

**evaluation study of health promotion program using Smart Band:  
Focusing on the management of metabolic syndrome subjects**

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**Abstract**

The purpose of this study is to evaluate the effectiveness of utilizing community-based health promotion program using the wearable device. The management program of metabolic syndrome that is the cause of various chronic diseases was the focus to match among health promotion programs in the community level. This study quantified the physical activity of the metabolic syndrome patients using a wearable device(smart band) and it would be investigated whether the effects on health. For data collection, it was used as an application that works with the smart band. The experimental and control groups were divided according to whether the use of a smart band and they are each 30 persons. It was a follow-up study for six months and all participants were conducted every three months for physical measurement. The results show that there are any visible differences in health benefits between smart band users and non-users. This study may suggest a new paradigm in the Korean community health promotion program

**1. Introduction**

The worldwide increase in the recent mobile devices and wearable health work suggests the possibility to overcome the limitations of conventional physical activity healthcare programs. In particular, there is 68.8% smartphone users in Korea over 13 years old and this rate is up to world class(National Statistics Korea, 2014). It means Korea has optimum conditions to maximize the advantages of health care services with the mobile device or wearable device. There are some research about pedometer based physical activity program, but pedometer (pedometer) only available a limited function in health promotion programs in the device so there is a few research on whether the effects on health promotion using wearable device nationally and internationally. In particular, around the community, it is too difficult to find related research, despite the surge in industry and users. The one that we can find is a research in Canada. It is 'EASY (Everyday Activity Supports You) model' in which the number of participants are only dozen so it could be difficult to seen its accuracy. For this reason, we feel the need for this study was designed to evaluate effectiveness study of a smart band based on community

health center. As shown in Table 1, in comparison with the conventional pedometer, wearable device have lots of advantages it may decrease the disadvantages of the existing Public Health promotion program. For example, wearable device in the public health dimension missing data problem, a more efficient operation becomes possible to compensate for the problem of insufficient follow-up and participants can increase satisfaction in the individual's perspective through programs tailored to their tastes.

Wearable devices industry is continuing to grow at home and abroad, and it has already used a lot of individual users who feel the effectiveness of wearable devices. But still wearable devices are verifying whether the effectiveness of health promotion scientifically. In that, if it provided the scientific basis for health-related wearable device, the mobile industry will grow even more. Therefore, the central government, local communities(public health center) are obliged to dig more demand and lead research groups. For this reason, the purpose of this research is to evaluate the effectiveness of utilizing health promotion programs of metabolic syndrome management using smart band.

table1. the benefits of wearable device

<b>장점</b>	<b>세부내용</b>
<b>Social Networks</b>	<ul style="list-style-type: none"> <li>◦ To be able to quantify and record their physical activity , as well as share them with others available</li> <li>◦ Through competition and acquaintances can give each other motivation and support</li> <li>◦ Even after the program shut down and will continue to practice a healthy lifestyle it can act as a factor</li> </ul>
<b>visibility and convenience</b>	<ul style="list-style-type: none"> <li>◦ Wearable devices to choose how to wear because of the variety of instruments also available to fit various tastes by</li> </ul>
<b>Information management (personal/groups/community)</b>	<ul style="list-style-type: none"> <li>◦ The biggest advantage of wearable devices is cumulative information of physical activity that generated big data Health Information</li> <li>◦ Individuals can self monitoring for their physical activity</li> <li>◦ Groups (business and community) can refer to design effective health care program in the future</li> </ul>
<b>Feedback</b>	<ul style="list-style-type: none"> <li>◦ Through a web-based data management that public health is real-time to identify the physical activity of the managing subjects path</li> <li>◦ The immediate feedback available using the on / off lin</li> </ul>
<b>works with smart phone application</b>	<ul style="list-style-type: none"> <li>◦ Wearable devices basically provide self-developed mobile operating as application</li> </ul>

<b>works with other device</b>	◦ It can be used to measure physical activity in conjunction with other device .
<b>Accuracy</b>	◦ Study on the measurement of physical activity with wearable devices have already been conducted several times that validity is proven

## 2. Data and Methods

Seocho-gu Health Center gave smart bands to 50 participants February 2015, and all participants were conducted physical measurements every three months . The experimental and control groups were divided according to whether the use of a smart band and they are each 30 persons. This study is based on whether the health benefits of using Smart Band for three months. Also, Three months before the start of the experiment, start point and end point represent any significant change. Demographic characteristics of the study subjects is as following table.

**Table2. Demographic characteristics of the participants**

<b>Smart band users group (n=29)</b>	
Age(yrs)	41±6
Height(cm)	175.1±6.5
Weight(kg)	80.83±11.0
BMI(kg/m <sup>2</sup> )	26.31±2.9
Waist Cir.(cm)	91.96±7.3
Blood Pressure(mmHg)	
Systole	136.2±12.5
Diastole	89.57±9.1

The subjects are aimed at 20-64 years old and younger residents who are working in Seocho-gu and consists of the main age groups are as 3,40. For this study, from April 20, 2015 April 20, 2016 our research was signed a business agreement with Seocho-gu Health Center for a total of 1 years and after than process, we got receive data through the IRB approval.

Table 3 shows the results of physical measurement changes before and after the program started.

**Table3. Results of physical measurement change before and after the program**

<b>variables</b>	<b>Pre</b>	<b>Post</b>	<b>변화량</b>
Weight, kg	80.8	80.2	-0.6
Waist, cm	92.0	90.2	-1.8
BMI	26.3	26.1	-0.2
Systolic blood	136.2	135.4	-0.8

pressure			
Diastolic blood pressure	89.6	86.3	-3.3
cholesterol	190.9	186.9	-4.0
TG	165.3	160.8	-4.5
HDL	41.7	40.8	-0.9
LDL	98.3	87.3	-11.0

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The other existing research to see what the relationship between physical activity and the prevalence of the metabolic syndrome are figure out the change of 5 kinds of metabolic syndrome indicators and evaluate the effectiveness of physical activity programs. So we'll see how varied the metabolic syndrome indicators before and after the program.

### 3. Discussion

The results of this study will be able to take advantage of this by the individual users who use the wearable device and health-related mobile apps and also it can give a valuable information to policymakers to develop health promotion and health policy. Since this study is intended to community-based health promotion programs not for individuals, it's meaningful that suggests possibilities of a new way to collect data of community-based health information. Because of there is no research about the effectiveness evaluation of the wearable device in domestic and abroad so far, this study could be a cornerstone of the foundation laid for a wearable device industries.