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Health Impact Assessment of ICT-based Walking Promotion Project in Gimhae, Korea

People with People in Mind

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Introduction

I Introduction

The purpose of health impact assessment (HIA) is to review and analyze the potential impact of a new policy or project on the given demographic segment before its implementation in order to ensure health-positive outcomes. As much of the established literature in Korea on policy impacts focuses on providing ex-post performance reviews, it is expected to take a while before HIA becomes a widely practiced norm.

The Korean government has been seeking to ensure balanced national development by enhancing the institutional basis for decentralization and local self-government. Even the system for national development ensures that policymakers at diverse levels actually listen to and gather local constituents' opinions and that the policy measures they propose benefit as many constituents as possible. The overarching objectives guiding the design and execution of new policy initiatives include revitalizing local economies through urban regeneration, enhancing the competitiveness of local industries, realizing the ideal of the inclusive welfare state for all, ensuring dignity and health in old age, providing safe housing for ordinary people, and enhancing the public input and goals of health and medical services.

The World Health Organization (WHO)'s Healthy City cam-

paign, which strives to ensure HIA in all forms of policymaking, is increasingly gaining ground worldwide today. The Korea Healthy City Partnership (KHCP), for example, now consists of 100 full-status local governments (as of October 2019).[1)]

HIA is at the center of the Healthy City policy programs. By mandating HIA, policymakers seek to ensure that diverse determinants of health are considered so as to develop policy measures that minimize the health gap in the population and promote public health.

The goal of HIA is to provide recommendations regarding the prevention of illnesses and health orientation for all policy plans and projects (WHO, 1999).

The Korean Ministry of Health and Welfare (MOHW)'s Fourth National Health Promotion Plan (NHPP), which lists a number of major health objectives to be achieved nationwide by 2020, provides for the expansion of the health-promoting infrastructure as well. The plan requires local governments to conduct HIAs in developing and executing their respective healthcare plans and aims to have at least 100 local governments conduct such assessments (MOHW and KHPI, 2015).

The Korea Institute for Health and Social Affairs (KIHASA)'s HIA system development and operation project encompasses the trial HIAs that the institute has conducted of the policy initiatives of national and local governments since 2008. KIHASA has been

1) KHCP website (http://www.khcp.kr/hb/main), retrieved on October 7, 2019.

building a database, managing an official website, and developing HIA guidelines for major categories of policymaking as part of its efforts to expand the basis for the practice of HIA in Korea.

Crucial to the systematization and widespread practice of HIA in all areas and levels of policymaking is the need to analyze the health-related capabilities of all stakeholders, including policymakers and beneficiaries/constituents (individuals and local communities) in order to identify the social determinants of health.

The purpose of this study is to provide the necessary technical support for HIAs conducted by local governments. It achieves this by realizing the following two specific aims:

- Identify and develop recommendations for local governments to enable them to incorporate the assessment and analysis of health impacts into all their policy decisions.
- Identify capability-centered and social determinants of health that can be applied to and used for pilot HIA. In 2019, in particular, the goal is to research and analyze the determinants of the walking-promoting program of Gimhae's Public Health Clinic (PHC) using information and communications technology (ICT), a policy initiative that has been selected from among the Healthy City applications submitted by local governments across Korea.

Ⅱ

HIA Process: Overview

1. Rationale for HIA
2. HIA Framework

Ⅱ HIA Process: Overview

1. Rationale for HIA

1) Deciding the Candidate Project

In an effort to find a Healthy City project to be subjected to the HIA in 2019, KIHASA began to receive applications from willing local governments, via the KHCP, in January that year. The institute formed a panel of internal and external experts to perform technical review on the four applications it received and selected the highest-scoring application as the subject of its HIA. Below is the rubric used in the technical review and screening of applications.

〈Table 1〉 Technical Screening Tool

	Strongly disagree ① ------ ② ------ ③ ------ ④ ------ ⑤ Strongly agree				
Would this project affect the following types of determinants of health?					
Lifestyle					
Physical environment					
Socioeconomic environment					
Capacity of healthcare system					
Is this project capable of exerting an impact on health?					
Positive impact (direct or indirect)					
Negative impact (direct or indirect)					
Is this project suited to the purpose and aims of KIHASA's technical support program for HIA?					
Health in all policies					

	Strongly disagree ① ------ ② ------ ③ ------ ④ ------ ⑤ Strongly agree				
Participatory HIA					
Developing measures to counter health inequality					
Overall opinion					
Is HIA appropriate/required for this project?					

(2) ICT-based Walking Promotion Project in Gimhae: Introduction

○ In 2014, Gimhae City began to encourage citizens to walk more by training Walking Exercise Leaders (WELs) and subsidizing citizens' own walking clubs.

- The city has been training and certifying WELs every April since 2014.
- WELs go on to form walking clubs for their own neighborhoods, encouraging locals to walk with one another two to three times a week.
- Participants are given community service points and activity subsidies.
- Meetings are held every other month to provide additional training for WELs.
- Civil servants monitor and review walking clubs' activities twice a year.
- From 2014 to 2018, a total of 185 WELs were trained (31 in 2018).

- As of December 2018, there were 28 walking clubs across Gimhae, with 316 members in total.

○ In 2019, Gimhae adopted the ICT-based Walking Promotion Project (WPP) as one of its new annual policy projects.

- The project involved distributing a mobile app designed to encourage citizens to walk and also help boost the local economy and businesses.
- The project aimed to enlist 1,000 local citizens to participate.
- The Walk-On app was used to compare participants' walking patterns and also provide them with useful information/content on:
  - Participating local businesses (restaurants, cafés, etc. to help boost the local economy);
  - The option of converting the accumulated number of steps the participant has taken into monetary points that can be donated to charities;
  - Walker-friendly paths and other supportive policy measures.
- Rationale for HIA: As there has not been a far-ranging assessment of the health impacts of using ICT in policy projects, there was much value in assessing how the use of technology has helped

increase citizens' walking, contributed to the local economy, encouraged charity (donating monetary points/gifts converted from citizens' walk records), and shed light on the social, economic, and environmental benefits of walking more, using the WHO's health economics assessment tool, existing qualitative analyses, and input from Healthy City experts.

