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EFFECT OF ONLINE MESSAGING INTERVENTION TO ENGAGE ADULTS FROM THE QATAR COMMUNITY IN PHYSICAL ACTIVITY

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ABSTRACT

In Qatar, physical inactivity amongst 18-64 years old adults is at risk of NCD diseases (obesity (41.4%), high cholesterol level (21.9%), diabetes (6.7%), low participation in physical activity (63.3%), with annual mortality due to physical inactivity of 9. 3% and 36.8%. not meeting current national physical activity recommendations. This study evaluates the effect of online messaging intervention and walking program to engage adults from Qatar community in PA. The concept of online messaging intervention as motivation and awareness of PA in Qatar is explored. Randomized pretest-posttest experimental study method with a follow-up period of 16 weeks was applied to a total of 299 healthy adults (18 to 64 years) in SIH community settings (143 adults control group, 156 adults experiment group, 68 (22.7%) adults IPAQ participants). Evaluation of PA levels and daily steps from pedometers and mob app classified into categories. Evaluation of IPAQ results calculated as MET minutes per week. The walking program combined with online messaging motivated a percentage of 22.7% of adults to continue an active lifestyle, at 16 weeks of follow-up. Self-rated PA level similar to data reported by pedometers demonstrates that adults in the IPAQ group (68 (22.7%)) have a good PA awareness. The statistical findings demonstrate that walking in combination with online messaging programs implemented among adults in the Qatari community can increase awareness of the health benefits of physical activity by forming the basis of an active lifestyle.

Keywords: *awareness; IPAQ; physical activity; step count; Qatar;*

INTRODUCTION

Worldwide exists an increasing interest at governmental, stakeholder and individual levels, to enhance efforts to promote and acquire a healthy lifestyle through physical activity among healthy adults aged 18 - 64 years old, while an active lifestyle is endorsed by strong scientific evidence as a great factor to obtain health benefits (Haskell et al., 2007), (WHO, 2019. GAPPA 2018-2030).

Globally, even though the benefits of physical activity are well known, evidence illustrates that the levels of inactive lifestyle amongst adults (31% of the world's population do not participate in enough physical activity) and the habit of spending a lot of time sitting are frightening, hence this situation creates among healthy adults (18 - 64 years) the risks of

developing many types of non-communicable diseases (6-10% of major noncommunicable diseases such as obesity, overweight, cardiovascular disease, diabetes, high blood pressure, high blood cholesterol globally are associated with lack of physical activity). (QNPAG, 2021) (Kohl et al., 2012), (Hallal et al., 2012), (Boutayeb & Boutayeb, 2005)

In the Eastern Mediterranean Region (EMR) obesity is a major health problem, particularly amongst adolescents and women while the physical inactivity levels fluctuate in the 22 countries between 14.1% (in Sudan) and 82.1% (in Saudi Arabia). (WHO, 2019)

In Qatar, the percentages of the 18-64 years old adults that face noncommunicable diseases caused by physical inactivity refer to obesity (41.4%), high cholesterol level (21.9%), diabetes (6.7%), low participation in physical activity (63.3%) (QNPAG, aspetar.com, 2021), annual mortality due to physical inactivity (9. 3%) (GoPA, 2020) not meeting current national physical activity recommendations (36.8%). (QNPAG, aspetar.com, 2021)

Evidence recommends combating the pandemic of physical inactivity through the implementation of effective public health interventions that address physical activity awareness, knowledge, commitment to an active lifestyle, capacity building in the field, and allocation of adequate resources for community support. (Pratt et al., 2020)

1. CONTEXT AND REVIEW OF LITERATURE

Benefits of Regular Physical Activity

Physical activity performed at the recreational level have many functions such as training, entertainment, relaxation or disconnection, rehabilitation, etc. while exercising on a long-term basis, the results consist in improved health. The benefits of physical activity for health represent a complex theme that refers to humans and their ability to be active from an anthropological, anatomical, physiological, biomechanical, psychological, sociological, etc. perspective (Epuran, M., 1992). Enhanced health benefits through practicing physical activities are obtained when the exercises are personalized to adults' needs, gender and age, but also by the risk factors to which the population is exposed (Dumitru, Gh., 1997). Healthy adults aged 18 – 64 years are recommended to participate in moderate-intensity exercise for at least 150 minutes per week, or vigorous-intensity aerobic exercise for at least 60 minutes per week or 60 - 150 minutes per week combination of moderate with vigorous intensities. Examples: brisk walking, jogging, swimming, kayaking, football, handball, etc.(Sayegh et al., 2022)

