage transitions and transition profiles. *Psychology & Health*, 20(4), 415–428.https://doi-org.ezproxy.okcu.edu/10.1080/14768320500051425.

DiClemente, R. J., Salazar, L. F., & Crosby, R. A. (2019). *Health behavior theory for public health: Principles, foundations, and applications (Second ed.)*. Jones & Bartlett Learning.

Edelman, C. L., & Kudzma, E. C. (2018). *Health promotion throughout the life span* (9 ed.). St. Louis, Missouri, USA: Elsevier, Inc.

Glanz, K. A. R. E. N., Rimer, B. K., & Viswanath, K. (2015). *Health behavior. Theory, research, and practice, 5,* San Francisco, CA, USA: Jossey-Bass.

Le Chatelier, E., Nielsen, T., Qin, J., Prifti, E., Hildebrand, F., Falony, G., ... Kennedy, S. (2013). Richness of human gut microbiome correlates with metabolic markers. *Nature*, 500(7464), 541–546.

Liu, R. H. (2007). Whole grain phytochemicals and health. *Journal of Cereal Science*,46(3), 207–219.

Maina, S. N. (1994). *Application of the transtheoretical model of behavior change to consumption of fruits, vegetables, and grain products among young adults* (Order No. 9924743). Available from ProQuest Dissertations & Theses Global. (304518900).

Mckeown, N. M., Jacques, P. F., Seal, C. J., De, V. J., Jonnalagadda, S. S., Clemens, R., ...Topping, D. (2013). Whole grains and health: From theory to practice—Highlights of the Grains for Health Foundation's Whole Grains Summit 2012. *Journal of Nutrition*,143(5), 744S.

Raymond, J. L., & Morrow, K. (2021). *Krause and Mahan's Food & the nutrition care process* (15 ed.). St. Louis, Missouri, USA: Elsevier, Inc.

Rebello, C. J., Greenway, F. L., & Finley, J. W. (2014). Whole grains and pulses: A comparison of the nutritional and health benefits. *Journal of Agricultural and Food Chemistry*, 62(29), 7029.

Rosa-Sibakov, N., Poutanen, K., & Micard, V. (2015). How does wheat grain, bran and aleurone structure impact their nutritional and technological properties? *Trends in Food Science & Technology*, 41(2), 118–134.

Turnbaugh, P. J., Bäckhed, F., Fulton, L., & Gordon, J. I. (2008). Diet-induced obesity is linked to marked but reversible alterations in the mouse distal gut microbiome. *Cell Host & Microbe*, 3(4), 213.

Turnbaugh, P. J., Ley, R. E., Mahowald, M. A., Magrini, V., Mardis, E. R., & Gordon, J. I. (2006). An obesity-associated gut microbiome with increased capacity for energy harvest. *Nature*, 444(7122), 1027–1031.

U.S. Department of Agriculture: Food and Nutrition Service. (2021, 06 01). *MyPlate/ MiPlat*. Retrieved March 8, 2023, from USDA U.S. Department of Agriculture: https://www.fns.usda.gov/resource/myplate-miplato.

Vrieze, A., Van, N. E., Holleman, F., Salojärvi, J., Kootte, R. S., Bartelsman, J. F., ...Oozeer, R. (2012). Transfer of intestinal microbiota from lean donors increases insulin sensitivity in individuals with metabolic syndrome. *Gastroenterology*, 143(4), 913–916.