※ Status of WELs in 2018:

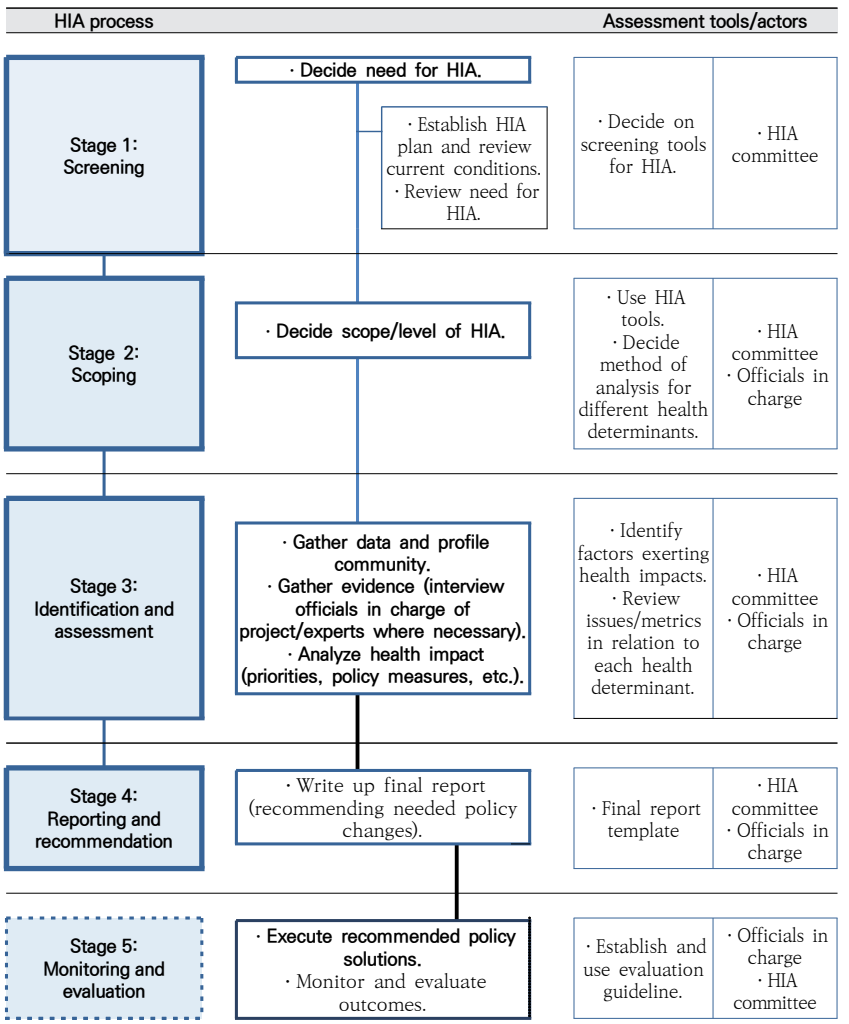
- WELs led the walking campaign and events throughout the city, including the Bongha Village Walk Campaign on June 4, Forest Trail Walkathon on August 15, and Healthy Walkathon with WELs on October 13. They also helped:
- maintain walking trails (the trail behind Seokchil Village in Juchon-myeon);
- organize a weekly walking campaign for four months in cooperation with members of the Mental Health Welfare Center (MHWC); and
- host 5,010 walking club activities in 2018, for 37,141 members in total.

2. HIA Framework

Figure 1 provides the standard model of HIA that was used for this study.

The model consists of five stages, including screening, scoping, identification and assessment, and reporting and recommendation. The screening process involved assembling an HIA committee, comprised of civil servants in charge, KIHASA researchers, and other experts, who together drafted the HIA plan. Scoping involved coordinating the specific tasks and schedule of the HIA, in consultation with PHC workers in Gimhae, health experts, and WELs. The determinants of health to be reviewed were divided largely into the physical environment and individual factors. The resulting assessment focused mainly on the utility of the ICT (mobile app) in promoting walking.

[Figure 1] Standard Model of HIA



Secondary source: Choi, E., Kim, J., Lee, N., Kim, J., Lee, H., and Kim, J. (2018). HIA Technical Support: Application and Use of Participatory HIA Methods. KIHASA Research Report 2018-28.

Primary sources: Delany et al. (2014); Haigh et al. (2013); Kim, et al. (2016). HIA Operation 2016, pp. 166-168; Kim, et al. (2017). HIA Operation 2017, p. 95.

〈Table 2〉 HIA Scoping Tool

Category	Determinant of health	Negative impact (–)	No impact (0)	Positive impact (+)	Note (impact on specific groups)
Socioeconomic factors	1. Life expectancy, health span, current illness (Major: cardiovascular disease, cancer, senile dementia, atopic dermatitis, etc.)				
	2. Strength of local economy				
	3. Crime/security				
	4. Policy/legal (e.g., by-laws on health, etc.)				
Physical environment	1. Water quality, atmosphere, waste management, etc.				
	2. Traffic/parking				
	3. Living conditions for residents				
	4. Accidents/injuries of residents				
Society and community	1. Cultural/athletic activities in community				
	2. Social/emotional support/solidarity (e.g., local hobby clubs, etc.)				
	3. Risk of gentrification/deprivation of residents				
Individual habits	1. Physical activity				
	2. Mental health				
Functional factors of walking paths	1. Physical maintenance (pavement, regulation on obstacles, etc.)				
	2. Safety (against accidents, crime, etc.)				
	3. Continuity of walking paths				
	4. Pleasantness (freedom from noise, visual stress, etc.)				

[Figure 2] HIA Committee Meetings (Gimhae)

○ Identifying determinants associated with walking

- Literature review of ICT-based initiatives promoting walking
- Literature review of capability enhancement
- Analysis of local factors for walking
- Interviews with locals and opinion poll (questionnaire based on studies on walk-friendliness)[2)]

○ Articulating recommendations

- The researchers organized an international workshop in September 2019 to determine the principles of policy recommendation, based on HIA, and discuss the application of such principles.

2) References for interviews: Michie S., Stefanie A., Falko F.S., Stephan U.D., Alex Bishop & David P. F. (2011) A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: The CALORE taxonomy, *Psychology & Health*, 26:11, 1479-1498, DOI: 10.1080/08870446.2010.540664
References for questionnaire: Park, S., Choi, I., and Seo, H. (2008). Use of Assessment Indicators of Walk-Friendliness in Living Zones for the Development of Healthy Residential Environments. Seoul National University College of Engineering and Health Promotion Support Group.

[Figure 3] Working-level International Workshop on HIA

Literature on ICT-based Support for Walking

Koreans have begun to group a wide variety of health and medical services based on the latest ICT, including smartphones, computers, and GPS devices, under certain terms, such as e-health and U-health (Jeong et al., 2005). As the purpose of this study is to gauge how an ICT solution has affected the behavior of users, we refer to the concept of "mHealth," cited in Kuru (2018). mHealth serves two main purposes: first, to aid the prevention and treatment of diseases at healthcare facilities, and, second, to induce positive behavioral changes and promote wellness. Well-known examples of mHealth include devices and software that encourage people to increase their physical activity. Think, for example, of health-monitoring technologies (amounts of exercises, heart rate, etc.) that use the accelerometer and GPS features of smartphones, smartwatches and fitness trackers, or apps that encourage users to exercise more by providing them with necessary social networking support (Kuru, 2018).

We surveyed the literature in order to hypothesize and predict how smartphone apps affect the health-related behavior of different demographic groups. We focused particularly on whether Gimhae's current ICT-based WPP had the potential to influence the health of different groups differently. The scope of literature we surveyed was therefore matched to the scope of

health impacts we determined during our scoping process.