Some of the benefits of regular physical activity on health are stated in the scientific evidence as following: enhanced heart performance, increased amount of blood in the vessels, boosted air per minute ventilation in the lungs, increased strength, endurance and power, support to lose fat, decreased total fat mass and fat around the viscera, increased muscle ability to extract glucose from the blood, improved ability of the immune system to respond to microbial aggression, improved intestinal transit, eliminating constipation, improved movement coordination and balance, improved speed of reaction responses to various stimuli, improved self-image, professional effectiveness, family behavior , well-being and joy of living (Dumitru, Gh., 1997). Regular physical activities alleviate the problems of obesity and overweight, high blood pressure, anxiety and depression. (Bota, A., 2006)

Walking performed as form of physical activity brings extensive benefits on human health. Regular and prolonged walking reduces systolic blood pressure and diastolic blood

pressure, resting heart rate, body fat, body mass index, total cholesterol, depression and increases VO2max. (Hanson, S., & Jones, A., 2015)

The implementation of different health promotion interventions, programs and campaigns targeting different communities in Qatar, such as community public, universities, and public places, motivates the population to follow the physical activity guidelines (Stănescu, M., et al., 2021). The levels of physical activity and self-reported gait increases through walking while the population is motivated by online messaging and makes use of steps tracking devices such as pedometers and mobile applications for step counting. (Joseph-Shehu et al., 2019). A combination of pedometer-based interventions with e-mail communication has the potential to enhance physical activity levels. (Vetrovsky et al., 2018)

The Importance of Physical Activity Awareness

Awareness of physical activity among adults can improve physical fitness, weight management, cognitive function and quality of life as well as reduce the risk of injury.

Physical activity levels of adults are classified into active population, (those who meet the WHO physical activity recommendations), partially active population, (those who carry out a heavy work activity without reaching the level of physical activity recommended by the WHO during their free time), and "sedentary population" (those with sedentary work activity, who do not reach the level of physical activity suggested by the WHO guidelines). At the same time scientific evidence mentions that adults who overestimate their level of physical activity do not intend to change their behavior to improve the level of physical activity, a situation that makes awareness a potential barrier in promoting physical activity. Lack of time and motivation are barriers that prevent adults from becoming active; these are factors that denote a poor health benefits of physical activity awareness. A solution investigated in this study is to include interventions that improves physical activity recommendations dissemination amongst adult population aiming increased awareness levels on this topic. (Palermi et al., 2020)

Messaging methods such as social media are highlighted as an appropriate, applicable and well-resourced modality (eg: educational, motivational, instructional information through videos, infographics, graphics, billboards, mass media), in inducing awareness and knowledge to increase levels of physical activity and motivation. (Williamson et al., 2019)

The regularly physically active adults that are motivated by their own intrinsic state aim to achieve relaxation, fun and socialization which results in higher life satisfaction compared to inactive adults. (Jetzke, M., et al., 2020)

Effective knowledge transmission interventions take place when the type of communication used is based on the target audience needs. (Stănescu, M., 2005)

Phone and email messaging during pedometer-based interventions are feasible and have the potential to enhance physical activity levels. (Vetrovsky et al., 2018)

In U.S. community-based walking intervention programs can help adults meet national physical activity guidelines. It is important to assess whether such approaches can be effective among the Qatar community (Sisson et al., 2008)

Solutions to Tackle Physical Inactivity in Qatar

The 2022 year is of great significance for Qatar since the FIFA World Cup Qatar 2022 is planned to take place. On this occasion the World Health Organization (WHO), the State of Qatar through Ministry of Public Health and FIFA signed a three-year partnership,

entitled Healthy 2022 World Cup: Creating Legacy for Sport and Health. This partnership is based on 3 pillars, to deliver pre, during and after the World Cup joint activities to promote a healthy lifestyle, health security and physical and mental well-being. One of the pillars of this partnership focuses on promoting physical activity and nutrition as means to improve health, as safe health and sports interventions will continue the World Cup itself. Through this pillar, interventions will be implemented by which people can improve the physical activity awareness levels. (Bull F, et al., 2022)

The high levels of obesity, lack of physical activity, and the negative impact of COVID-19 pandemic are some of the barriers for which the Qatar government came in support of tackling the case through documents, plans, and strategies: Qatar National Vision 2030 (QNV 2030); Qatar National Health Strategy (QNHS 2018 - 2022); Qatar National Physical Activity Guidelines (QNPAG); Qatar National Sports Day (QNSD); Healthy 2022 World Cup: Creating a Legacy for Sport and Health; Step into Health (SIH).

