



# The Effects of “I Walk App” on Physical Activity Among Public Health Nurses in Taiwan

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# Overview

- ➡ Profile of Taiwan
- ➡ Background of the Study
- ➡ Study Purposes
- ➡ Methods
- ➡ Results
- ➡ Conclusions



# Profile of Taiwan

- Population: 23.58 million (2018)
- Birth rate: 1.06 (2018)
- Population aged over 65: 14.76% (2019.03)
- Life expectancy: M 77.3; F 83.7 (2017)
- National Health Insurance (since 1995)  
Coverage rate: 99.7%





# Public Health Centers in Kaohsiung

There are 38 public health centers in 38 districts in Kaohsiung City.



Source: <https://sam1.kcg.gov.tw/> 2019/06/04



## Background of the Study (1/4)

- ☞ In Taiwan, public health nurses (PHNs) serving in the public health centers play significant roles in disease prevention and health promotion for the public.
- ☞ There is rare research to investigate the health-promotion behavior and self-management of health of the PHNs.

*Healthy Nurses for Healthy People*



## Background of the Study (2/4)

- ☞ In Taiwan, leading causes of death including cancer, heart disease, CVD, DM, chronic respiratory disease, hypertensive diseases, nephritis, and chronic liver disease.
- ☞ Physical activity can lower the incidence and mortality of chronic diseases and is considered a behavior that promotes good health.
- ☞ Most healthcare providers merely focus on the health status of patients and neglect the importance of their own health.





## Background of the Study (3/4)

- ☞ National Communications Commission of Taiwan (2013): 26.78 million smartphone users, and 126 mobile phone subscriptions for every 100 people.
- ☞ Mobile phone usage has become highly popularized in Taiwan.
- ☞ With advances in information technology and the increased popularization of wireless communication technologies, the use of mobile devices such as smartphones for the improvement of physical activity has become increasingly (Hong et al., 2014; Roiget al., 2014).



## Background of the Study (4/4)

- ☞ The development of apps that can influence and assist in the establishment of healthy behaviors has become an inevitable global trend (Fox, 2010).
- ☞ Smart mobile devices can provide health education, assist users in target setting, and facilitate changes and cultivation of physical activity habits through real-time feedback mechanisms, network supporting systems, or even intervention methods (Roiget al., 2014).
- ☞ Mobile apps can not only promote physical activity and control body weight, but also encourage the pursuit of healthy behaviors (Lee et al., 2018).



# Study Purposes

- ➔ Develop a program for self-managing physical activity with intelligent mobile technology-- “i walk App” and to examine the status of physical activity of the PHNs.
- ➔ Evaluate the effectiveness of self-managing physical activity with “i walk App” on physical activity intention, physical activity (weekly walking time, daily sedentary time), BMI, and waist circumference among PHNs.



# i walk App (1/3)



Register to be the participant and input personal information.



Set up a personal goal of walking, including time, consumption of calorie, and distance.



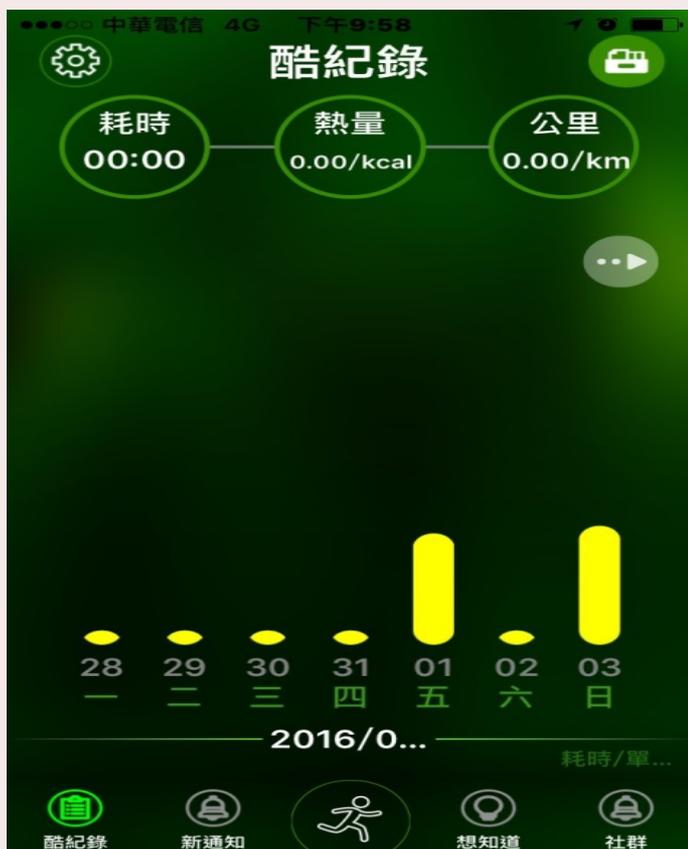
# i walk App (2/3)



Walking routes and other information



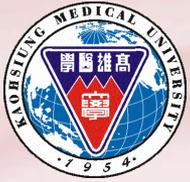
# i walk App (3/3)



Personal daily walking record information



Set up a walking team to motivate for each other/networking support systems



# Methods

☞ Design:

A quasi-experimental design with a random assignment.

