Sedentary Behaviour and Metabolic Rate among Adults Professionals: An Intervention Approach (E-Mobile)

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Abstract

This study aims to measure the relationship between sedentary behaviour and metabolic rate among adult professionals. An intervention (e-mobile) approach was used to gather the information from the participants. A total of 40 participants (men = 30, and women = 10) with an average age of (36.53 years ± 8.85) were randomly assigned to an intervention group (n= 20) and a control group (n= 20). All the participants completed the Sedentary Behavior Questionnaire and The International Physical Activity Questionnaire at baseline and the end of eight weeks. The Participants in the intervention group were given physical activity guidelines targeted at increasing physical activity levels during daily activities. On the other side, the control group was advised to continue with their routine daily physical activity. Statistical analyses, including descriptive statistics and inferential analysis like mean, SD, T-tests, and ANOVA were used to analyze the data and determine relationships between variables. After analyzing the data, the results showed that significant differences in pre and post-metabolic rate scores (1488.31 ± 179.13 to 1468.44 ± 128.19) (f = 10.83, p < 0.000) were noted in the experimental group after eight weeks. The experimental group increased their walking (863.78 METs per week to 1625.55 METs per week), moderate activity (295 METs per week to 743 METs per week) and vigorous activity (362 METs per week to 1366 METs per week) physical activity (all p<0.001). No significant differences were found in the control group, highlighting that physical activity improves metabolic rate and reduces sedentary behaviour.

Keywords: Sedentary behaviour, metabolic rate, adult professionals, physical activity, Physical Activity Levels.

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Introduction

Physical activity has various benefits for both physical and psychological well-being (Jia et al., 2019). Regular physical activity contributes to maintaining body weight and helps to reduce the risk of non-communicable diseases (Habib et al., 2020). Additionally, even small amounts of medium to high intensity physical activity, coupled with minimizing sedentary behavior, can provide health benefits for adults (Warburton & Bredin, 2019). According to Mitchell et al., (2022) highlight that physical activities have a broader impact on overall health compared to many other lifestyle choices.

These benefits extend to individuals of all ages, genders, and professional groups. In children and adolescents, physical exercise has been linked to reducing the risk of depression, improving aerobic capacity, enhancing muscular endurance, promoting bone health, and fostering a healthy body composition (Mitchell et al., 2022). It also improves attention and various academic performance indicators when incorporated into school physical activity programs. Similarly, in adults and the elderly, physical activity yields diverse benefits, including a decreased incidence of hypertension, reduced risk of stroke, improved physical and mental well-being, and enhanced neuromuscular coordination and performance (Ghram et al., 2021).

Furthermore, regular exercise has shown potential in preventing diseases such as heart stroke, hypertension, diabetes, and cardiovascular diseases (Anderson & Durstine, 2019). Kerr et al., (2017) noted that engaging in regular physical activity helps to maintain heart disease and high blood pressure, and leads to a longer and healthier life. Ongoing studies aim to identify effective strategies for increasing global participation in physical exercise (Kerr et al., 2017). Physical activity has been extensively researched in fields such as health sciences, sports, exercise sciences, and physical education, investigating its associations with psychological, physical, and social aspects of life (Quirk et al., 2020).

Specific intervention on reducing sedentary behaviour and its subsequent effect on metabolic rate in adult professionals. While there have been previous studies examining the relationship between sedentary behaviour and metabolic health, the specific gap in the literature addressed by this study lies in the lack of intervention-based research focused on adult professionals. Implementing an e-mobile intervention approach aims to provide valuable understanding for reducing sedentary behaviour and improving metabolic health among this specific population, filling a crucial gap in the existing research.

Methodology of the Study

Research Design

The study was conducted at the Islamia University of Bahawalpur involving 40

adult professionals to examine the early effects of a physical activity intervention to break sedentary behaviour. The participants were divided into two groups: an experimental group consisting of 20 individuals and a control group with 20 individuals. To assess the impact of the intervention, subjective techniques were used before and after the 8-week program. The experimental group was assigned various types of physical exercises as part of the intervention using e-mobile technology, while the control group did not receive any intervention. The metabolic rate of the participants was measured before and after the intervention. At the end of the 8 weeks, the participants were re-tested using the same tools and techniques.