It is recommended to raise awareness of the physical activity guidelines and promote behavior change among those considering health enhancement. (Piercy, K. L., et al., 2020), (Van Sluijs, E. M., et al., 2007)

2. METHODS

Study Objective

This study evaluates the effect of online messaging intervention to engage adults from Qatar community in physical activity implemented as walking intervention. The concept of online messaging intervention as motivation and awareness of physical activity in Qatar is explored. Pedometers, mobile application and IPAQ questionnaire are used as measurement tools. Physical activity levels are assessed against the goal of 10,000 steps/day.

Research Question

The research question addressed in this study is: “to what extent the walking programs in combination with online messaging implemented among adults from Qatar community can increase awareness of the health benefits of physical activity as a starting point towards forming an active lifestyle?”

Research methodology

This paper is a randomized pretest-posttest experimental study method with a follow-up period at 16 weeks after intervention completion. The eligible population has been randomly assigned to experimental group and control group and at 16 weeks after intervention, they were invited to complete online the International Physical Activity Questionnaire (IPAQ). The study population, pedometers and mobile applications users, were invited to participate in an 8 weeks physical activity intervention based on walking daily 10,000 steps and more. During this time, the experiment group received 16 messages through email and 16 phone SMS, twice a week, containing educational messages related to Qatar National Physical Activity Guidelines. (QNPAG, aspetar.com, 2021). After the intervention, the research population was not contacted for 16 weeks; afterwards, the research team invited participants for a period of 4 weeks to complete the short form of IPAQ questionnaire. The 7 questions investigated the types of physical activities people do as part of their daily lives and the time spent as physically active in the last 7 days.

To evaluate the physical activity intervention through online messaging, the number of daily steps is classified into the following categories: less than 5,000 steps per day - sedentary lifestyle index, 5,000-7,499 steps per day - low active, 7,500- 9,999 steps per day,

active, more than 10,000 steps per day - active, more than 12,500 steps per day - very active. The average of steps uploads to the system is also calculated. (Tudor-Locke et al., 2013), (Tudor-Locke et al., 2018), (Tudor-Locke, 2002).

To evaluate the awareness of physical activity the IPAQ results are reported in two forms:

a. categories of physical activity (high, moderate and low level) or

b. continuous variable MET – minutes of physical activity per week. MET minutes represent the amount of energy expended to perform physical activity. A MET is energy expended at rest. Therefore, 2 METS is energy expended twice as much as at rest. Walking is valued at 3.3 METS, moderate physical activity is valued at 4 METS and vigorous physical activity at 8 METS.(Bauman et al., 2009), (Kim et al., 2013), (IPAQ Research Committee, 2005)

A daily number of steps was measured using two types of equipment. One method is the Omron HJ-324U pedometer (Manual OHIOPH-Uu, 2012) with an USB connection to the SIH web database. The second method to measure the daily accumulated steps is through the mobile application synchronized to the SIH program website, and compares steps achievements to the average healthy standard of 10,000 steps per day.

The IPAQ results as MET minutes per week are calculated as follows: the given MET value (walking = 3.3 METS, moderate activity = 4METS, vigorous activity = 8METS) is multiplied by the minutes in which the activity was performed and the number of days in which it was performed that activity. Ex: walking for 30 minutes a day, over a period of 5 days a week = 3.3 X 30 X 5=495 MET minutes a week. The MET minutes achieved in each category (walking, moderate activity and vigorous activity) were summed to obtain the total MET minutes of physical activity per week.

Data collection for pedometers steps, mobile application steps and IPAQ questionnaire was completed by using the SIH system supported by IT implications. Data has been prepared using the Excel program, and imported into the SPSS program for analysis while the results were displayed through graphs and tables. The quantitative statistical analysis of this research was done through the IBM statistical package for social sciences (SPSS version 21.0, IBM Corp., Armonk, NY, USA). Descriptive statistics (mean ± SD and frequencies) were established at the group level. Subgroup analysis of the classified categories of physical activity levels was conducted making use of the following tests: the arithmetic mean (X) to estimate the central predisposition of the series; the standard deviation (SD) to form a point of view on the homogeneity of the sample.

The study complied with all requirements to receive the ethical approval from the Ministry of Public Health in Qatar through the Aspire Zone Foundation Institutional Review Board (AZF IRB) with the following registration and insurance numbers: MoPH Registration: IRB-AOSM-2020-007, MoPH Assurance: IRB-A-AOSM-2020-0036.