☞ Participants:

All the 110 PHNs at Kaohsiung City in Taiwan were invited to participate and randomly assigned to the experimental group and control group.

Finally, 104 (94.55%) completed the study.

☞ The experimental group (n=54):

received the “i walk App” self-management intervention.

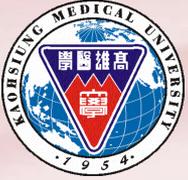
☞ The control group (n=50):

received 3-time e-mail reminders to engage in physical activity during the study period.



# Research Process

- ☞ Before starting the research project, the research purpose and process were explained to the participants via e-mail.
- ☞ After determining eligible participants, the PHNs were randomly assigned into experimental group and control group.



## Measurements (1/3)

- ☞ Demographic Inventory:  
age, educational level, marital status, work experience, public health work qualification, number of children, and disease condition.
- ☞ Physical Activity Intention Scale (PAIS)
- ☞ The Taiwan Version of International Physical Activity Questionnaire (TV-IPAQ): was authorized for use by the Taiwan Ministry of Health and Welfare to measure physical activity.



## Measurements (2/3)

### ☞ Physical Activity Intention Scale (PAIS):

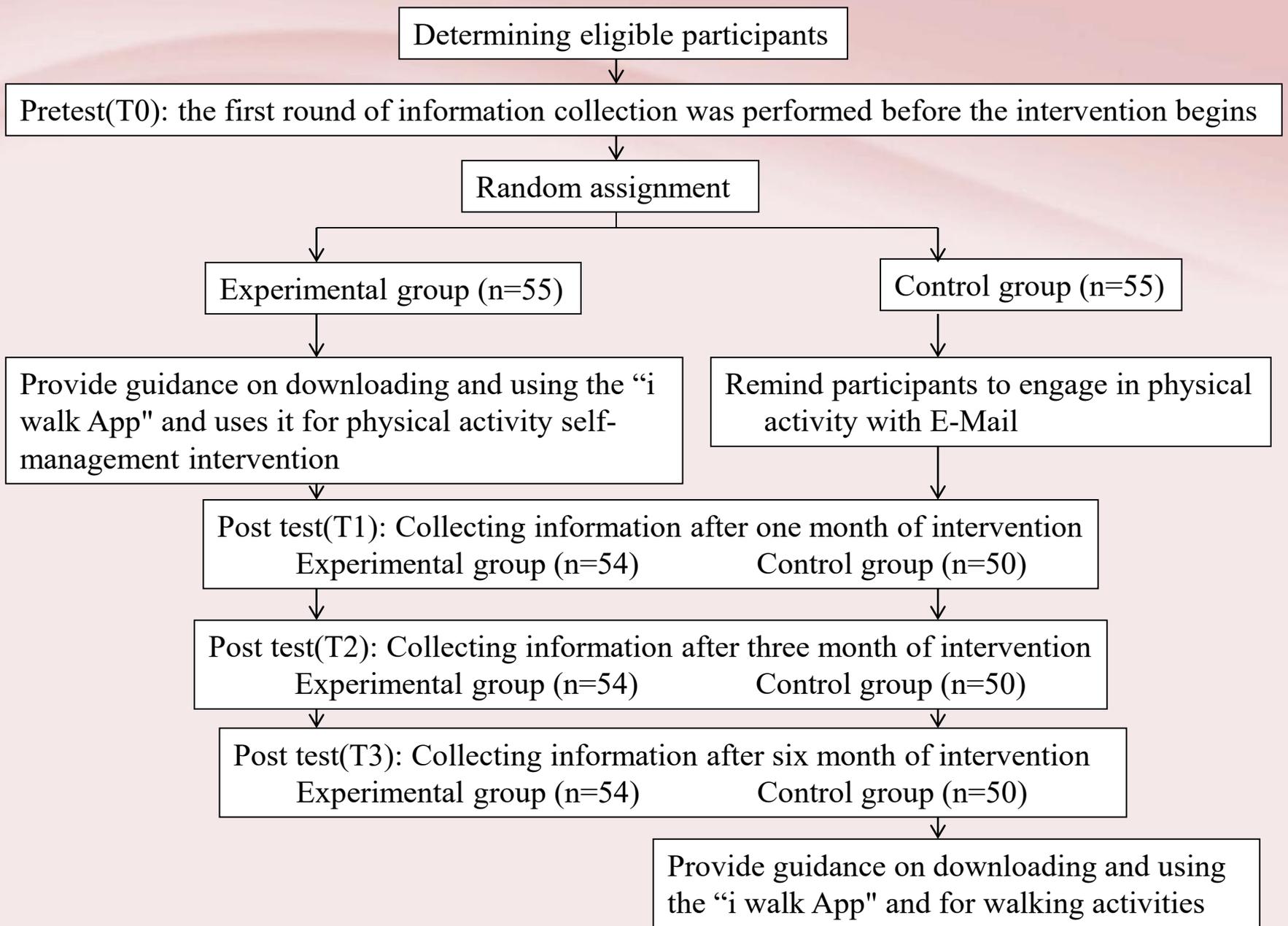
- Measures the likelihood and motivation of physical activity in the coming week.
- 4 items
- Each item comprises a Likert's scale ranging from 1 to 5.  
A total score ranges from 4 to 20.
- The higher score indicates higher level of behavioral intention.
- Cronbach's  $\alpha$ : 0.95
- One-week test-retest reliability coefficient: 0.92