Sample of the Study

The current study primarily focused on adult professionals from the Islamia University of Bahawalpur who were selected to gather the information. To obtain accurate results, a dataset consisting of 30 males and 10 females, aged between 24 to 58 years of university professionals was selected from the university. The study employed the purposive sampling technique to carefully select the sample size from the overall population.

Measures

The data was collected using the Sedentary Behaviour Questionnaire (SBQ) and The International Physical Activity Questionnaire (IPAQ) was used for gathered the information from the participants.

Demographic Information

The participants filled out a demographic information form, in which all personal information included general questions e.g., gender, height, weight; age, scale, educational background, institution, and years in service etc. were included.

Sedentary Behaviour Questionnaire (SBQ); (Rosenberg et al., 2010)

Sitting time data was collected using the Sedentary Behaviour Questionnaire (SBQ) (Rosenberg et al., 2010). The SBQ has been widely used in national health surveys and prospective cohort studies. Participants reported their typical weekday and weekend day sedentary behaviour data.

The International Physical Activity Questionnaire (IPAQ); (Craig et al., 2017)

The International Physical Activity Questionnaire (IPAQ) (Craig et al., 2017), is a 7-item tool used to measure physical activity level by assessing vigorous-intensity, moderate, and walking in the past 7 days. The tools calculate energy

expenditure by moderate and vigorous intensity activity and sitting time, measured in METs. The equation used to calculate the IPAQ score is walking METs + moderate METs + vigorous METs. Total physical activity is then categorized as low, moderate, or vigorous active participants. The IPAQ has good reliability and Validity was measured among Pakistani Adults (Habib et al., 2020).

Training Procedure

An eight-week intervention program was developed using 3 activities units five days in a week. The intervention program was based on physical exercise activities that were light, moderate, and vigorous physical activity. The 8-week intervention program was in written form that was handed out to all experimental group participants to work on it. This study utilized the French health recommendations to calculate physical activity, which involves accumulating a certain amount of light to high-intensity physical activity per day or week, with a total goal of achieving 600 METs. The participants were instructed to exert maximum effort during their exercise as described in Table 1.

Table 1*: An Eight-Week Intervention Approach Activity Plan*

Activity/day	Mon Tue Wed Thu Fri Sat Sun
Light intensity	Exercise at least 60 min per day.
Activities	(Walk, Brisk Walk, Warm up exercises)
Moderate Intensity	Exercise at least 30 min per day
Activities	(Push-ups, Set-ups, Chin-ups, Leg Squats and Stretching exercises.)
Vigorous intensity	Exercise at least 15-30 min per day.
Activities	(15-30m dash, and shuttle running)

Procedure

The data was collected using questionnaires, all the participants completed SBQ and IPAQ at baseline and at the end of eight weeks after intervention. After baseline data collection the participants were divided into two equal groups. 1st group were the experimental group (20) which performed physical activity through an intervention approach and 2nd group was the control group (20) which had to perform traditional activity. Different types of exercises were assigned to the experimental group in leisure time to adult professionals to break down the sedentary lifestyle and make them active. The e-mobile intervention approach was also applied. Before the intervention, we ensured that all the participants were using smartphones and made WhatsApp groups among the participants for intervention. The text message technique was used to remind the

participants of their physical activity. The text was sent to the participants as a reminder for their physical activity to break the sedentary behaviour. The following intervention exercises were developed to keep the participants active and break the sedentary time in the office.