Target population

The sample size enclosed active members of different SIH community settings (SIH Qatar Community, SIH Campuses, SIH Workplaces) with a total of 299 participants (143 adults control group, 156 adults experiment group, 68 (22.7%) adults IPAQ participants). The research population represents healthy adults in the Qatar community conforming with the inclusion criteria of 18 to 64 years old, women, and men, of different nationalities registered and active members of SIH program which consented their participation to the study and

currently have pedometers or the steps measurement app on their mobile phones. Exclusion criteria for study population referred to adults with chronic diseases, those who refuse to sign informed consent and those who report less than 1,100 or more than 65,000 daily steps as outliers or erroneous measures. Registered participants have the option to withdraw from the SIH web database at any time. The sample population was randomly selected from all SIH registered members from the beginning of the program to the present.

Targeted adults received educational content through online messaging simultaneously with a walking intervention as per the rules of randomized control trial research and invited after 16 weeks to complete IPAQ questionnaire for a duration of 4 weeks. Once the intervention was completed, the number of daily steps performed by the subjects and the questionnaire data was analyzed.

3. FINDINGS

The IPAQ results related to the general characteristics of the study population such as group distribution, demographics and levels of physical activity deployed that from the total study population of 299 (100%) adults, 68 (22.7%) of them participated in completing the questionnaire, while 231 (77.3%) of them did not respond to the invitation (Table 1).

Table 1. Total study population distribution

Distribution of the total study population		
IPAQ Group n (%)	Non-IPAQ Group n (%)	Total Group n (%)
68(22,7)	231(77,3)	299(100)

The results related to the study population's demographic characteristics presented the following findings: men (control group 31(83.7%) / experimental group 29 (93.5%)) participate in physical activities in greater numbers than women (control group 6 (16.2%) / experimental group 2 (6.4%)); adults aged 35-55 years (control group 24(64.8%)/experimental group 21(67.7%) and adults with BMI 26 – 30 kg/m² (control group 17 (45.9%)/experimental group experiment 14(45.1%) are more numerous in practicing physical activities. Participants of non-Qatari nationality (control group 31(83.7%)/experimental group 25(80.6%)) engage in physical activities in greater numbers (group of control 6(16.2%)/experimental group 6(19.3%) than those of Qatari nationality, and adults who are part of the Qatari workplace community (control group 24(64.8%)/experimental group 21(67.7%) participate in greater number in physical activities to improve health (Table 2).

Tabel 2. Demographic characteristics of the IPAQ sample

Group		Control	Experimental	P
Variables		n (%)	n (%)	value
Gendre	F	6(16.2)	2(6.4)	0,213
	M	31(83.7)	29(93.5)	
Age (Years)	<= 35	0(0)	0(0)	0,999
	35 - 55	24(64.8)	21(67.7)	
	55+	13(35.1)	10(32.2)	

BMI (kg/m²)	<= 25	12(32.4)	9(29)	0,909
	26 – 30	17(45.9)	14(45.1)	
	31+	8(21.6)	8(25.8)	
Steps Measuring Device	Mobile app	17(45.9)	12(38.7)	0,548
	Pedometer	20(54)	19(61.2)	
Nationality	Qatari	6(16.2)	6(19.3)	0,735
	Non-Qatari	31(83.7)	25(80.6)	
Communities in Qatar	Universities	3(8.1)	1(3.2)	0,662
	Workplaces	24(64.8)	21(67.7)	
	Public	9(24.3)	9(29)	

During the 8 weeks walking program and online messaging intervention the step count results of the IPAQ sample adults (68 (100%)), measured by pedometers and the application on mobile phones, placed this group in the somewhat physically active category (7,500-9,999 steps/day). The maximum median of 10357.5 steps/day was recorded in the 1st week of intervention and the minimum median of 7434.0 steps/day in 7th week. The experimental group registered the highest average number of steps per day in the 1st week of the intervention (course 1 = 11078.6 steps/day) compared to the highest value of the average number of steps per day of the control group in the last week after the intervention (fast 6 =10127 steps/day) (Table 3).

Table 3. Weekly evolution of IPAQ Group steps during the online walking intervention period

Weeks	IPAQ Total Group		IPAQ Groups (Steps Mean)	
	Steps Mean ± SD	Median	Control	Experimental
Pre 1	8937,4±4652,2	9108,0	8350,7	9601,1
Pre 2	9259,5±4893,4	9384,0	8216,6	10402,7
Pre 3	9222,8±5276,1	9292,5	8826,3	9641,3
Pre 4	9594,3±5370,4	9813,0	9034,3	10212,7
Pre 5	9618,1±5355,2	9694,0	8898,7	10337,5
Pre 6	9093,7±4868,5	9482,0	8695,6	9515,1
Pre 7	8768,6±5265,6	8381,5	8343,2	9234
Pre 8	9537,8±5991,5	8752,0	8582,1	10729
During 1	10234,9±5120,8	10357,5	9491,1	11078,6
During 2	9697,9±5259,1	9328,0	8796,7	10798,7
During 3	10102,8±5085,4	9668,0	9771	10477,1
During 4	9784,6±5083,0	9937,0	9706	9877,7
During 5	9155,8±5288,9	8629,0	9264,6	9058
During 6	8504,0±5230,0	7437,0	8569,4	8444,5
During 7	8390,6±5387,8	7434,0	8141	8635,7
During 8	8685,9±4589,7	8867,0	8706,3	8665,8
Post 1	8689,5±4957,3	8280,0	8913,3	8434,4
Post 2	8835,0±5082,2	8303,0	8578,2	9127,2
Post 3	8836,8±4758,7	8685,0	8523,9	9205,5
Post 4	9353,6±4975,5	9080,5	8998,5	9804,4
Post 5	9635,7±5178,9	9447,0	8477,7	10903,5
Post 6	9672,5±5542,9	9895,0	10127	9184,8