The central subject matter of this literature review is the impact of smartphone health apps on health-related behavior. Gimhae's WPP, for example, is encouraging local citizens to download, install, and use the city's walking app to induce them to walk more for their health. The program's app counts the number of steps taken by users, and keeps track of their interactions with WELs and local walking clubs and participation in team competitions. Because the WPP, subject to our HIA, aims to get users to walk more, studies analyzing smartphone apps that promote certain behaviors for the purpose of preventing and managing lifestyle diseases (including obesity) were excluded from the scope of literature we reviewed. Instead, our review included studies targeting the general local population and adults aged 19 or older. The method and findings of our literature survey are based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Liberati, Altman, Tetzlaff, Mulrow, Gøtzsche, Ioannidis,…Moher D., 2009).

Our review also included studies targeting the general adult local population and analyzing the accessibility of digital solutions. Our independent variable (i.e., intervention) was the smartphone app for promoting walking. The outcomes we sought to observe were the contributions of smartphone apps to walking and physical activities involving walking (Higgins and Green, 2011).

Our criteria of inclusion and exclusion were refined as we

proceeded with the literature search. Studies on smartphone apps that promote physical activity are, by definition, very recent because smartphones have become popular only in recent years. Accordingly, we limited the temporal scope of the studies subject to our review to the past five years (2014 to 2019). Our survey design encompasses all possible types of studies, including observational, cross-sectional, case-control, cohort, longitudinal, systematic review, and meta-analysis studies.

Key to the intervention that is the subject of our analysis is the use of smartphone apps or wearable devices that are capable of counting the number of steps taken and enable users to monitor their physical activity on their own. Accordingly, apps and devices providing personalized features and/or messaging-connected motivational features and lacking step-counting features were excluded from our survey.

Also, our review included studies that targeted the general local population and not demographic groups diagnosed with, or at higher risk of contracting, particular lifestyle diseases (diabetes, cardiovascular diseases, obesity, etc.).

The international databases included in our survey were PubMed, Web of Science, and Scopus, all of which are widely used by health and medical researchers worldwide. The search terms used in the surveyed literature were also applied. The dependent variables included walking-related keywords. The search terms were applied to medical subject headings

(MeSHs), while non-MeSHs were searched based on titles and abstracts. Our searches of these databases returned a total of 2,715 studies in total. That number was reduced to 2,128 after the overlapping papers were eliminated. Having chosen 35 of these studies on the basis of titles and abstracts, we finally narrowed them down to 21 based on full-text review.

The characteristics of the mHealth-related studies we discovered, based on systematic literature survey and screening, can be summarized as follows.

First, the number of studies on smartphone apps and their impact on the health of the general adult local population began to increase significantly in 2015. Most of the studies on smartphone apps, such as Gimhae's Walk-On, and wearable devices that count steps using build-in accelerometers date back to 2015 or later. Prior to 2015, much of the literature focused on text messaging- or Web-based health programs. Furthermore, much of the pre-2015 literature also targets specific demographic groups, i.e., those diagnosed with, or at higher risk of developing, specific diseases.

Second, the majority of authors of the studies we reviewed point out that the theoretical basis (e.g., referencing behavioral change) of studies on mHealth and related cases remains weak. There is not yet a widely accepted and comprehensive theoretical framework that can be applied to the entire process, from the design of the smartphone app/wearable device to the plan-

ning and evaluation of the health solutions. This may be because programs using smartphone apps and wearable devices are still relatively novel. Future research is therefore expected to focus on app designs, program planning and evaluation, and research based on theories of behavioral change (Brickwood, Watson, O'Brien, and Williams, 2019).

Third, our review found no studies that address the accessibility and equality of healthcare. The dearth of studies addressing this essential subject matter was mentioned by numerous authors as well. The authors of the studies we surveyed pointed out that there are simply too few policy programs or analyses analyzing the impact of smartphone apps and digital devices on the accessibility of health services.

Researchers argue that programs offering more diverse features besides the counting and daily monitoring of steps and other physical activities, such as competitive games and rewards, tend to be more effective in inducing healthy behavior. In other words, it is better to combine the smartphone apps with other forms of rewards and activities in order to promote walking (Brickwood et al., 2019).

Technology-based programs encouraging healthy behavior are centered upon technological solutions that keep track of exercises and changes in health conditions in real time. Persuasion is, in turn, at the center of how these solutions induce positive behavioral changes. The literature therefore ad-

dresses diverse strategies of persuasion and behavioral change. Theories commonly discussed in the literature on mobile apps include the social cognitive theory, planned behavior theory, transtheoretical model, cognitive therapy, principles of persuasion and motivation, and elaboration likelihood model (Alkis and Coskuncay, 2018). If the behavioral change techniques (BCTs) and persuasive system design represent the sums of components to be incorporated into behavioral change apps, the theory of healthy behavioral changes is the framework that explains the logical correlations among those components.

The social cognitive theory explains self-efficacy as the core factor of behavioral change, and holds that self-efficacy is reinforced through social interactions and observational learning. If an mHealth solution not only taught individuals specific ways of performing certain behavior, but also enabled individuals to observe how others performed said behavior successfully, it could help harness their self-efficacy. The planned behavior theory is one of the leading conceptual tools used to explain the relationship between attitude and behavior. It holds that behavioral intentions are central to predicting behavior, and that behavioral intentions are determined by attitude toward behavior, subjective norms, and perceived sense of control (Ajzen, 1991). The components of smartphone apps that embody techniques for behavioral change can be effective in strengthening individuals' attitude toward, or sense of control over, desired behavior.

The transtheoretical model explains that there are a series of steps involved in behavioral change, each open to diverse strategies capable of facilitating transition to the subsequent step (Prochaska, DiClemento, and Norcross, 1997). According to this theory, an effective smartphone app design would feature techniques and components that guide users through all the steps of behavioral change. From a purely theoretical perspective, the features of the app would be most useful to users who are in the behavior stage. Rewards and penalties, social support, and controlled stimuli are features that can be most fruitfully applied to smartphone apps.

The elaboration likelihood model explains how attitude changes. Here, elaboration refers to the extent to which people think deliberately about important issues during the process of persuasion. It holds that attitudes shaped with a high level of elaboration endure, while attitudes shaped with a low level of elaboration are transitory and mutable. The model presents two routes of persuasion, i.e., central and peripheral. The central route leads to a high level of elaboration, while the peripheral one leads to a low one. The elaboration likelihood model can be applied to mHealth as a theoretical lens for explaining change in health-related behavior. We may use an elaboration likelihood scale to measure app users' motivation, capability, and perception, and apply the knowledge gained to the design of the app's features (Alkis and Coskuncay, 2018).

Ⅲ

Identification of Determinants on Walking

1. Community Profile
2. Determinants Associated with Walking
3. Focus Group Interviews with Gimhae Residents
4. Gimhae Residents' Walking Behavior and Opinion on the Smartphone App

Ⅲ Identification of Determinants on walking

1. Community Profile

(1) Gimhae City

Gimhae is a city located in the southeastern part of Gyeongsangnam-do Province. With an area of 463.36 square kilometers, it was home to 558,769 people in 2019. The city consists of one *eup*, six *myeon*, 12 administrative *dong* (divided into 34 legal *dong*), and 246 administrative *ri* (across 67 legal *ri*). The city hall is located in Buwon-dong (AKS, 2009).

