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A Thesis for the Degree of Master

On Influencing Factors of Smart
Watches/Sports Wristbands Using
Health Promotion Model

GRADUATE SCHOOL

JEJU NATIONAL UNIVERSITY

Department of Management Information Systems

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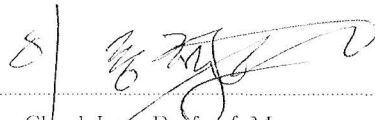
On Influencing Factors of Smart Watches/Sports Wristbands Using Health Promotion Model

Chen Li
(Supervised by professor Min Cheol Kim)

A thesis submitted in partial fulfillment of the requirement for the
degree of Master of Management Information Systems

Dec. 2017.

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Abstract

As the society has been boosted by leaps and bounds in the past decades, people work hard every single day, cope with the complicated interpersonal relationships during work and have been highly engaged in work for a quite a long period, which triggers numerous health problems. Yet since 2007, as Apple's iPhone turns out to be the representative of the smart terminal, we are allowed to usher life progressively into the new era in accordance with the mobile intelligence terminal. The smart terminals, inclusive of smart watch/ sports wristband health monitoring bracelet, smart watches, etc., makes the health promotion of people remarkably easier, and supervises people's health behavior. To elucidate the impact exerted by smart watch / sports wristbands on health promoting behaviors, this paper probes into the smart watch/ sports wristband users whereby the random sampling method, and discusses the factors influencing the health promotion behavior's production.

To understand the use and characteristics of smart watch / sports wristbands, and to explore the relationship between factors and factors that affect health behavior. It also provides the basis for the development of health function of smart watch/ sports wristband.

This paper carries out the analysis through employing a two-stage random sampling method. 300 smart watch/sports wristband users in total were probed of all ages and of all levels of occupations education and income. The questionnaire contains:

1. User's basic situation questionnaire
2. Self-efficacy scale for users
3. The questionnaire in terms of the factors of promoting the health behavior of the smart watch/sports wristband encompasses five characteristics, viz. the easy to use, convenience real-time monitoring, personal and instant connectivity. Totally 20 entries and 350 questionnaires were collected, with a recovery rate of 100%,

of which 300 were valid questionnaires. SmartPLS3.0 path analysis software was adopted to conduct the descriptive statistical analysis, and the theoretical model was evaluated whereby the parameter analysis.

The size and path of each factor on health promoting behavior were ascertained.

1. Smart watches / sports wristband users shall increasingly promote health awareness in the process of using.

2. To promote health awareness effect on the promotion of health behavior is considerably influential.

3. Health self-efficacy and self-efficacy of technology have a significant impact on the promotion of health awareness, especially the health self-efficacy also has a positive effect on health behaviors.

4. Shall vigorously develop and promote these types of intelligent portable health monitoring equipment, and also shall facilitate the healthy approach of life education and promote the formation of health awareness.

Key words: smart watches; sports wristband; easy to use; convenience;
real-time monitoring; personal; instant connectivity;
Health promotion awareness ; smartPLS3.0

Chapter 1: introduction

1. Need for research

The development of science and technology has brought us an entirely new and intelligent society. Therefore, we should also integrate high-tech products and smart devices in terms of human health and health promotion. For example, the most popular smart watches and sports wristbands in recent years . Therefore, the impact of smart watches and sports wristbands on human health is worth our exploration and in-depth study(Jiang.W et al 2017). It is indicated whereby the data that 14 million high-tech wearing equipment pieces were marketed in total among the global market in 2011, and even more remarkably in 2017, this data has boomed to approximately 70 million pieces of intelligent wearable equipment. The smart watch/sports wristband broadens the market and makes this field progressively and extensively well-known in virtue of its powerful data collection and data analysis capabilities (Yong, W, 2016). In particular, the smart watch/sports wristband is deemed as a trendy tool for healthy communication. This is because they are actually able to monitor user's physical condition through detecting user's body. The smart watch/sports wristbands are penetrated into the people's lives unconsciously awareness of the user's health status is conducive to facilitating the user's awareness of health promotion and health care (Patrick et al., 2008).

Increase the rapid growth of population, the average human life extension, the problem of aging society has increased many difficulties and the burden on hospitals and medical aspects(Dan.H , 2017).David E. Bloom, a professor of economics and demography at Harvard University's Global Health and Population Department, also mentioned that the increase in life expectancy in

the future population may also increase the prevalence of chronic diseases and that the acceleration of the population shall lead to health care , the burden of medical insurance("Finance and Development", March 2016) (Kim, M. 2015).

So in order to solve the medical burden, not only to enhance people's health, cultivate people's awareness of health promotion, intelligent equipment should also be reasonable use of these popular and convenient and (smart watches and sports Bracelet). Therefore, it is necessary for research about the smart watch and sports wristband to promote health awareness and healthy behavior.

As the global warming, environmental degradation, depletion and destruction of the ozone layer have been jeopardizing our health, forest depletion, land desertification, air pollution, water pollution, marine pollution and hazardous waste trans boundary movements have also consequently deteriorated the chronic diseases and cancer (Greene, G. 1994). For this reason, the physical fitness and disease prevention, and health promotion awareness are also required to be strengthened. Lack of exercise and obesity also pose a major threat to people's health. People who are fatter than ordinary people shall be subject to the diabetes, with the probability of two to three times higher (JinS.H, 2015).In terms of disease prevention and disease control, health behaviors and health promoting awareness all play a certain role. Therefore, it is necessary to study the influencing factors of healthy behavior and health promoting awareness for smart watches and sports wristbands.

In a nutshell, as technology has been advanced rapidly, people tend to massively adopt the intelligent products, and the public are gaining a growing amount of health knowledge whereby these smart watches / sports wristbands and thus laying increasingly particular stress on health. Among the aged with serious illness, the awareness of the disease prevention shall be promoted, the probability of illness shall be reduced, and the good health

habits shall be developed. Hence, they trend to create a healthy and longevity society, which can also alleviate the medical and economic development issues. In this regard, it is of crucial necessity to analyze the impact exerted by smart watches / sports wristband on health promotion behavior, so that the smart watches / sports wristband can both better promote health behavior and adhere to a tool, and promote the development of social health education and health awareness.