After 16 weeks from the intervention, the IPAQ Group (68 (100%)) adults recorded the highest participation in vigorous intensity physical activities (control group 22 (59.4%)/experimental group 15 (48.3%)) followed by moderate-intensity physical activities (control group 9 (24.3%)/experimental group 12 (38.7%)), and the fewest adults were identified in the low-intensity physical activity category (control group 6 (16.2%) /experiment group 4 (12.9%)). (Table 4, Figure 1).

Table 4. Physical activity categories IPAQ Group

Variables	Physical activity categories	Control n(%)	Experimental n(%)	p Value (Pearson Square)	Chi-
IPAQ Group 68 (100%)	Low	6 (16.2)	4 (12.9)	0,441	
	Moderate	9 (24.3)	12 (38.7)		
	Vigorous	22 (59.4)	15 (48.3)		

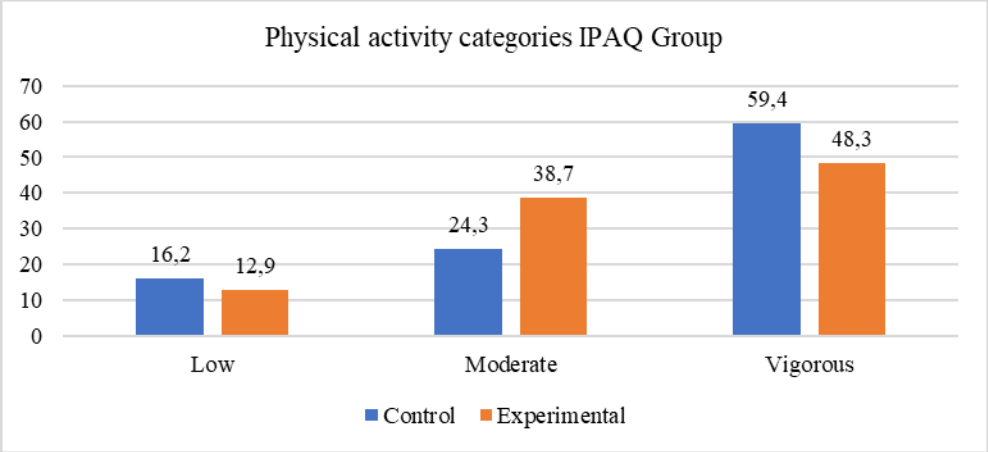

Figure 1. Physical activity categories IPAQ Group

The results of the physical activity categories of the IPAQ Group, with comparison amongst the control and experimental population, were found according to the following independent variables: gender, age, community, BMI, pedometer, and nationality Statistically significant differences were observed in the following situations:

- Men in the experimental group reported a higher Mean ± SD of total days of recorded activity (6.7±1) compared to the control group (6.2±1) and a p value = 0.037 (Table 5)
- In the category of adults aged >55, the control group accumulated a total physical activity of 183.9±127.3 (min/week) compared to the experimental group which achieved a total physical activity of 134.5±60.4 (min/week)) with a p-value of 0.029. All these adults of the control group believe that they practice physical activities at vigorous intensity 1975.3±2436 (MET- min./week) in a greater amount than the experimental group 624±1320.3 (MET- min./week). (Table 6)
- Adults from the university community participated in the questionnaire in a very small number (control group 3 adults (7±0 total days of activity) and 1 adult (7±0 total days of activity) in the experimental group; Although the adults from the

experimental group in the public community marked a higher number of total days of recorded activity (6.7±0.7) compared to the control group (6.1±1.9) and a p value = 0.007, the control group recorded a physical activity vigorous in greater amount 2097.6±2672.4 (MET-min/ week) than the experimental group 1163.8±1628.2(MET-min/week) and a p-value of 0.033. Control group adults in the workplace community marked a significantly greater difference (p = 0.036) of total days of recorded activity (7±0), compared to the total days of recorded activity of the experimental group (6.4±1.6), the experimental group of the workplace community reported a significant difference (p= 0.029) higher of the total number of MET- min./week. = 5647.9±6344 than the control group with only 3338.4±2132.1 (MET- min./week) (Table 7).