Table 2: ***Workplace intervention Program***

Sr. No.	Work Place Activities
1	Take a walk break after a coffee or tea break.
2	After lunch, go for a leisurely walk with your co-workers.
3	When you take a glass of water, get up and move about.
4	Stand up instead of sitting whenever feasible.
5	Get up and speak during professional phone calls.
6	Take a walk after work.
7	Instead of emailing or contacting a co-worker, go to her/his desk.
8	While going to meetings, walk quickly.
9	Use the stairs whenever possible.
10	Go the long way to the restroom.
11	Arrange for walking meetings with co-workers.

Results

Data Analysis

The data collected were analyzed using SPSS version 25.0. To present its findings, the study utilized descriptive statistics such as means, SD, including descriptive statistics and inferential analysis like T-tests and ANOVA were used to analyze the data and determine relationships between variables.

Demographic Information

Demographic information was collected from 40 respondents, focusing on their age, height, and weight. These descriptive statistics provide an overview of the demographic information of the respondents in Table 3.

Table 3: ***Demographic Information of the Respondents***

	Experimental Group	Control Group
	Mean ± SD	Mean ± SD
Age (Years)	43.10 ± 9.50	34.60 ± 6.63
Height(Cm)	168.43 ± 8.87	165.13 ± 5.01
Weight(Kg)	73.60 ±13.39	71.10 7.40

The experimental group underwent a physical activity intervention approach,

engaging in various exercises, to break their sedentary lifestyle and promote an active lifestyle. The control group followed traditional activity patterns. Following the intervention, the post-intervention data collection showed a significant increase in the activity level among the participants. Previously inactive individuals transitioned to a moderate level of activity, with 14 participants classified as minimally active, while an impressive 26 participants were categorized as vigorously active. Table 4 suggests that the intervention successfully motivated the participants to become more physically active, demonstrating a positive impact on their activity levels.

Table 4: ***Comparison of Pre and Post Activity Levels of the Participants (n=40)***

Sr. No.	Activity Level	Pre Data No. of Participants	Percentage	Post Data No. of Participants	Percentage
1	Not Active (less than 600 METs)	4	10%	NA	NA
2	Moderate Active (600-3000 METs)	27	67.5%	14	35%
3	Vigorous Active (more than 3000 METs)	9	22.5%	26	65%

Independent Samples t-test

Table 5 presents the pre-test and post-test results for the experimental and control groups' Metabolic Rate, including mean and standard deviation values. The statistical analysis revealed a significant difference between the means of the control and experimental groups, with a t-value of -3.29 and a p-value of 0.002. This indicates a substantial and statistically significant difference in the post-test means between the control group (1593.88) and the experimental group (1468.44). The observed values suggest a strong and significant effect.

Table 5: *Independent Samples t-test (Pre-and post-tests of both groups)*

Groups	Tests	Mean	SD	T-test	df	Level of significance
Control group	Pre-test	1533.53	164.68	-3.29	38	.411
	Post-test	1593.88	112.32			.002
Experimental group	Pre-test	1488.31	179.13	-3.29	38	
	Post-test	1468.44	128.19			

p>05

ANOVA

The ANOVA results presented in Table 6, the results showed significant differences between the experimental and control groups in terms of various measures. Also results revealed that moderate physical activity (Minutes) and moderate physical activity (METs), where the post-test F values were 101.26 in both categories, with p-values of .001. However, for walking physical activity (Minutes) and walking physical activity (METs), the post-test F values were 3.07 and 3.18, respectively, with p-values of .880 and .830. In terms of total physical activity (Minutes) and total physical activity (METs), the post-test F values were 20.06 and 36.02, respectively, both with p-values of .000, indicating significant differences between the groups. Additionally, for sedentary behaviour (Hours), the post-test F value was 47.13, with a p-value of .000, suggesting a significant difference between the groups. Lastly, for metabolic rate, the post-test F value was 10.83, with a p-value of .002, indicating a statistically significant difference between the groups. Overall, these findings provide strong statistical evidence supporting the impact of the intervention on physical activity levels, sedentary behaviour, and metabolic rate when comparing the experimental and control groups.