2. Research purposes

As the intelligent products and wireless networks, artificial intelligence, large data, the development of internet of things have been popularized, and people are immersed by a booming number of intelligent devices on a day-to-day basis. And people can come into contact with various news and information, and pay a growing attention to healthy living via network thanks to the development of science. Through adopting and realizing these intelligent devices, the health awareness can be better promoted, intelligent devices or mobile intelligent terminal can be rationally adopted, the health promoting behavior can be nurtured, the good habits can be cultivated, people's physical fitness and health status can be enhanced, and some chronic diseases can be effectively prevented, which shall monitor and control the condition. In the meantime in that the intelligent products remain to be developed. Although these products have made our lives considerably convenient, guided out healthy living, supervised and promoted out living condition, it is undeniable that the smart watch / sports wristband remains to be limited. The analysis and research are conducted to grasp the factors promoting the health behavior, to eventually form a scientific way to promote health, enhance people's awareness of promoting healthy living, nurture people how to develop health behavior, to create a healthy and positive social

environment.

The objectives of the study are presented as follows:

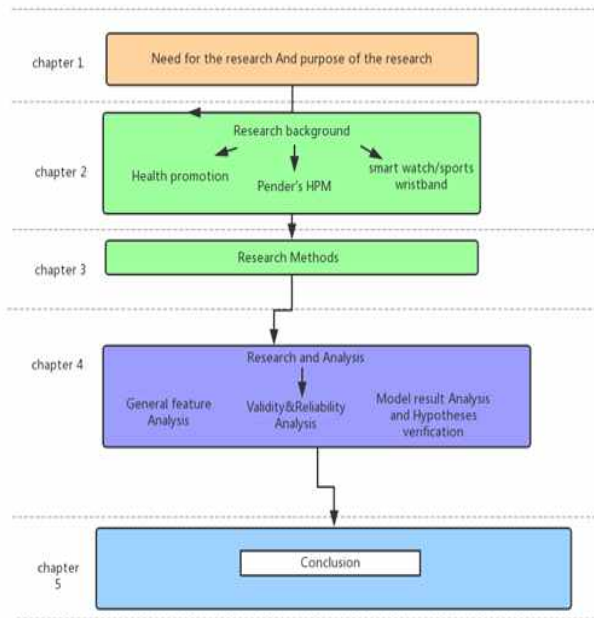
Objective 1: To anatomize the factors exerting impact on the formation of health awareness and health behaviors, involving the direct influencing factors and the indirect influencing factors.

Objective 2: To grasp the current public awareness of the health of the situation, and how the health promotion awareness and health behavior are bound by each other whereby the data analysis,, eventually as to provide reasonable recommendations for boosting the health of the people.

Objective 3: The purpose is to study and investigate the direct or indirect effects of the properties of intelligent sports wristband on promoting the health model.

3. Research Structure Program:

As the second chapter discusses the research background and theoretical premise, respectively, “Pender’s” promotion of health model composition and smart watch / sports wristband features are introduced separately to promote the concept of health. The usage of smartPLS3.0 is introduced, and the research model is established primarily in the third chapter and the fourth chapter, to continue the questionnaire survey and the analysis to the questionnaire survey data. The fifth chapter summarizes the research results, and proposes the analysis and suggestions.



<Figure 1> Research structure diagram

Chapter 2: Research Background

1. Promotion of Health Concept

As the society, economy, science and technology and living standard make great strides in progress, people's understanding of health has been penetrating. Health promotion is deemed as a course encouraging people to maintain and adjust their health (SuMei.Yu,2017) The concept of health promotion was first proposed at the WHO conference in Almaty in 1979(YongF.W, 2006)The definition is now perceived as the WHO former director general Brundtland in 2000 fifth global health promotion conference pointed out: "Health promotion is to enable people to do everything possible to attain the optimal spirit and body. It primarily seeks to let people know how to stay healthy, live in a healthy way of life, and have the ability to make healthy choices." (World Health Organization. (1986)) Health promotion is through behavioral changes in health education and environmental support, changing lifestyles and social impacts, reducing the incidence of disease, improving public quality of life and physical fitness(Ye.R, 2011).

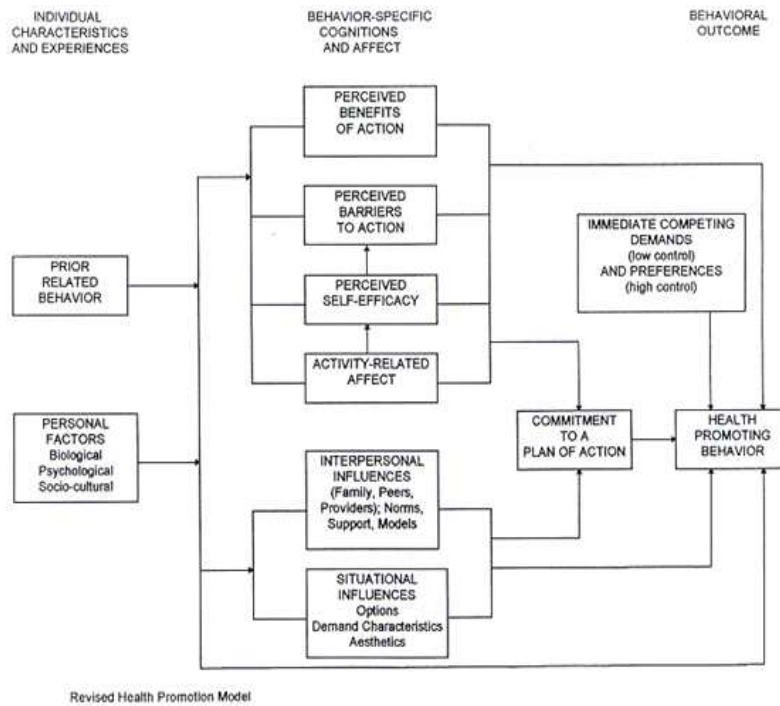
2. Pender's health model and composition

Pender's health promotion model is perceived as a nursing model helping people with the formation of healthy behaviors. (Pender, A. R. 1987)

(Heydari, A., & Khorashadizadeh, F. 2014) .HPM is first proposed by Pender nursing, an American scientist in 1982, the health promoting behavior can be elucidated through anatomizing the origins of this behavior to patient health education, and eventually the bad behavior of patients can be effectively optimized (GuoLi.Z et al, 2014) . This model also counts as a comprehensive model to predict health promotion behavior, emphasizing the role of cognitive factors in regulating health behaviors, primarily adopted in the health promotion behavior of individual and family care and related research

(Guedes, N. G., 2009).