The Gimhae population has been aging in recent years (2013 to 2018), with the proportion of people aged 14 or under steadily shrinking, and that of seniors aged 65 or older continuously rising. As of 2019, there were 82,374 people under the age of 15 in Gimhae; 401,411, aged 15 to 64; and 56,180, aged 65 or older. In 2018, 82,442 people were under the age of 15; 397,477, aged 15 to 64; and 54,753, aged 65 or older.

(2) Leading Causes of Death and Influencing Factors of Healthy Behavior

As for the healthy behavior rate, Gimhae's population scored

23.2 percent in 2018, 7.5 percentage points lower than the nationwide average and 3.8 percentage points lower than the province-wide rate. Like the percentage of the population that walks regularly, the healthy practice rate, too, dropped significantly at all levels—national, provincial, and municipal—from 2008 to 2010, but has been fluctuating since 2010.[3)]

- As for the healthy behavior rate, Gimhae's population scored 23.2 percent in 2018, 7.5 percentage points lower than the nationwide average and 3.8 percentage points lower than the province-wide rate. Like the percentage of the population that walks regularly, the healthy practice rate, too, dropped significantly at all levels—national, provincial, and municipal—from 2008 to 2010, but has been fluctuating since 2010.
- The healthy practice rate in Gyeongnam was 27.0 percent in 2018, 2.4 points up from the 24.6 percent recorded in 2017. The healthy practice rate across Korea was 30.7 percent in 2018, 3.7 points up from 27.0 percent in 2017.

3) Percentage of individuals who engage in all healthy behaviors (non-smoking, limited drinking, and walking) (MOHW and KCDC, 2018).

〈Table 3〉 Healthy Practice Rate in Gimhae

(Unit: percentage)

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gimhae	41.7	32.7	17.3	26.3	29.5	26.1	22.0	26.2	21.5	22.4	23.2
Gyeongnam	34.6	34.6	22.4	25.1	24.9	23.6	21.5	24.9	21.6	24.6	27.0
Nationwide	34.5	33.8	30.0	28.4	28.5	26.2	25.6	28.3	27.0	27.0	30.7

Source: MOHW and KCDC (2019). Local Health Statistics at a Glance 2008-2018.

(3) Walking Rates in Gimhae

We analyzed the changing percentage of Gimhae's regularly walking population from 2011 to 2018 using the raw data of the Gimhae Local Social and Health Survey.[4)]

The walking rate, for this purpose, was defined as the percentage of respondents who answered that they had walked at least 30 minutes a day for at least five days in the past week (seven-day period), which is the definition used in the National Health Statistics (MOHW and KCDC, 2019). To estimate the yearly trend, we also computed the age standardization ratio based on the size of the registered population as of July 1, 2015 (Statistics Korea, 2019).

From 2011 to 2018, 35.4 percent of the 7,315 respondents who participated in the Gimhae survey walked regularly. The walking rates were 36.3 percent among men and 34.6 percent among women, specifically. While there appears to be no con-

4) GPHC (2019).

sistent pattern in the year-to-year changes, the walking rate generally declined from 2012 and onward, before rising back up in 2018. While men walked regularly at a slightly higher rate than women throughout the analyzed period, the walking rate of women shot up dramatically in 2018 compared to 2017.

〈Table 4〉 Age-Standardized Walking Rates by Year in Gimhae

Year	N	Walking rate (%)			
		Overall	Men	Women	Difference
2011	950	38.7%	40.9%	36.6%	4.3%p
2012	920	41.9%	41.7%	42.1%	-0.4%p
2013	916	35.2%	35.5%	34.9%	0.7%p
2014	922	34.9%	36.9%	32.8%	4.1%p
2015	908	38.0%	38.6%	37.3%	1.3%p
2016	904	30.0%	32.3%	27.7%	4.6%p
2017	904	29.6%	29.9%	29.3%	0.6%p
2018	891	35.3%	32.8%	37.7%	-4.9%p
Average (2011 to 2018)	7,315 (total)	35.4%	36.3%	34.6%	1.7%p

Note: Age standardized in reference to registered population as of July 1, 2015.
Source: Gimhae PHC (2019), Gimhae Local Social and Health Survey, 2011 to 2018 (raw data).

(3) Walking Rates by Administrative Area

The raw data of the Gimhae Local Social and Health Surveys of 2011 through 2018 (Gimhae PHC, 2019) were merged and analyzed to determine changes in age-standardized walking rates by administrative area.

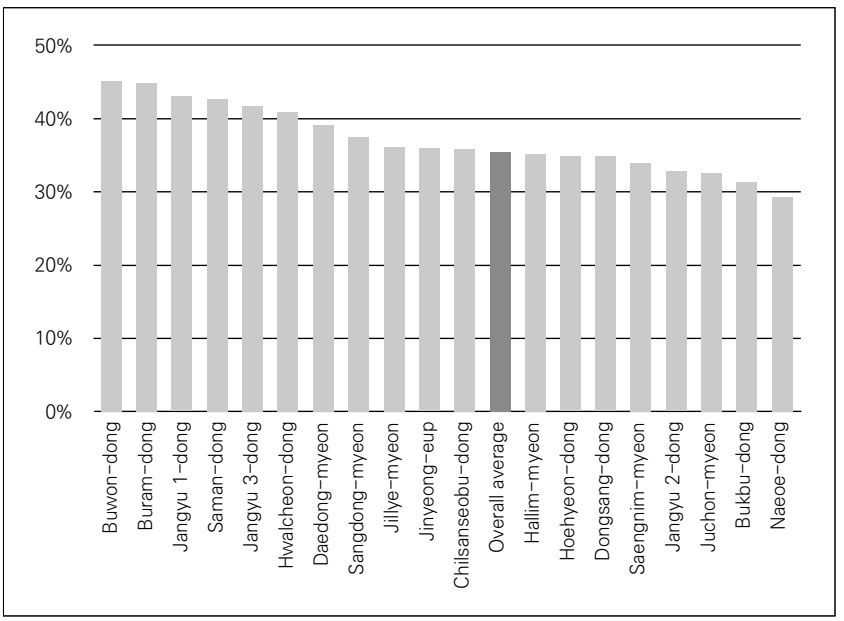
Over the eight-year period, walking rates were highest in

Buwon-dong (45.2 percent) and Buram-dong (45.0 percent) for both men and women. Naeoe-dong had the lowest walking rate, at 29.4 percent, with men there walking notably less than men elsewhere (25.7 percent). Juchon-myeon was the area where the male-female difference in walking rates was most prominent, as men reported a walking rate of 44.7 percent, which is 23.6 percentage points higher than women's 21.1 percent. Jangyu-myeon, which was divided into Jangyu 1-, 2-, and 3-dong in 2014, was an area where walking rates remained generally high, and the male-female difference was the smallest.