## Measurements (3/3)

### ☞ TV-IPAQ (short version):

- Measures the physical activity, including vigorous physical activity, moderately vigorous physical activity, daily walk time, and daily sedentary time, of the participants in the past 7 days.
- The content validity was 0.994 and 0.992 for language equivalence and meaning similarity, respectively, between the English and Taiwan versions of the IPAQ-SS, and consistency values for the English and Chinese versions in terms of intra-class correlation coefficients were 0.704.



**Figure 1. Research Process**



# Ethical considerations and data collection

- Institutional Review Board.
- The researcher contacting the in-charge nurse at each district's public health center via phone or mail to invite PHNs.
- The study participants returned the questionnaires with a sealed envelope and sent them by mail to the researcher.



# Study Results



Table 1: Demography of the experimental and control groups

			App users (n=54)		Non-app users (n=50)		$\chi^2$	<i>p</i>
			n	%	n	%		
Education level							0.028	0.8671
college	88	84.6	46	85.2	42	84.0		
above college	16	15.4	8	14.8	8	16.0		
Marital status							0.046	0.4736
unmarried	24	23.1	14	25.9	10	20.0		
married	80	76.9	40	74.1	40	80.0		
Children							0.063	0.8019
no	24	23.1	13	24.1	11	22.0		
yes	80	76.9	41	75.9	39	78.0		
Chronic disease							0.051	0.8207
no	78	75.0	40	74.1	38	76.0		
yes	26	25.0	14	25.9	12	24.0		
			M	SD	M	SD	<i>T</i>	<i>p</i>
Age			43.80	7.92	44.30	7.15	0.1153	0.7349
Work experience (yr)			20.10	8.09	19.81	7.88	0.0346	0.8528



Table 2. Difference in physical activity intention score between the experimental and control groups

	App users ( <i>n</i> =54)		Non-app users ( <i>n</i> =50)		<i>P</i>
	M	SD	M	SD	
PAIS					
Base	14.89	2.87	15.9	3.07	0.0852
1 month	15.91	2.80	15.14	2.37	0.0019
3 months	16.56	2.45	15.14	2.03	0.0011
6 months	17.52	2.42	15.50	1.94	<0.0001
Amount of change after 6 months	2.63	3.41	-0.40	2.27	<0.0001
Confidence intervals of difference	(1.70, 3.56)		(-1.04, 0.24)		
Value of paired <i>t</i> -test	<i>P</i> <0.0001		<i>P</i> =0.4375		



Table 3. Difference in weekly walking time between the experimental and control groups

	App users ( <i>n</i> =54)		Non-app users ( <i>n</i> =50)		<i>P</i>
	M	SD	M	SD	
Weekly walk (min)					
Base	78.15	103.36	90.30	82.90	0.5120
1 month	114.63	114.55	67.30	113.39	0.0368
3 months	160.74	110.89	38.20	77.12	<0.0001
6 months	214.44	122.80	46.20	73.24	<0.0001
Amount of change after 6 months	136.30	135.15	-44.10	95.33	<0.0001
Confidence intervals of difference	(99.41, 173.18)		(25.39, 67.01)		
Value of paired <i>t</i> -test	<i>P</i> <0.0001		<i>P</i> =0.0058		

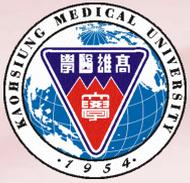


Table 4. Difference in daily sedentary time between the experimental and control group

	App users ( <i>n</i> =54)		Non-app users ( <i>n</i> =50)		<i>P</i>
	M	SD	M	SD	
Daily sedentary time (h)					
Base	8.67	1.45	8.28	1.07	0.1279
1 month	8.06	1.67	8.09	2.24	0.9481
3 months	7.48	1.46	8.24	1.67	0.0152
6 months	7.11	1.23	8.42	1.54	<0.0001
Amount of change after 6 months	-1.82	2.16	+0.14	1.13	<0.0001
Confidence intervals of difference	(-2.41, -1.23)		(-0.18, 0.46)		
Value of paired <i>t</i> -test	<i>P</i> < 0.0001		<i>P</i> = 0.5987		