HPM shall influence the formation of public health behavior (Heydari, A.,2014) . e.g., the promotion of physical strength, and the disease control, etc. (Pender, N. J. 2011) .HPM can also be extensively adopted by people coming from all groups, through optimizing the interpersonal relationships, the surrounding environment and personal attitude as to increase the health status, and to facilitate personal health (Bond, E. A et al,2011) HPM is predominately adopted to control disease, prevent disease, give health education and do promotions in other three aspects. The chronic diseases can be effectively controlled whereby the HPM intervention. For instance: diabetes, heart disease(Kai.W,2016), chronic hepatitis (Jin'an.D et al, 2016) cancer (Pender,N.J, 1990) . Accordingly the disease can be stabilized, and the state of illness can be no longer deteriorated. Additionally, the promotion of healthy lifestyle shall effectively develop the chronic disease prevention in adults (Jang, H et al, 2005) . Furthermore, whereby the health education, the health information and intervention can be spread in public behavior to help people gain health care knowledge, build a health-oriented concept, voluntarily take a healthy behavior and lifestyle. (XueQing.S, & Ai'Chen.F, 2016.



<Figure 2> Diagram of Pender's Health Promotion Model

From: <https://nursekey.com/21-health-prommation-model/>

As presented in Figure 2, the three basic components of this model contain:

- 1). Individual characteristics and experiences (e.g. personal, biological, psychological, and social factors, and prior related behavior);
- 2). Behavior-specific cognitions and affect (e.g. benefits and barriers to action, self-efficacy, interpersonal influences from family, peers, providers and activity-related affect).
- 3). Commitment to a plan of action and responses to immediate competing preferences. (Pendergast, D. et al, 2014).

In the foregoing categories, it is found that health promotion behaviors are affected by multiple factors. Whether or not people implement health promotion behaviors depends not only on their willingness whereas on their own cognition, experience, environment and health requirements. Among the

10 factors of the Pender health promotion model, in addition to the relationship between early related behavior and personal factors and health promotion behavior, the other 8 factors may directly or indirectly influence health promoting behavior, which has been confirmed in some nursing studies (Pender, N, 2005).

3. Smart watch/sports wristband:

Smart watch/sports wristband is a wearable smart device. Through the device, the user can record everyday exercise, sleep, diet and other parts of the real-time data, and these data with mobile phone, tablet, iPod touch and other terminal synchronization, play a guiding role in healthy living through data.

3.1 The current global smart watch / sports wristband usage and development status

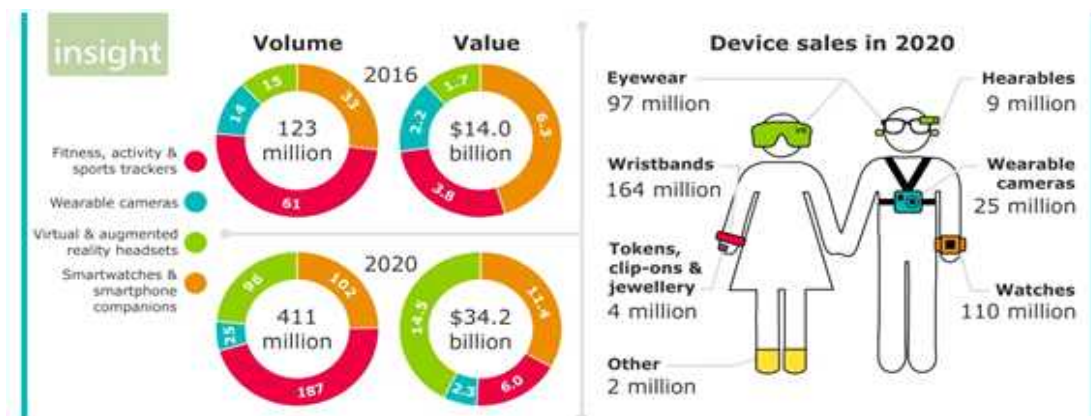
Currently the smart wearable devices on this planet are primarily comprised of smart watches smart wearable devices, smart/ sports wristband and other related products (JianBo.Lei et al, 2016). As Gartner statistics indicates, total sales of the global smart wearable devices in 2015 reached 116 million units, increased by 53.6% in contrast with the data last year. Yet the annual sales of smart wearable devices, smart watches / sports wristband approximately take up half of the sales, and are deemed as the mainstream products in the field (YaPeng.L, & YanKun.Z, 2016).

<Table 1>2016-2018 and 2021 Global wearable equipment sales forecast (Unit: million)

Products	2016	2017	2018	2021
Smart watch	34.8	41.5	48.2	80.96
Smart/Sports wristband	56.2	65.53	70.49	86.17
Fitness tracker	30.12	30.28	30.97	58.73
Total	121.12	137.31	149.66	225.86

<https://www.dongguanfit-watch.blogspot.com>

<Figure 3> Global Wearables Forecast, 2016



[@ccsinsight](mailto:info@ccsinsight.com)

It can be attained through viewing the foregoing Table 1 and Figure 3 that, smart watches / sports wristband and smart life related smart devices have been booming in the past two years. It is inevitable that, the smart watch / sports wristband makes up the higher ratio in the current smart portable devices or the smart watch / sports wristband shall take up a larger

proportion in the future smart portable devices market, It is also adequately bespoken that smart watches / sports wristband are perceived as the tools that shall be the most extensively adopted tool to promote health in the future (.Kim, H, 2015).