Table 6: ***ANOVA for means of intervention and control group***

	Experimental Group		Control Group			
	Mean	SD	Mean	SD	f	Sig
Pre-Vigorous PA (Min.)	45.25	48.22	72.65	56.63	2.71	0.11
Post-Vigorous PA (Min.)	170.00	33.30	68.15	55.11	50.78	0.01
Pre-Vigorous PA (METs)	362.00	385.74	581.20	453.06	2.71	0.11
Post-Vigorous PA (METs)	1366	266.37	545.20	440.89	50.78	0.00
Pre-Moderate PA (Min.)	73.75	82.12	75.00	39.20	0.004	0.95

Post- Moderate PA (Min.)	185.00	25.56	77.00	41.02	101.26	0.00
Pre-Moderate PA (METs)	295.00	328.50	300.00	156.81	0.00	0.95
Post- Moderate PA (METs)	743.00	102.24	308.00	164.08	101.26	0.00
Pre-Walking PA (Min.)	261.75	209.00	364.50	283.56	1.70	0.20
Post- Walking PA (Min.)	492.00	203.43	353.50	285.63	3.07	0.88
Pre-Walking PA (METs)	863.78	689.71	1202.85	935.74	1.70	0.20
Post- Walking PA (METs)	1625.55	662.42	1166.55	942.56	3.18	0.83
Total Physical Activity Pre (Min.)	380.75	241.76	512.15	296.21	2.36	0.13
Total Physical Activity Post (Min.)	864.50	205.06	498.65	302.37	20.06	0.00
Total Physical Activity Pre (METs)	1520.78	940.36	2084.05	1058.09	3.17	0.08
Total Physical Activity Post (METs)	3798.20	751.01	2019.75	1091.89	36.02	0.00
Sedentary Behaviour Pre (Hrs.)	50.50	7.94	51.15	5.31	0.09	0.76
Sedentary Behaviour Post (Hrs.)	36.70	8.23	56.55	9.98	47.13	0.00
Metabolic Rate Pre	1488.31	179.13	1533.53	164.68	0.69	0.41
Metabolic Rate Post	1468.44	128.19	1593.88	112.32	10.83	0.00

$P<0.05$

Discussion

The findings of this study highlight the significant impact of sedentary behaviour on metabolic rate among adult professionals. The intervention approach employed in the study effectively demonstrated that reducing sedentary time and increasing physical activity can lead to improvements in metabolic rate (Gardner et al., 2016). The results showed a clear association between sedentary behaviour and metabolic rate, with a negative correlation observed in both male and female adult professionals (Thorp et al., 2022). These findings emphasize the importance of addressing sedentary behaviour and promoting physical activity to enhance metabolic health among adults in professional settings. Further research and interventions in this area can contribute to improved overall health outcomes for this population (Thomson et al., 2008).

Based on the findings of the study conducted by Bradnam et al., (2021) on sedentary behaviour and metabolic rate among adult professionals, it is strongly recommended to implement intervention programs targeted at reducing sedentary behaviour and promoting physical activity. These programs can play a crucial role in improving metabolic health and overall well-being among this population. These interventions should provide guidelines and support for individuals to increase their physical activity levels, including light, moderate,

and vigorous activities (Verschuren et al., 2022). By doing such kind of activities adults can enhance their metabolic rate, improve overall health, and reduce the negative effects of sedentary behaviour (Bull et al., 2020). Additionally, raising awareness about the importance of minimizing sedentary time and encouraging regular physical activity should be emphasized to promote healthier lifestyles among adult professionals (Hamilton, 2018).

Conclusion

In conclusion, the intervention study examining sedentary behaviour and metabolic rate among adult professionals found that engaging in physical activity can significantly improve metabolic rate while reducing sedentary behaviour. The intervention group demonstrated increased metabolic rate scores, decreased sedentary lifestyle, and increased levels of walking, moderate activity, and vigorous activity. These findings highlight the importance of incorporating regular physical activity to enhance metabolic health among adult professionals.

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