Buwon-dong and Buram-dong, where the average walking rates were high, and Juchon-myeon, with its prominent male-female difference, all had fewer than 200 respondents each participating in the eight years of the surveys. Naeoe-dong, which had the lowest walking rate, had nearly 10 times as many participants by contrast. The local survey sample itself was not designed to ensure demographic representativeness across all administrative areas. Rankings of these areas by walking rates therefore need to be taken with a grain of salt.

[Figure 4] Walking Rates Standardized to Average Age by Administrate Area in Gimhae, 2011 to 2018

(Unit: percentage)



Notes: Age standardized in reference to registered population as of July 1, 2015.
Jangyu 1-, 2-, and 3-dong rates are averages of the years 2014 through 2018.
Source: Gimhae PHC (2019).

The variation between administrative areas remained significant throughout the years. However, the sample sizes also varied widely from area to area, with the risk of regular walkers being overrepresented in areas with small sample sizes. The factors of walking across administrative areas were therefore analyzed on the basis of merged multi-year data.

2. Determinants Associated with Walking

(1) Demographic Factors

Of the 7,313 respondents who participated in the Gimhae local surveys from 2011 to 2018 and answered the questions about their demographic characteristics, 2,542 (34.8 percent) answered that they had walked for at least 30 minutes continuously per day on at least five days over the past week (seven-day period).

The Chi-square test on the differences in walking rates revealed that age, income, education, occupation, subjective health, diagnosis of hypertension, obesity, and engagement in moderate- to high-intensity physical activity were factors that had significant impacts on walking rates.

As for age and its influence, respondents aged 35 to 49 had the lowest walking rate, at 30.4 percent ($p < .001$), while walking rates rose in proportion to age among those aged 50 or older. The higher the income level ($p = .006$) and education level ($p < .001$), the lower the walking rate. As for occupations, respondents in the office worker category had the lowest walking rate ($p < .001$).

Respondents who subjectively rated their health as good tended to walk more (38.9 percent) than those in subjectively poor health (32.5 percent) ($p < .001$). Also, respondents who

had been diagnosed with hypertension walked more than those without such diagnosis (p = .025). Non-obese respondents also had a significantly higher walking rate than obese ones (p 〈 .001). Respondents who performed high-intensity exercise for at least 20 minutes continuously per day on at least three days or moderate-intensity exercise for at least 30 minutes continuously per day on at least five days over the past week (seven-day period) also had a significantly higher walking rate, at 50.6 percent, than those who did not engage in such exercise (30.1 percent) (p 〈 .001). However, the question about physical activity was changed in 2018 (KCDC, 2019). Statistics on moderate-intensity exercises were thus computed excluding the data for 2018.

〈Table 5〉 Demographic Factors and Walking Rates

Variable	Status	Walked		Did not walk		Total		$x2$
		N	(%)	N	(%)	N	(%)	(p-value)
Sex	Male	1,198	(35.8)	2,151	(64.2)	3,349	(45.8)	2.7895
	Female	1,344	(33.9)	2,620	(66.1)	3,964	(54.2)	(0.095)
Age	19 to 34	597	(34.2)	1,147	(65.8)	1,744	(23.8)	56.849
	35 to 49	839	(30.4)	1,922	(69.6)	2,761	(37.8)	(〈.001)
	50 to 64	703	(37.7)	1,161	(62.3)	1,864	(25.5)	
	65+	403	(42.7)	541	(57.3)	944	(12.9)	
Average monthly household income (KRW)	Less than 1,000,000	269	(39.5)	412	(60.5)	681	(9.3)	12.323
	1,000,000 to 2,999,999	759	(34.8)	1,421	(65.2)	2,180	(29.8)	(0.006)
	3,000,000 to 4,999,999	949	(35.2)	1,746	(64.8)	2,695	(36.9)	
	5,000,000 or more	564	(32.1)	1,191	(67.9)	1,755	(24.0)	

Variable	Status	Walked		Did not walk		Total		x2
		N	(%)	N	(%)	N	(%)	(*p*-value)
Education	Middle school or less	620	(40.0)	931	(60.0)	1,551	(21.2)	36.676
	High school	1,110	(35.5)	2,020	(64.5)	3,130	(42.9)	(<.001)
	College or more	810	(30.9)	1,813	(69.1)	2,623	(35.9)	
Occupation	Office worker	510	(28.7)	1,267	(71.3)	1,777	(24.3)	38.285
	Non-office worker	1,044	(36.4)	1,822	(63.6)	2,866	(39.2)	(<.001)
	Student/house-wife/un-employed	988	(37.0)	1,681	(63.0)	2,669	(36.5)	
Marital status	Married	1,748	(34.1)	3,371	(65.9)	5,119	(70.0)	2.870
	Not married	794	(36.2)	1,399	(63.8)	2,193	(30.0)	(0.090)
Subjective health	Good	1,003	(38.9)	1,577	(61.1)	2,580	(35.3)	29.915
	Poor	1,538	(32.5)	3,194	(67.5)	4,732	(64.7)	(<.001)
Diagnosis with hypertension	Diagnosed	413	(37.8)	681	(62.2)	1,094	(15.0)	5.044
	Not diagnosed	2,129	(34.2)	4,088	(65.8)	6,217	(85.0)	(0.025)
Diagnosis with diabetes	Diagnosed	179	(36.6)	310	(63.4)	489	(6.7)	0.791
	Not diagnosed	2,362	(34.6)	4,460	(65.4)	6,822	(93.3)	(0.374)
Obesity	BMI ≥25	596	(31.4)	1,305	(68.6)	1,901	(26.0)	13.157
	BMI<25	1,946	(36.0)	3,466	(64.0)	5,412	(74.0)	(<.001)
Stress	Prone to stress	609	(35.7)	1,099	(64.3)	1,708	(23.4)	0.788
	Not prone to stress	1,933	(34.5)	3,672	(65.5)	5,605	(76.6)	(0.375)
Depression	Prone to de-pressed feelings	104	(33.9)	203	(66.1)	307	(4.2)	0.110
	Not prone to de-pressed feelings	2,438	(34.8)	4,568	(65.2)	7,006	(95.8)	(0.740)
Moderate- to high-intensity exercises (not including 2018)	Exercise	732	(50.6)	714	(49.4)	1,446	(22.5)	207.956
	No exercise	1,497	(30.1)	3,475	(69.9)	4,972	(77.5)	(<.001)
Total		2,542	(34.8)	4,771	(65.2)	7,313	(100)	

Source: Gimhae PHC (2019).

(2) Environmental Perceptions

The Gimhae local surveys also gather data on locals' perceptions of local environments every other year. The Chi-test on respondents' perceptions of their environments revealed that satisfaction with the natural and living environments and perceived accessibility of exercise locations had significant impacts on walking rates.