3.2 Currently on the market's best-selling six smart watch/sports wristband features and types introduced

<table 2> 2017 best fitness trackers

product	Type	main function	pros and cons
Apple watch 2	Smart watch	1.running, swimming and health tracking 2.can monitor a huge range of exercises 3.heart rate monitor Connectivity: Wi-Fi, Bluetooth, NFC A better connection with the world's best smart watch.	pros : Can plug into a variety of gym equipment. cons : 1.Battery 18 hours 2.Compatibility iOS 3.expensive
Moov Now	Healthy Training	1.can measure a wide range of motions 2.Low latency 3D motion tracking and monitoring, better measure of exercise level and type of exercise. 3.Provide a full range of accurate exercise instruction. 4.Supports two Moov Now bracelets that work together to match and provide tracking of specific motions	Pros: 1.Six month battery life 2.flexible design 3.Low price cons : 1.No screen 2.Can't be charged 3.Small language support
Xiaomi 2	Sports wristband	Support sports pedometer, sleep monitoring, sedentary reminder, heart rate monitoring (real-time monitoring), call reminder, unlock the screen (Android system), vibrate the alarm clock and pay in secret. Worldwide smart wearable sales were	Pros: 1.Low price 2.Strong compatibility 3.Long battery cons :

		highest in the first quarter of 2017.	1.The data is not accurate enough 2.Does not support special sports
Samsung Gear Fit2	Sports wristband	1.Heart rate tracker 2.Activity tracking 3.Message notification 4.real-time monitoring	Pros : 1.Compatibility Android/iOS 2.Beautiful design cons : 1.Battery life only 3 days. 2. expensive
Fit bit Charge 2	Healthy wristband	1.can monitor running, cycling, a general workout, weights, elliptical and more 2.Accurately monitor heart rate and record calorie consumption, can help users to optimize fitness activities, to understand the overall health of the body 3.Cardio fitness class and breathing instruction course, to help users looking for the most relaxed moments of peace every day	Pros: 1.Personalized customization 2.High performance price ratio 3.The best fit bit tracker cons : 1.only four day battery life 2.Wear comfortable in general 3.Not waterproof
Huawei band2 Pro	Sports wristband	1.Heart rate tracker 2.Activity tracking, running, swimming and health tracking 3.GPS,Precise positioning 4.sleep monitoring, real-time monitoring	Pros: 1.Battery life: 21 days standby 2.Low price 3.Business design 4.waterproof cons : 1.Data accuracy is not high 2.Few functions

4. Smart watch / sports wristband in use to promote health behavior of the factors:

4.1 Five characteristics of smart watch / sports wristband:

4.1.1 Easy to use

Easy to use indicates the degree to which a particular system is asserted to be capable of making a person readily accessible (Davis, 1989) Easy to use means that users are able to readily access to all kinds of information using the device(Venkatesh.V, 2000) Users readily use the smart watches / sports wristbands, through the smart watch / sports wristband easy access to their daily exercise, sleep and other information to nurture good habits, and generate healthy behavior.

4.1.2 Convenience

Wearable devices are more convenient to carry, and can be employed as a smart invisible tool in life and work (Min.Z et al, 2017). Additionally, the smart watch/ sports wristband is deemed as a major reform of traditional methods to promote the health and to monitor the movement, incorporating the function of smart phones, measuring instruments and health equipment functions, The convenience of the smart watch/ sports wristband also makes people easier to be concentrated in sports more scientifically and rationally. (Qian.W, 2016).

4.1.3 Real-time monitoring

The function of smart watch/ sports wristband monitoring is available under

all-weather, anytime and anywhere. In day time, you are able to acquire walking distance, steps, length of exercise, and calories consumed. At night, you can record the sleeping hours and sleep quality (Qian.W, 2016). Factoring out the form of movement, the time, and the location all the way, the wearer's movement, sleep and diet are overall monitored. The ultimate objective of the smart watch/sports wristband, is not only to monitor data, but managing how to improve the recommendations through the monitoring data and application measures. (Yong.W, 2016).

4.1.4 Personalized

Smart watch/ sports wristband can be selected or set in accordance with individual requirement(Qian.W, 2016) Can select your own smart watch/ sports wristband.(For instance, the elderly can tend to smart wristband with heart rate measurement and blood pressure function, office workers can tend to supervised smart wristbands, which can remind the daily amount of water, exercise and sleep time.)Can also set the smart watch/ sports wristband in virtue of your personal situation, For instance: in terms of personal habits to remind the rest time, and a quiet vibration alarm clock function (Armanasco, 2017).

4.1.5 Instant Connectivity

Intelligent portable devices can provide access for users to information anytime, anywhere, and lay the foundation for them to browse health data and fitness knowledge (XiangWu.M et al,2016) . In this regard, when adopting smart watch/ sports wristband, people can be connected via the app mobile phone whenever and wherever possible, can comprehend the personal health data, and numerous movements in promoting health knowledge, which

exerts a certain impact on the users of health promoting behavior, and additionally turns out to be conducive to developing a healthy lifestyle.

4.2 Self-efficacy:

4.2.1 Health self-efficacy(HSE)

HSE is able to optimize patient's cognitive and compliance behavior, helps patients consciously establish a good way of life, and with the effective control of the disease and with the incidence reduction of complications(HuaYing.Y,2016). For this reason, while promoting health, HSE is able to drive the user to promote the formation of health awareness to help them consciously establish a good way of life, and independent compliance with the smart watch/ sports wristband health data to adjust the living habits.(Jackson.E et al , 2007).

4.2.2 Technical self-efficacy(TSE)

TSE denotes the extent to which a person thinks he or she is able to use a tool / device to perform a particular task (Ventakesh, 2000) . It is also asserted as a confidence in the ability to fulfill an advanced technology (McDonald.T, & Siegall. M , 1992) .While using the smart watch/ sports wristband, users are confident that the technology-related self-efficacy can be promoted accordingly (Agarwal. R et al, 2000) . Thereupon, user's understanding shall be promoted regarding the smart watch/ sports wristband, and users are able to produce health behavior with the use of its technology and function.