- The p value = 0.035 is observed in the group with BMI 30+ where the total number of activity days recorded by the experimental group is higher (7±0) than the control group (6.3±1.7). (Table 8)
- IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) according to the pedometer did not report any statistically significant value. (Table 9)
- Adults of Qatari nationality, although they completed the questionnaire in a very small number, their control group reported a vigorous intensity physical activity 800±1959.5 (MET- min./week) compared to the experimental group with 80± 195.9 (MET- min./week) and p value = 0.049. (Table 10)

4. DISCUSSION

From a statistical point of view, the non-significant p-values obtained from the comparisons of each variable (gender, age, BMI, measuring device, nationality, community in Qatar) between the control and the experimental group denote that both groups are equally representative and it is less likely that there is a bias towards erroneous situations in the population distribution (Table 1).

The results of Table 2 highlighted that a walking program with online messaging with a follow up at 16 weeks after intervention has a significant impact on the physical activity awareness levels of the adults with the following demographic characteristics: men (control group 31(83.7%) / experimental group 29 (93.5%)) participate in physical activities in greater numbers than women (control group 6 (16.2%) / experimental group 2 (6.4%)); adults aged 35-55 years (control group 24(64.8%)/experimental group 21(67.7%) and adults with BMI 26 – 30 kg/m² (control group 17 (45.9%)/experimental group experiment 14(45.1%) are more numerous in practicing physical activities. Participants of non-Qatari nationality (control group 31(83.7%)/experimental group 25(80.6%)) engage in physical activities in greater numbers (group of control 6(16.2%)/experimental group 6(19.3%) than those of Qatari nationality, and adults who are part of the Qatari workplace community (control group 24(64.8%)/experimental group 21(67.7%) participate in greater number in physical activities to improve health. (Table 2)

The results displayed in Table 3 emphasized that the walking program and the online messaging intervention positively influenced the experimental group during the intervention period, hence they managed to uphold a higher interest in the daily walking activity, and increase physical activity levels (Table 3).

Chi-square statistical analysis of the IPAQ group data shows a p-value (0.441) which does not denote differences large enough to conclude that the control and experimental groups are associated with each other. The hypothesis that the experimental group has a

higher level of physical activity 16 weeks after the end of the intervention than the control group due to prior participation in the walking intervention with online messaging is not confirmed (Table 4, Figure 1).

The results of steps per day of the adults who completed the IPAQ questionnaire (68 (22.7%)) oscillated during the walking program between the "somewhat physically active" category (7,500-9,999 steps/day) and the "physically active" category with 10,000+ steps/day, while the self-reported results in the questionnaire state that participants oscillated between the "vigorous" and "moderate" physical activity categories. The assessment of their own level of physical activity similar to the data reported by the step measuring devices demonstrates that the adults in the IPAQ group (68 (22.7%) have a good awareness of their own physical activity. At the same time, the long-term participation, of the 68 (22.7 %) adults, (September 2021-July 2022) in physical activity both, during and after the walking program, indicates active behavior. Walking program combined with online messaging has the effect of engaging Qatar community in physical activity after 16 weeks since the program stopped on a percentage of 22.7% adults of the total study population while 77.3% of them stopped reporting their physical activity performance or using the step count devices.

Tables 5 – 10 of this paper provide an overview of the physical activity categories of the IPAQ research population, where it is observed that regardless of the population variables, physical activity is most commonly reported as vigorous, followed by moderate and the fewest adults reported engaging in low-level physical activity. The p values reported in Table 10 are not significant when referring to the differences between the control and experimental groups.

Table 5. IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) according to gender

Gender	F				P Value	M			
Group	Control		Experimental			Control		Experim	
Surveillance physical activity	n	Mean ± SD	n	Mean ± SD		n	Mean ± SD	n	Mea
Total days activity	6	14.8±4.1	2	8.5±4.9	0,773	31	11.1±5.8	29	11
Total days recorded activity	6	7±0	2	6±1.4	0	31	6.2±1.7	29	6
Total activity (min./week)	6	284.1±193.3	2	172.5±116.6	0,42	31	165.5±191.4	29	201.
Total activity (min./week)	6	231.6±124.5	2	172.5±116.6	0,782	31	150.5±132.6	29	173
Vigorous (MET- min./week)	6	2420±2042.7	2	1440±2036.4	0,828	31	1738±2487.8	29	1688.
Moderate (MET- min./week)	6	1233.3±820.6	2	360±509.1	0,524	31	748.3±925.2	29	1023.
Walking (MET- min./week)	6	1963.5±1775.8	2	1485±0	0,043	31	1168.5±964.7	29	1522.
Total (MET- min./week)	6	5616.8±2903.3	2	3285±2545.5	0,781	31	3654.9±3926.6	29	4234.