Specifically, respondents who said they were satisfied with the natural environment (air and water quality, etc.) and living environment (electricity, water and sewage, waste management, sports facilities, etc.) of their respective neighborhoods had higher walking rates than those who were not so satisfied (p = .026 and p = .008, respectively). Also, those with (perceived) ready access to locations where they could exercise had a higher walking rate, at 35.9 percent, than those without such access (28.0 percent) ($p < .001$).

〈Table 6〉 Subjective Perceptions of Environments and Walking Rates

Variable	Status	Walked		Did not walk		Total		$x2$
		N	(%)	N	(%)	N	(%)	(p-value)
Safety of surroundings	Satisfied	918	(35.7)	1,652	(64.3)	2,570	(69.9)	2.514
	Not satisfied	365	(33.0)	741	(67.0)	1,106	(30.1)	(0.113)
Natural environment	Satisfied	1,060	(35.8)	1,904	(64.2)	2,964	(80.6)	4.986
	Not satisfied	223	(31.3)	489	(68.7)	712	(19.4)	(0.026)
Living environment	Satisfied	1,045	(36.0)	1,860	(64.0)	2,905	(79.0)	6.985
	Not satisfied	238	(30.9)	533	(69.1)	771	(21.0)	(0.008)
Transportation environment	Satisfied	767	(34.5)	1,456	(65.5)	2,223	(60.5)	0.394
	Not satisfied	516	(35.5)	937	(64.5)	1,453	(39.5)	(0.530)
Exercise locations	Satisfied	1,077	(35.9)	1,920	(64.1)	2,997	(82.7)	14.548
	Not satisfied	176	(28.0)	453	(72.0)	629	(17.3)	(<.001)

Source: Gimhae PHC (2019).

(3) Multilevel Analysis of Factors

We performed a multilevel logistic regression analysis to determine the respective effects of individual (demographic) and environmental factors on Gimhae residents' walking rates. Our analysis specifically targeted respondents who participated in the Gimhae Local Social and Health Surveys from 2015 to 2018.

With the aim of exploring the factors that could affect individuals' engagement in physical activities other than walking

prior to the multilevel logistic regression analysis, we merged the raw data of the Gimhae local surveys from 2011 to 2018 and subjected them to a multivariate logistic regression analysis. With the dependent variable of moderate-to-high-intensity exercise (performed for at least 30 minutes continuously on each of at least five days for moderate exercise or for at least 20 minutes continuously on each of at least three days for high-intensity exercise over the past seven days), we cross-checked the factors influencing both types of exercise and walking. Because the method for measuring physical activity and exercise was changed in 2018 (KCDC, 2019), the data for moderate-to-high-intensity exercise from 2018 were not included in our analysis.

As the Gimhae local surveys explore respondents' satisfaction with their surrounding environments and perceived accessibility of exercise locations on alternating years, we set up two different models for these variables.

Our analysis revealed that respondents in the office worker category had a higher walking rate than workers in other categories or economically inactive respondents. Respondents who were in subjectively good health were also likelier to walk than those who were in subjectively poor health. Satisfaction with the surroundings in their respective neighborhoods and perceived accessibility of exercise locations also raised walking rates.

Our multilevel logistic regression analysis of physical activities

of moderate to high intensity other than walking also revealed that men, non-office workers, and respondents in subjectively good health were more likely than other groups of respondents to engage in moderate or high-intensity exercises. Satisfaction with their respective surroundings, on the other hand, did not exert a significant effect. The perceived ease of accessing locations where they can exercise nearby did significantly raise the probability of respondents' engaging in these exercises.

While the results of the multilevel analysis without the independent variable are not presented herein, the analysis affirmed the significance of variations in walking rates across administrative areas.

We then performed the multilevel analysis on the individual and environmental factors associated with variations across areas. Respondents aged 35 to 49 had a significantly lower walking rate than those aged 19 to 34. Non-office workers, students, housewives, and the unemployed also had higher walking rates, with statistical significance, than office workers. With the demographic variables of respondents controlled, those who subjectively thought they were in good health still had a significantly higher walking rate than those in subjectively poor health.

Moreover, respondents' satisfaction with the safety of their respective surroundings also raised their walking rates significantly. That satisfaction continued to exert a significant influence even after the effects of other physical elements of

their living environments (e.g., presence of parks and exercise facilities) were controlled.

Even with the individual demographic variables controlled, satisfaction with the perceived safety of their respective surroundings raised respondents' walking rates significantly. Satisfaction with the perceived accessibility of exercise locations and transportation environments also exerted a significant effect on walking rates, with a significance level of 10 percent. In other words, even with the effect of physical infrastructure (parks and exercise facilities) controlled, the perceived accessibility of exercise locations played a significant role in motivating respondents to walk. On the other hand, the stronger the satisfaction with the transportation environment, the lower the walking rate.

3. Focus Group Interviews with Gimhae Residents

Our design of the focus group interviews (FGI), in-depth interviews, and opinion poll of Gimhae residents was approved by the Internal Review Board (IRB 2019-25). The participants of the FGIs were chosen from among the WELs nominated by Gimhae PHC. The interviewees for the in-depth interviews were also chosen from among those nominated by Gimhae PHC, with care taken to ensure the representation of different age groups and sexes.

(1) Participation in Walking Clubs and Advantages of ICT Solutions

We organized an FGI with WELs who lead their respective local walking clubs. The interview was held in the conference room of Gimhae PHC on September 14, 2019, with four female WELs and one male WEL. The chosen participants were mostly middle-aged, and they mostly began walking for exercise when they decided to do some physical exercise to improve or manage their health. Their main motive for volunteering as WELs was to help others while also taking good care of their own health. The biggest advantage of using ICT solutions like the Walk-On app identified by these WELs was that such solutions motivated users to participate in exercise through challenges, rewards, and charity work. They also pointed out, however, that the elderly might find the challenges difficult and give up. The FGI revealed the need to tailor exercise-encouraging measures differently according to the needs of different age groups.

〈Table 7〉 FGI Participants

WEL	Age	Sex	Active area	Motive for leading walking clubs	Focus of practice	Comment on using Walk-On app
1	55	F	Jangyu and Daecheon Valley	To manage health (menopause, depression, or weakness) and having heard about PHC's WELs training program	Middle-aged and elderly participants, residents in need of rehabilitation as part of their therapies, and walking and talking	Challenges can motivate locals to keep participating.
2	44	F	Haebanche on	To help improve the health of young housewives	Couples' participation and health of young mothers	The cash feature can keep participants motivated.
3	53	M	Jangyu	To improve health and encourage locals to walk more	Motivation for post-therapy rehabilitation, interests, socializing, etc.	The app allows users to support charity by walking.
4	51	F	Juchon	Having been trained as a WEL as part of health coordinator training	Seniors in rural areas	Long-term challenges and charity drives are necessary.
5	59	F	Andong	For rehabilitation after arthritis treatment	Health of patients in rehabilitation	Support is needed both online and offline.