4.3 Promote the formation of health awareness

Smart watch/ sports wristband is not only to provide the software support, offer perception, and conduct the analysis of life characteristics and movement data, but also to nurture people's health awareness, and let people understand a healthy way of life while using the smart wristband, and progressively nurture a sense of healthy living. Health awareness is also deemed as a condition of necessity for behavioral changes enabling users to produce healthy behavior as to maintain or promote health (Huang.X et al, 2017) Over time, the smart watch/sports wristband makes people's health awareness become daily habits and normal, making people's health awareness more specific.(Yong.W, 2016).

4.4 Healthy behavior

Health behavior indicates the preferable behavior that boosts health promotion. It also encompasses people's activities to optimize their physique and maintain their physical and mental health, develop ability for health promoting, and strengthen healthy habits and good behavior (SuMei.Yu,2017) Health behavior, comprising reducing smoking, drinking, staying up all night, fatigue, high-fat high-sugar high-calorie high-salt diet and other bad life behavior, reasonable arrangements for the number of weekly exercise, controlling their own healthy weight, maintaining emotional stability, etc. (Chen.J, 1998) For this reason, the emergence of healthy behavior has a direct and positive effect on health promotion.

Chapter 3: Research Methods

1. Survey Methods

The purpose of this study was to investigate the relationship between health promotion models and users of smart watches / sports wristbands and research on smart watches / sports wristbands that consumers who have adopted or are using smart watches / sports wristbands. Most adults are very concerned about health care, fitness and healthy living. In the meantime, some people with chronic diseases shall also be happy to accept or use smart watches / sports bracelets. Therefore, this study is in the light of adults.

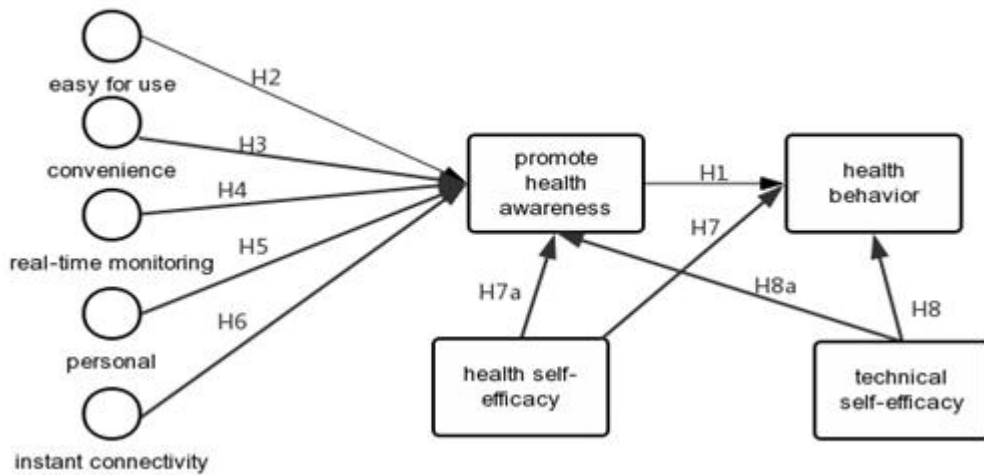
2. Research hypotheses and research models

The research model is built on the basis of Pender's HPM that is primarily designed to study the behavioral changes of different human beings under the cognition and influence of health. The theoretical framework of Pender's HPM stems from the subjective self-efficacy and social cognition theory, that individual's cognition and behavior as well as External factors / tools interference shall to some extent affect the behavior changes in the future(YongBae.Y ,2011).

Therefore, the research model predominately chose five representative attributes bound by health promotion mode in the smart watch / sports wristbands, as well as people's health self-efficacy and technical self-efficacy during the use of the smart watch / sports wristbands for the second-order variables, smart watch / sports wristband and self-efficacy formed under the promotion of health awareness and health actions as a first-order variables to the smart watch / wristband users to study. Through research to identify the smart watch / sports wristbands five major properties of the real impact on

health, adopting smartPLS3.0 to objectively and accurately evaluate and suggest the relevance and potential relevance of these variables. The research model in the light of the above purpose is exhibited in <Figure 4>:

<Figure 4> Research Model



2.1 Research hypotheses

(1) Promote health awareness and health behavior

Promoting health awareness is a basic factor that causes healthy behavior, is the mental activity that people produce healthy behavior (Huang. X et al, 2017) .In the second chapter of the smart watch / sports wristband HPM to promote the impact of factors that we can know that the promoting health awareness has a direct impact on health behavior. Health promotion awareness can change people’s health awareness and understanding, and increase people’s attention and concern for health. So we assume:

H1: The stronger the awareness of health promotion, the more healthy

behaviors it produces.

(2) Easy to use and promote health awareness

Ease of use refers to the user can easily grasp the use of equipment, a variety of information, and easy to operate and use some kind of equipment or a system. In the Davis (1989) study, it has been shown that ease of use has a direct impact on the degree of application and use of its equipment or system. So through the analysis of the attributes of smart watches and sports wristband, the user's behavior to promoting health awareness and indirect effects on health behaviors. So we can get the following hypotheses:

H2: Ease of use has a positive effect on promoting health awareness.

(3) Convenience and health promotion

In the course of using the smart watch / sports wristband, the convenience increases the usage time and the usage rate of the smart watch / the sports wristband, and also enables the user to concentrate on the sports. At the same time, the convenience of the use of the smart watch / sports wristband makes it easier for users to pay attention to health and maintain healthy exercise. Therefore, it can be concluded that convenience has a positive effect on promoting health awareness.

H3: Convenience has a positive effect on promoting health awareness.

(4) Real-time monitoring and promote health awareness

Smart Watch / Sport wristband has all-day, anywhere monitoring of user movement, sleep time, sleep quality, health, heart rate and other real-time monitoring properties. Therefore, under the function of real-time measurement and supervision, users will develop the habit of paying attention to and paying attention to their own health status so as to form a health promotion awareness so as to achieve the purpose of generating healthy behaviors. So

available this assumption:

H4: Real-time monitoring has a positive effect on promoting health awareness.