Table 6. IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) according to age

Age	<= 35				35.1 - 55				P Value	>55	
Group	Control		Experimental		Control		Experimental			Control	
Surveillance physical activity	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD		n	Mean ± SD
Total days activity	0	0±0	0	0±0	24	11.8±6.1	21	11.8±4.9	0,271	13	11.5±5
Total days recorded activity	0	0±0	0	0±0	24	6.1±1.9	21	6.6±1.2	0,097	13	6.8±0.5
Total activity (min./week)	0	0±0	0	0±0	24	185.2±224.7	21	230.9±236.4	0,834	13	183.9±127.3
Total activity (min./week)	0	0±0	0	0±0	24	153.9±139.6	21	191.6±138.3	0,899	13	181.6±123.5
Vigorous (MET- min./week)	0	0±0	0	0±0	24	1780±2443.7	21	2171.4±3029.3	0,573	13	1975.3±2436
Moderate (MET- min./week)	0	0±0	0	0±0	24	775±981.1	21	1028.5±1131.6	0,715	13	923±811.4
Walking (MET- min./week)	0	0±0	0	0±0	24	1225.1±1138	21	1439.4±1137.4	0,811	13	1430.9±1180.4
Total (MET- min./week)	0	0±0	0	0±0	24	3780.1±3970	21	4639.4±4752.6	0,406	13	4329.3±3640.2

Table 7. IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) by community.

Communities Qatar	Universities				Public						
Group	Control		Experimental		Control		Experimental		P Value	Control	
Surveillance physical activity	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD		n	Mean ± SD
Total days activity	3	14.6±5.1	1	10±0	25	11.4±6.2	21	11.7±5.1	0,196	9	11.6±4.3
Total days recorded activity	3	7±0	1	7±0	25	6.1±1.9	21	6.7±0.7	0,007	9	7±0
Total activity (min./week)	3	383.3±200	1	60±0	25	173±211.5	21	199.2±213	0,751	9	151.1±94
Total activity (min./week)	3	278.3±91.1	1	60±0	25	154.4±145.5	21	165±99.4	0,082	9	151.1±94
Vigorous (MET- min./week)	3	1120±1939.8	1	480±0	25	2097.6±2672.4	21	1163.8±1628.2	0,033	9	1400±1767.7
Moderate (MET- min./week)	3	1406.6±773.6	1	0±0	25	808.8±1024.8	21	1119±1056.4	0,900	9	684.4±572.8
Walking (MET- min./week)	3	3234±1600.4	1	0±0	25	1080.6±957.6	21	1433.9±919.4	0,744	9	1254±954.7
Total (MET- min./week)	3	5760.6±3124.9	1	480±0	25	3987±4353.8	21	3716.7±2655.8	0,100	9	3338.4±2132.1

Table 8. IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) according to BMI

BMI	<=25					25.01-30.00					
Group	Control		Experimental		P Value	Control		Experimental		P Value	Control	
Surveillance physical activity	n	Mean ± SD	n	Mean ± SD		n	Mean ± SD	n	Mean ± SD		n	Mean ± SI
Total days activity	12	13.5±6.4	9	11.7±5.7	7,000	17	11.1±5.5	14	11.2±5.3	0,493	8	10.3±4.7
Total days recorded activity	12	6.3±2	9	6.4±1.6	0,855	17	6.4±1.3	14	6.6±0.9	0,408	8	6.3±1.7
Total activity (min./week)	12	212.9±271.6	9	171.6±153.4	0,540	17	165.6±137.7	14	255.7±261.7	0,344	8	183.1±179.(
Total activity (min./week)	12	174.1±157.6	9	171.6±153.4	0,956	17	163.8±134.8	14	196.7±117.7	0,261	8	147.5±100.:
Vigorous (MET-min./week)	12	2683.3±3074.6	9	1528.8±3281.8	0,745	17	1814.1±2157.4	14	2014.2±2805.2	0,833	8	670±1249.5
Moderate (MET-min./week)	12	948.3±1156	9	1064.4±1347.1	0,718	17	720±801.6	14	998.5±1194.3	0,228	8	872.5±833.
Walking (MET-min./week)	12	1381.8±1127.1	9	1578.5±1453.5	0,231	17	1198±1123.5	14	1736±878.7	0,563	8	1381.8±1330
Total (MET-min./week)	12	5013.5±5057.3	9	4171.8±4938.5	0,970	17	3732.2±3445.9	14	4748.8±4427.6	0,887	8	2924.3±2068