(2) Prioritized Capabilities of WELs

We requested 27 WELs registered with Gimhae PHC to participate in an opinion poll, and were able to survey the opinions of eight consenting WELs from October 24 to 27, 2019, online. Some of the capabilities required of WELs that these subjects thought were most important/prioritized included the capability to: find ways to reward the efforts that went into/success with meeting the targets of walking; set specific goals for walking exercises; analyze the process and goals of walking exercises; lead participants to exercise in unfamiliar situations; share helpful information on behavioral change; provide counseling on medical checkup results and overall health management as part of keeping participants motivated; analyze participants' performance in relation to achieved targets/goals; imagine improved states of individual participants and support their successful engagement in exercises; and manage the time necessary for walking exercises.

〈Table 8〉 Prioritized Capabilities fo WELs

Capability	mean score
Finding ways to reward the efforts that went into meeting the targets of walking	4.8
Finding ways to reward success in meeting the targets of walking	4.4
Setting specific goals for walking exercises	4.3
Analyzing the process and goals of walking exercises	4.3
Leading participants to exercise in unfamiliar situations	4.3

Capability	mean score
Sharing helpful information for behavioral change	4.3
Providing counseling on medical checkup results and overall health management as part of keeping participants motivated	4.3
Communicating with others to encourage them to keep walking	4.3
Setting step-by-step tasks toward meeting targets/goals	4.1
Adjusting difficulty of walking exercises as participants make progress	4.1
Observing, monitoring, and sharing one's own progress	4.1
Setting future rewards for walking exercises	4.1
Setting goals for walking exercises	4.0
Setting specific action plans for walking exercises	4.0
Analyzing participants' performance in relation to achieved targets/goals	4.0
Imagining improved states of individual participants and supporting their successful engagement in exercises	4.0
Managing time necessary for walking exercises	4.0
Helping participants reflect on their past successful experiences with walking	3.9
Practicing and repeating until walking becomes a habit	3.9
Mutually encouraging one another to maintain good habits	3.9
Managing stress and emotions	3.9
Using technology to obtain general information on walking exercises	3.8
Identifying obstacles to engagement in walking exercises and possible solutions	3.8
Providing feedback on participants' behavior/performance	3.8
Providing information and guidance on specific exercise techniques	3.8
Conceptualizing and testing exercise plans	3.8
Making changes to surroundings to support participation in walking exercises	3.8
Managing failures to help realize goals/targets	3.8
Leading oneself, through self-talk, to start and continue with exercises	3.8
Observing, monitoring, and sharing one's own performance	3.6
Providing technological rewards and alerts for meeting	3.6

Capability	mean score
goals/targets of exercises	
Establishing plans to prevent relapse	3.6
Using technology to share information on walking performance with individuals	3.5
Informing others of normative behavior they need to adopt	3.5
Documenting resolutions to continue engaging in exercises	3.5
Using technology to share success stories and garner support	3.5
Using technology to provide a role model of walking exercises for others	3.5
Predicting negative consequences of failure to exercise	3.5
Using technology to obtain information on others	3.4
Using technology to compare and encourage walking among people	3.4

Note: the mean score was from 5 point scale survey of 27 WELs.
주: 5점 척도 질문의 평균 점수임.
자료: 행동변화 테크닉 40가지의 참고문헌: Michie S., Stefanie A., Falko F.S., Stephan U.D., Alex Bishop & David P. F. (2011) A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: The CALORE taxonomy, *Psychology & Health*, 26:11, 1479-1498, DOI: 10.1080/08870446.2010.540664

(3) FGI with Citizens on Walk-On

In August 2019, we held two FGIs, the first with five men, followed by the second with five women. The FGIs revealed that the main motives for starting walking exercises involved worries about health in general or poor results on medical checkups. Some interviewees found Walk-On, the smartphone app, convenient; others, not so. One was also dissatisfied because he found the step count provided by the app to be inaccurate.

〈Table 9〉 General Users' Experience and Satisfaction with Walk-On

Interviewee	Age	Motive for exercise	Favored exercise spot	Use of exercise apps
Male 1	58	Worries about health deterioration due to aging	Haebancheonbyeon Park	Uses a step counter app, and encourages neighbors to do the same.
Male 2	48	Worries about health deterioration due to aging	Haebancheonbyeon	Walk-On
Male 3	41	Poor health	Around home	CashWalk (to compete with his children)
Male 4	42	Increase in weight	Finds it difficult to exercise regularly	Walk-On (ease of use on his smartphone)
Male 5	38	Increase in weight	Parks	Doesn't use any exercise app. Does not trust accuracy of Walk-On's step counter.
Female 1	41	Deteriorating health	None (in need of recommendation)	Uses Walk-On and another step counter. Satisfied.
Female 2	45	Increases in cholesterol level and weight confirmed by	None (due to worries about air pollution)	Uses Walk-On, but finds it annoying that she has to carry her

Interviewee	Age	Motive for exercise	Favored exercise spot	Use of exercise apps
		checkups		smartphone all the time.
Female 3	49	Lower-back problem	None (due to difficulty picking up after her pet)	Uses Walk-On. Satisfied.
Female 4	41	Poor checkup results	None (due to mosquitoes)	Uses Walk-On. Satisfied.
Female 5	38	Restricted to taking short walks around home due to childcare responsibilities	None (due to mosquitoes, air pollution, and having to pick up after pet)	Doesn't use any exercise app. Prefers exercises that can involve her children.

4. Gimhae Residents' Walking Behavior and Opinion on the Smartphone App

(1) Opinion Poll Overview

The poll targeted residents of Gimhae aged 19 to 69, and a total of 854 people participated. The poll was conducted in three neighborhoods, i.e., Haebancheon in Naeoe-dong (residential zone), Yulhacheon in Jangyu-dong (residential zone), and Juchon-myeon (industrial zone). The polling period was from August 30 to September 30, 2019.

The poll surveyed respondents regarding whether and how extensively they walked for exercise, what factors affected their walks, the effect of technology (smartphone app) on their exercise, and the safety of and their satisfaction with their walking environments.[5)]

(2) General Characteristics of Respondents

Men and women made up 48.6 percent and 51.4 percent of respondents, respectively. The average age was 43.3 years old overall. Among those who use smartphone apps in general to support their walking exercises, the average was 44.7 years old; among Walk-On users, 45.8 years old; and among those who use no walking exercise apps, 43.0 years old. The percentage of office workers was higher among men than women, and the percentage of smartphone exercise app users (including those using Walk-On) was higher among women than men.

Satisfaction with walking environments varied significantly from area to area. Walkers in Juchon-myeon, a predominantly industrial area, were generally less satisfied than walkers in residential zones.

Of respondents, 62.5 percent walked for at least 30 minutes continuously on five days or more per week. The walking rate was the highest among those using Walk-On (78.2 percent). Also, Walk-On users had the highest percentage of respondents affiliated with Gimhae PHC's walking clubs (21.3 percent).