(5) Personalized and promote health awareness

Personalization refers to the smart watch / sports wristband can be based on personal work habits and preferences for selection and settings. Because of its personalization can make it to meet the needs of users to the maximum, be more humane and meticulous, and effectively play a monitoring role in the development of good habits of users, allowing users to gradually form awareness to promote their own health. So available this assumption:

H5: Personalization has a positive impact on promoting health awareness.

(6) Instant connectivity and promote health awareness

Users can connect other smart device terminals (like mobile phones, computers, ipad, etc.) anytime they use the smart watch / sports wristband. By connecting to other terminals we can get real-time health data as well as lots of health knowledge, helpful health information, and ways to promote health. The speed of the network continues to develop, the faster the connection, the easier it is to use, the more effective health information is available in a short period of time. At the same time, users are more concerned about health and have a stronger awareness of health promotion. So available this assumption:

H6: Instant connectivity has a positive effect on promoting health awareness.

(7) Healthy self-efficacy and health behaviors:

In many studies, it has been shown that the sense of health self-efficacy can improve self-efficacy and compliance of patients, give patients confidence

in their own health, and consciously develop good and healthy living habits so as to effectively control the deterioration and promote the recovery of the disease ,can believe that effectively protect their own health (HuaYing.Y,2016).Especially in optimistic people who are positive and confident, they are more confident in their ability to maintain their health and are able to persistently and urge themselves to perform healthy behaviors and live healthy lives. So available this assumption:

H7 : Healthy self-efficacy has a positive effect on health behavior.

Health self-efficacy in the process of health behavior, first of all out of attention and concern for health, and secondly because of their own state of health and understanding of the health knowledge under the confidence generated by the promotion of healthy behavior. This shows that the sense of health self-efficacy will make people pay more attention to health and attention, but also make people have a positive attitude and sense of responsibility towards their own health conditions, resulting in promoting health awareness. So available this assumption:

H7a: Healthy self-efficacy has a positive impact on promoting health awareness.

(8) Technical self-efficacy and health behaviors

Technical self-efficacy refers to a person's confidence in the use of a particular tool / device / system by themselves and also their own ability to manipulate certain tools / devices. Confidence in the use of technology can prompt people to learn about new tools and devices and use more technology or new methods to steer healthy behaviors. So available this assumption:

H8: Self-efficacy of technology has a positive effect on health behaviors.

When using tools and equipment to supervise the health behaviors, first of

all, it is based on the users' understanding of health knowledge and their ability to judge whether they are healthy behaviors. Here with the technology self-efficacy enhanced at the same time, promote health awareness will be more and more in-depth user's mind. So available this assumption:

H8a : Self-efficacy of technology has a positive effect on promoting health awareness.

This study proposes the following assumptions:

H1: The stronger the awareness of health promotion, the more healthy behaviors it produces.

H2: Ease of use has a positive effect on promoting health awareness.

H3: Convenience has a positive effect on promoting health awareness.

H4: Real-time monitoring has a positive effect on promoting health awareness.

H5: Personalization has a positive impact on promoting health awareness.

H6: Instant connectivity has a positive effect on promoting health awareness.

H7: Healthy self-efficacy has a positive effect on health behavior.

H7a: Healthy self-efficacy has a positive impact on promoting health awareness.

H8: Self-efficacy of technology has a positive effect on health behaviors.

H8a: Self-efficacy of technology has a positive effect on promoting health awareness.

3. Measuring Instruments

3.1 PLS algorithm introduced

3.1.1 Application of partial least squares method

Partial Least Square (PLS) first proposed by Swedish scientist Wood and Calbano (1983) is deemed as a main application in the multi-factor variables and multi-independent causal modeling method. It also counts as a new iterative estimation method for collecting principal component analysis and multiple regressions. Partial least squares can be employed to perform path analysis of academic research in various fields appropriately and accurately. The problem of multi collinearity with variables existing in the study (Also known as relevance) can be possibly solved.

This smart watch / sports wristband on the user is adopted to promote health factors in the investigation and study, to establish numerous smart watches/sports wristband may exert an effect on health promotion. Additionally, these observations are not isolated, and accordingly the observed variables are correlated with each other in different degrees. If principal component analysis and ridge regression are adopted to solve such problems in the case of the large number of observed variables, the calculation of these two methods shall be excessively large, and not simple enough. When it comes to parameter estimation and to explicate which principal components are to be removed and the independent variables are not adequately factored in for the dependent variable. Principal component analysis and ridge regression can lead to unreliability of the model. So in this study, we acquired the models whereby smartPLS3.0 path analysis software, obtained the path coefficients to examine the relationship between each hidden variable and the implicit and measured variables, and verified the rationality of the model (Lauro.C et al,2005).

3.1.2 PLS path model test criteria

Partial least squares modeling method has no distribution requirement for data, The test method for PLS model is different from traditional Of the test

method. The model was employed to acquire the variance (AVE), incorporated reliability, R² value, Cronbach's Alpha value, Redundancy as well as the Bootstrapping method for model significance (stability) testing (HuiWen.W, LinHui.F, 2004). For this reason, Chin (1998) gives a series of evaluation criteria for PLS path model testing, then the internal model and the external model were evaluated separately, A brief introduction to these indicators follows:

(1).AVE: Similar indicators of commonality, adopted to measure the implied variables caused by the observed error from the corresponding observed variables then get the total amount of variance. AVE is adopted to evaluate the merits of the model, evenly explicit variable reliability, and normally the AVE value is greater than 0.5. The larger the value of AVE, the better the effect. (2).Composite Reliability: As the reliability factor of the measurement tool. If the incorporation of high reliability coefficient that the implied variables corresponding to the measurement of a high degree of consistency. A factor greater than or equal to 0.7 indicates that the measurement tool employed is reliable (Fornell. C & Larcker, D. F, 1981) .(3).R² value : Cross-test consistency indicators, can be adopted to evaluate the structural model of the ability to interpret. The bigger the value, the better.(4).Cronbach's Alpha value : The most commonly employed reliability factor, Alpha values are between 0 and 1. From the general perspective, the reliability coefficient of the total scale is preferably above 0.7.(5).Redundancy : The smaller the general redundancy, the better the degree of model fit.