Table 5. Difference in body mass index (BMI) between the experimental and control group

	App users ( <i>n</i> =54)		Non-app users ( <i>n</i> =50)		<i>P</i>
	M	SD	M	SD	
BMI (kg/m <sup>2</sup> )					
Base	23.80	3.85	23.25	4.69	0.5116
1 month	23.52	3.68	23.24	4.73	0.7402
3 months	23.41	3.71	23.29	4.81	0.8814
6 months	23.31	3.68	23.28	4.75	0.9690
Amount of change after the 6 months	-0.49	0.53	+0.03	0.44	<0.0001
Confidence intervals of difference	(-0.63, -0.34)		(-0.09, 0.16)		
Value of paired <i>t</i> -test	0.5040		0.9711		



Table 6. Difference in waist circumference between the experimental group and control group

	App users ( <i>n</i> =54)		Non-app users ( <i>n</i> =50)		<i>P</i>
	M	SD	M	SD	
Waist circumference (cm)					
Base	81.19	7.56	81.46	8.45	0.8614
1 month	80.65	6.95	81.60	8.11	0.5209
3 months	80.35	6.93	81.66	8.26	0.3823
6 months	80.20	6.85	81.68	8.25	0.3219
Amount of change after the 6 months	-0.98	1.50	+0.22	1.36	<0.0001
Confidence intervals of difference	(-1.39, -0.57)		(-0.17, 0.61)		
Value of paired <i>t</i> -test	0.4812		0.8955		



Table 7. Changes over time for outcome variables and the dichotomized variables (App use vs. Non-app) analyzed by generalized estimating equations

	PAIS			Weekly walk (min)			Daily sedentary time (h)		
	Estimate	SE	<i>P</i>	Estimate	SE	<i>P</i>	Estimate	SE	<i>P</i>
App vs. Non-app use	0.82	0.40	0.042	83.21	14.18	<0.001	-0.44	0.26	0.096
1 month vs. base	0.16	0.28	0.55	7.89	10.089	0.44	-0.40	0.17	0.015
3 months vs. base	0.50	0.23	0.033	17.84	11.022	0.11	-0.64	0.14	<0.001
6 months vs. base	1.17	0.32	<0.001	49.57	14.45	<0.001	-0.74	0.15	<0.001
Age (yr)	0.028	0.027	0.30	2.00	1.28	0.12	-0.033	0.017	0.061
Education									
Above vs. college	0.39	0.59	0.51	60.00	20.34	0.003	0.17	0.38	0.66
(Intercept)	13.68	1.24	<0.001	-56.46	58.28	0.33	10.12	0.80	<0.001



Table 8. Changes over time for outcome variables and the dichotomized variables (App use vs. Non-app) analyzed by generalized estimating equations

	BMI (kg/m <sup>2</sup> )			Waist circumference (cm)		
	Estimate	SE	<i>P</i>	Estimate	SE	<i>P</i>
App vs. Non-app use	0.32	0.80	0.69	-0.90	1.44	0.54
1 month vs. base	-0.15	0.044	<0.001	-0.21	0.13	0.108
3 months vs. base	-0.18	0.049	<0.001	-0.34	0.15	0.023
6 months vs. base	-0.24	0.054	<0.001	-0.40	0.15	0.008
Age (yr)	0.14	0.048	0.003	0.26	0.080	0.001
Education						
Above vs. college	0.093	1.026	0.93	-2.06	1.59	0.20
(Intercept)	17.18	2.15	<0.001	70.58	3.67	<0.001



## Conclusions (1/2)

- ☞ Walking is an easy way to engage in physical activity.
- ☞ The “i walk App” was used effectively to improve the walking time as well as reduce sedentary time.
- ☞ “i walk App” users were able to monitor their physical activity, as well as increase the sustainability of the program through goal setting, group interaction, the reminder function, and immediate feedback and guidance after walking.
- ☞ The social networking function of the App can provide support by presenting community information for walkers or inviting friends to walk together, compete, or share fun. These additional features helped increase the walking behavior of PHNs.



## Conclusions (2/2)

- ☞ The changes in BMI and waist circumference could not have a significant effect in a shorter period of time, the users should also know the amount of walking required to consume a certain number of calories can be provided, together with dietary suggestion functions (Rabbi et al., 2015).
- ☞ The engagement of physical activity of the PHNs can play a role model for health promotion and community health services.
- ☞ The “i walk APP” can be applied to other healthcare providers and the public.



# Acknowledgements

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