Users of smartphone walking exercise apps, including Walk-On, also engaged more frequently in other moderate-in-

5) See Park, S., Choi, I., and Seo, H. (2008). Use of Evaluation Metrics for Pedestrian-Friendliness of Living Spheres for Fostering Healthy Living Environments. Seoul National University College of Engineering-Health Promotion Project Support Group.

tensity exercises than non-users. The greater the use of such technology, the greater the probability of one walking for exercise, and the greater the probability of one watching one's weight.

(3) Characteristics of Smartphone Exercise App Users (Including Walk-On Users)

In general, respondents using smartphone apps for walking exercises used those apps to set exercise goals or targets and carry out their exercises in a planned and sustained manner. These apps, in other words, played a major role in keeping people motivated to exercise (Table 10).

〈Table 10〉 Reasons for Using Walking Exercise Apps

Reason	Walk-On users	Other app users
1. To obtain information on health and disease prevention	3.5	3.3
2. To obtain information on the effects of walking	3.6	3.5
3. To obtain information on walking techniques	3.5	3.3
4. To obtain information on walking club activities and members	2.8	2.7
5. To get help/support with continuing walking exercises	3.4	3.3
6. To obtain information on locals' walking exercises	3.1	2.9
7. To obtain experts' help with walking	3.1	3.0
8. To obtain information on others' health and (walking) exercises	3.2	2.9
9. To set walking goals and achieve them in a planned manner	3.9	3.8

Reason	Walk-On users	Other app users
10. To identify obstacles to walking	3.0	2.9
11. To stay motivated about walking exercises	3.8	3.6
12. To keep a daily log of walking exercises	3.6	3.6
13. To receive feedback on walking exercise performance	3.4	3.3
14. To get rewards for meeting goals	3.3	3.2
15. To obtain information on other exercises and health clubs	2.8	2.8
16. To learn about exercise-related experiences of others with similar health problems	2.9	2.8

Note: Rated on a five-point scale (ranging from "strongly disagree" to "strongly agree").

App users also favored location-based apps such as Walk-On to obtain information on how their neighbors exercise and tips on general health management.

Ⅳ

Conclusion: How Will HIA be Used?

1. Performance Monitoring
2. Enhancing Capability for ICT-Based Promotion of Health

Ⅳ Conclusion: How Will HIA be Used?

1. Performance Monitoring

An HIA can be conducted either because it is required by law, because it is necessary/useful for policymaking, because it can help decide measures to protect the health of the given population, and/or because it can help improve the health capabilities of local communities. HIAs are planned and organized by local communities themselves for the last of these reasons.

To promote walking exercises among residents of Gimhae, it will be important to support and foster walking clubs. Also, more information is needed on the different exercise needs of different demographic groups, and the obstacles they face, and more walking courses should be developed, with appropriate safety measures. Streetlighting should be improved and pedestrian roads marked separately from bicycle paths to support nighttime walking. Health-related factors should also be monitored on a continuous basis because the WPP itself can have unintended and adverse consequences on some people's walking exercises. The substance of the program should be reviewed to better reflect public sentiment and opinion.

[Figure 5] Summary of Policy Recommendations for Promoting Walking

What to keep	• Foster use of smartphone app, walking clubs, and communication with locals • Partnership and governance
What to be improved	• Information on demographic groups to be prioritized for support • Safe walking environments
What to be monitored	• Possible unintended effects of WPP • Annual review of substance of WPP to better reflect public sentiment and opinion

Source: KIHASA (2019). HIA International Workshop (http://hia.kiahsa.re.kr), retrieved on October 4, 2019.

2. Enhancing Capability for ICT-Based Promotion of Health

The recommended measures for enhancing the capability for the ICT-based promotion of health for the local population are as follows. First, the different levels of policy implementation—individuals, between individuals, organizations and local communities, local government, and national government—should be identified. Next, measures should be sought for each area of capability enhancement, i.e., policy, intervention, advocacy, supportive environment, partnership, awareness and education, monitoring system and evaluation, research/investigation, capability development, and financing. While there is an infinite range of measures for promoting local public health, focus should be placed on the application of ICT and the abun-

dance of information it brings on physical health and exercise. To enhance the effectiveness and efficiency of physical exercise programs in local communities, measures should be devised to ensure overall reviews and systematic use of ICT-based solutions.

〈Table 11〉 ICT-Based Health-Promoting Capability Enhancement Strategy

Level	Area	Measures/tools
Personal and interpersonal	Intervention	• ICT-based physical activity coaching and counseling programs • Daily activity monitoring and health contract apps • Mileage points for physical activities at home, schools, workplaces, etc.
	Supportive environment	• Group chat messengers to support communication and health clubs • Online reservation systems for spaces/facilities for physical activities
	Awareness and education	• Training on use of safe walking course apps with a focus on neighborhoods • Sharing of physical activity experiences via health clubs • Mileage point competitions to increase physical activity
Organizational and community-wide	Policy	• ICT-based activities for schools, workplaces, local communities, etc. • ICT-based development of safe and healthy walking trails
	Intervention	• Using exercise apps to provide/use information on bulletin boards and multi-use paths • ICT-based solutions for finding routes • ICT-based solutions for searching for safe walking trails
	Supportive environment	• Mobile map of spaces/facilities for physical activities in local communities • Mobile apps providing information on safe walking trails/cycling paths

Level	Area	Measures/tools
	Awareness and education	• Using social media to advertise physical activity campaigns and events • Using local press to advertise physical activities and local health clubs • Enabling schools, workplaces, and local communities to share programs • Organizing local health campaigns online and offline
Governmental (local)	Policy	• ICT solutions for safe walking trails and parks • ICT solutions for facilities for sports, recreation, and other leisure activities • ICT solutions for developing and implementing physical activity guidelines • Guidelines for the use of ICT in physical activity programs
	Advocacy	• ICT-based message and PR strategies • Disseminating examples/role models/real stories on physical exercises • Social media events and challenges
	Supportive environment	• ICT-based maps of spaces/facilities for physical activity • Online search engines
	Partnership	• Interdepartmental partnership on use of ICT and physical activities • Networks with organizations specializing in physical activities
	Awareness and education	• ICT-based solutions for providing information on physical activities • Using social media to share slogans and videos
	Monitoring and evaluation system	• Monitoring of physical exercise trends • Evaluation of exercise performance and effectiveness of programs
	Research/ investigation	• Developing ICT-based tools for researching physical activities • ICT-based HIA and monitoring
	Capability development	• Specialized personnel training on ICT use • Training for the elderly

Level	Area	Measures/tools
	Financing	• Reallocation of resources to ICT-based physical activity programs • Securing resources for continued physical activity programs

Sources: Kim, M. et al. (2016), Theories of Public Health, Education, and Health Promotion, Gyechukmunhwasa; U.S. Department of Health and Human Service. (2018). Physical Activity Guidelines for Americans, 2nd edition. Washington, DC: U.S. Department of Health and Human Service. https://health.gov/PAGuidelines/ (retrieved October 10, 2019).

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