3.2 Questionnaire structure

The design of the questionnaire is primarily in the light of the understanding of the characteristics of smart watch / sports wristband, access

to smart watches / sports wristband and health-related factors bound by the questionnaire, especially, the incorporation of Dr. Young-Bea Yang's research on the demand factors for promoting health models in 2011. The questionnaire takes the Likert scale, the score is 1, 2, 3, 4, 5. To ensure the accuracy of the investigation, the survey is not limited to the location, age, profession, country. Take a random sample of the survey to smart watches / sports wristband users and buyers as the main survey. The questionnaire has 20 closed questions about the characteristics of smart watches / sports wristband. These closures are bound by the ease of use of smart watches / sports wristband, convenience, real-time monitoring, personal, and instant connectivity. The questionnaire was developed by senior medical personnel, long-term fitness staff and smart watch / sports wristband long-term users to analyze the revised questionnaire.

3.2.1 Self-efficacy

Self-efficacy survey is split into two parts, i.e. one is the sense of self-efficacy and self-efficacy of technology.

Health Self-efficacy is the user's ability to believe in health-related behaviors for health purposes. This measure, taken by Gutierrez and Long (2011), is in the light of a 5-point likert scale that strongly disagrees to strongly agree. Cronbach's $\alpha = 0.88$ for Gutierrez's Healthy Self-Efficacy Study for Diabetics, so this project is reliable. In this study have five 5-point questions.

Technical self-efficacy refers to the individual's ability to use a particular task to accomplish a task. The Ventakesh variable (2000) is adopted as a measure of technical self-efficacy. Totally four 5-point questions.\

3.2.2 Promote health awareness

Taking into account that the general awareness of users about their own health may affect the way users use health information and smart watches /sports wristbands. Therefore, the degree of health awareness of users in this study was determined by six projects in Hong (2009) (Hong's research Cronbach's alpha = 0.84, is reliable). This study employed totally three 5-point questions.

3.2.3 Smart Watch / sports wristband Attributes:

Smart watch / sports wristband attributes survey is divided into ease of use, convenience, real-time monitoring, personal and instant connectivity 5 parts, as a smart watch /sports wristband property measurement tool is an incorporation of other smart products apply related research questions. Split into five major items of twenty 5-point.

4. Data collection method

The questionnaire consists of variable issues and user basic information in two parts. The main questions are adapted from the reference. Individual questions are in the light of the definition of variables in the literature. The scores are 1, 2, 3, 4, 5. The score represents different meanings in turn corresponding to the user's degree of recognition: very disagree, do not agree, in general, agree, and very agree. Users are merely required to make rational judgments in the light of personal circumstances and select the answer to personal ideas. In the meantime in the research process has proved that these variables in terms of the problem for the user can accurately understand. To

take this scale is predominately because it is easy to understand, easy to operate. Questionnaire Reference <Appendix 1, 2, 3>.

As to ensure the questionnaire is accurate and feasible, and the data is true and reliable. Fifty users were tested before the formal questionnaire. In line with the pre-measured statements of the questionnaire to adjust and generate the final questionnaire.

The data required in this paper originate from Je Ju International Airport and online surveys. The entire survey was conducted separately in August and September. 50 questionnaires were adjusted and given away in line with the first test, 300 revised questionnaires were received validly. In this paper, 300 questionnaires were selected as sample data.

Chapter 4: Research and Analysis

1. General feature analysis of survey subjects

<Table 3> listed below, the general characteristics of survey subjects:

<Table 3> General Characteristics of Survey Subjects

variable	division	frequency(person)	rate%
Sex	male	124	41.33 %
	female	176	58.67 %
Age	under 18s	6	2%
	18-25	67	22.33 %
	26-30	91	30.33 %
	31-40	79	26.33 %
	41-50	52	17.33 %
	51-60	3	1%
	over 60s	2	0.67%
Job	students	23	7.67%
	House wives	36	12%
	finance/auditor	16	5.33%
	white-collar workers	26	8.67%
	blue-collar worker	36	12%
	medical workers	14	4.67%
	teachers	36	12%
	professionals	12	4%
	unemployed	11	3.67%
	others	90	30%
Income per month	under 2 thousand yuan	52	17.33 %
	2-5thousand yuan	131	43.67 %
	5-7thousand yuan	42	14%

	7-10thousand yuan	36	12%
	over 10thousand yuan	39	13%
Education	under middle school graduation	39	13%
	high school graduation	23	7.67%
	in college	50	16.67%
	college graduation	159	53%
	over college graduation	29	9.67%
Purpose	monitoring	187	62.33%
	movement	195	65%
	weight	136	45.33%
	habit	185	61.67%
	popular	56	18.67%
	others	45	15%
	total	300	100%

Among the 300 valid questionnaires:

(1). Men took up 41.33% and women made up 58.67%.Are people who have experience with smart watches / sports wristband.(inclusive of those who use less than a month).

(2). In the age distribution, 26-30 age group represented the largest proportion, 30.33%.Followed by 31-40 years old, 26.33%.18-25 years old occupied 22.33%, 18 years of age took up 2%. 41-50 years old made up 17.33%. In excess of 50 years old represented 1.67%.

(3). In the occupational distribution, students took up 7.67%, housewives made up 12%, financial / auditors represented 5.33%, white-collar workers (civilian staff) occupied 8.67%, blue-collar (technical staff) took up 12%, medical-related employees made up 4.67% 12% of the education industry staff, professional staff (lawyers, architects, designers, accounting, etc.)

represented 4%, unemployed occupied 3.67%, other occupations took up 30%.