Table 9. IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) according to pedometer

Steps measuring device	Mob App					Pedometer			
Group	Control		Experimental		P Value	Control		Experimenta	
Surveillance physical activity	n	Mean ± SD	n	Mean ± SD		n	Mean ± SD	n	Mean ± S
Total days activity	17	10.1±5.5	12	11.3±4.4	0,5337	20	13.1±5.5	19	11.7±5.4
Total days recorded activity	17	6.1±1.6	12	6.7±0.8	0,246	20	6.6±1.5	19	6.6±1.2
Total activity (min./week)	17	143.5±156	12	262.9±283.8	0,157	20	219.8±219.3	19	159.9±11
Total activity (min./week)	17	125±112.4	12	194.1±127.7	0,135	20	196.5±143.1	19	159.9±11
Vigorous (MET-min./week)	17	1061.1±1671.4	12	1500±2894.7	0,609	20	2518±2759.5	19	1781±261
Moderate (MET-min./week)	17	615.2±726.4	12	1280±1231.5	0,079	20	1007±1035.5	19	791.5±105
Walking (MET-min./week)	17	1216.1±1312.4	12	1442.3±948.4	0,615	20	1366.5±1002.6	19	1569.2±11
Total (MET- min./week)	17	2892.6±2752.1	12	4222.3±4662.6	0,343	20	4891.5±4389.9	19	4141.8±38

Table 10. IPAQ scores expressed as metabolic equivalent of activity units (MET minutes/week) according to nationality

Nationality	Qatari					Non- Qatari				
Group	Control		Experimental		P Value	Control		Experimental		P Value
Surveillance physical activity	n	Mean ± SD	n	Mean ± SD		n	Mean ± SD	n	Mean ± SD	
Total days activity	6	7.3±5.1	6	7.5±2.7	0,427	31	12.6±5.4	25	12.5±5	0,497
Total days recorded activity	6	5.5±1.9	6	6.1±1.3	0,453	31	6.5±1.5	25	6.8±1	0,234
Total activity (min./week)	6	78.3±110.9	6	81.6±53.3	0,281	31	205.3±201.1	25	228.1±213.6	0,913
Total activity (min./week)	6	78.3±110.9	6	81.6±53.3	0,281	31	180.1±132.2	25	195.1±122.6	0,750
Vigorous (MET-min./week)	6	800±1959.5	6	80±195.9	0,049	31	2051.6±2461.7	25	2054.4±2860.5	0,805
Moderate (MET-min./week)	6	560±979.7	6	260±482.4	0,143	31	878.7±911.3	25	1153.6±1181.6	0,209
Walking (MET-min./week)	6	508.7±567.4	6	816.7±756.3	0,228	31	1450±1166.2	25	1688.9±1059.9	0,892
Total (MET- min./week)	6	1868.7±3314.4	6	1156.7±783.5	0,109	31	4380.4±3818.4	25	4896.9±4232.1	0,668

CONCLUSIONS

Qatar has many strategies and programs to promote physical activity among the population through which it wants to achieve a higher level of awareness of the regular practice of physical activity and its benefits. Qatar's efforts in this direction are aligned with global practices. The long-time participation of the 68 (22.7%) adults, (September 2021-July 2022) in physical activity both, during the walking program and after its completion, indicates an active, efficient and acquired behavior; the walking program combined with online messaging motivated a percentage of 22.7% of adults to continue an active lifestyle, at 16 weeks after the end of the intervention. Self-rated physical activity level similar to data reported by pedometers demonstrates that adults in the IPAQ sample (68 (22.7%)) have a good awareness of their own physical activity. The statistical findings demonstrate that walking in combination with online messaging programs implemented among adults in the Qatari community can increase awareness of the health benefits of physical activity by forming the basis of an active lifestyle.

The Qatari community has a high preference for using mobile phone walking apps compared to pedometers,

The present work highlights that the population that prefers this type of physical activity and seeks participation in organized walking programs are adults between the ages of 35-55.

Significant research results demonstrate that the walking program with online messaging intervention improves physical activity in overweight adults (BMI 25.01 - 30.00 kg/m2).

The research population representative of the Qatari university community met Qatari national physical activity recommendations and responded effectively to walking programs with pedometers tending to remain in the active population category (10000+ steps/day).

The current study reinforces previous scientific evidence that walking interventions in Qatar conducted during autumn/winter increase participants' step count when weather conditions favor outdoor activities.

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