(4).In the income distribution, the monthly income of less than 2 thousand yuan made up 17.33%, 2 thousand -5 thousand yuan represented 43.67%, 5 thousand -7 thousand yuan occupied 14%, 7 thousand -1 million took up 12% Income of in excess of 1 million yuan made up 13%.

(5).In the degree of education, under secondary school graduates represented 13%, high school graduates occupied 7.67%, 16.67% of college reading, 53% of university graduates, over college education took up 9.67%.

(6).A multiple-choice question(MCQs) in the purchase / use purposes, 62.33% for health monitoring, 65% of the people is to exercise, 45.33% of the people to lose weight, 61.67% of the people as to develop good habits, in that the popular and buy / use people made up 18.67%, taking up 15% of the other.

2. Validity and reliability analysis

Model validation consists of two parts: measurement model checking and structural model checking. The SmartPLS3.0 software developed by Professor Ringle of University of Hamburg and the team developed by Germany is analyzed. The software is in the light of partial least squares, which requires less sample size and requires less distribution of sample data. First, the PLS Algorithm is adopted to verify the measurement model, and then the bootstrapping algorithm is employed to analyze the structure model. The path coefficient is obtained to investigate the relationship between the implicit variables and the implied variables and the measured variables, and the rationality of the model is verified.

2.1 The validity and reliability

Measurement model validation is mainly adopted to analyze the reliability

and validity of variables. Reliability is employed to indicate whether the results of the scale are credible. The validity includes aggregation validity and discriminate validity. Convergent validity indicates the degree at which the variables and their corresponding variables are correlated to each other. The discriminate validity is adopted to test whether how the variable and the corresponding variable are correlated to each other outstrips how the variable are correlated with other variables.<Table 4> is the measurement of the reliability of the model and the validity of the relevant indicators of the results. The scale reliability is measured by the Cronbach's alphas value (α) and the Composite Reliability (CR) of the variable.

<Table 4>: Construct Reliability and Validity

		F a c t o r loading	Cronba c h ' s Alpha	rho_A	Composit e Reliabilit y (CR)	AVE
H e a l t h behavior	Behavior_1	0.929	0.910	0.915	0.943	0.847
	Behavior_2	0.950				
	Behavior_3	0.882				
Easy for use	EU_1	0.945	0.879	0.879	0.943	0.892
	EU_2	0.944				
Promote h e a l t h y awareness	HPR_1	0.932	0.923	0.924	0.951	0.867
	HPR_2	0.950				
	HPR_3	0.912				
Health self-efficacy	HSE_1	0.891	0.932	0.933	0.948	0.786
	HSE_2	0.896				
	HSE_3	0.872				
	HSE_4	0.912				
	HSE_5	0.861				
Real-time monitoring	RTM_1	0.925	0.910	0.910	0.943	0.847
	RTM_2	0.928				
	RTM_3	0.908				

Technical self-efficacy	TSE_1	0.917	0.941	0.941	0.957	0.849
	TSE_2	0.936				
	TSE_3	0.923				
	TSE_4	0.910				
Instant connectivity	connect_1	0.902	0.895	0.895	0.934	0.826
	connect_2	0.932				
	connect_3	0.892				
Convenience	convenience_1	0.814	0.888	0.898	0.917	0.689
	convenience_2	0.847				
	convenience_3	0.878				
	convenience_4	0.847				
	convenience_5	0.760				
Personal	personal_1	0.829	0.929	0.934	0.946	0.779
	personal_2	0.906				
	personal_3	0.884				
	personal_4	0.906				
	personal_5	0.886				

The survey results encompass 9 factors in total. One of the easy-to-use items 4, item 3 was removed. In that they jeopardize the validity of discriminate validity. <Table 4 > shows, the factor is comprised of 3 behavioral changes questions, 2 easy to use questions, 3 health promotion awareness questions, 5 health self-efficacy questions, 3 real-time monitoring questions, 4 technical self-efficacy questions, 3 instant connectivity questions and 5 convenience questions and 5 personalized questions.

In addition, it is evident from <Table 4> that, the factor loading of all the variables is greater than 0.7. Measurement items can well explicate the variable. All variables of the alpha value is greater than 0.7, so the model has good reliability. The Composite Reliability serves as a reliability coefficient of a measurement tool. If the incorporation of high reliability coefficient, said the implied variables corresponding to the measurement of a high degree of consistency, a factor greater than or equal to 0.7 indicates that the measurement tool employed is reliable. The CR values in Table 4 satisfy

the evaluation criteria of reliability greater than or equal to 0.7. It shows that the variables have good internal consistency. The degree of polymerization was tested by the average extraction variance (AVE) of each variable. The average variance extraction AVE value is above 0.7, Meet the standard requirements greater than 0.5, which indicates that the model has good convergence validity and good model polymerization efficiency.

2.2 Discriminate validity

The next is to test the discriminate validity, is in the light of Hair and Hult (2016) of each potential value structure to be higher than the highest square structure and other potential structure, the load index shall be larger than the cross loadings. Therefore, in this study, the criterion of Fornell and Larcker 's (1981) was adopted to test the discriminate validity. The results are exhibited in <Table 5>:

<Table 5> Discriminate validity

	health behavior	instant connectivity	convenience	easy for use	promoting health awareness	health self-efficacy	personal	real-time monitoring	technical self-efficacy
health behavior	0.921								
instant connectivity	0.699	0.909							
convenience	0.734	0.806	0.830						
easy for use	0.677	0.716	0.764	0.945					
promoting health	0.886	0.693	0.694	0.662	0.931				

awareness									
health self-efficacy	0.789	0.632	0.706	0.647	0.805	0.886			
personal	0.698	0.881	0.837	0.766	0.698	0.670	0.882		
real-time monitoring	0.731	0.809	0.822	0.735	0.735	0.707	0.837	0.920	
technical self-efficacy	0.755	0.591	0.642	0.609	0.782	0.799	0.632	0.655	0.921

It can be seen from <Table 5>, in contrast with the correlation coefficient of each factor and the square root of its own AVE, in that the former is smaller than the latter, there is enough discriminative validity among the factors.

3. Model Results Analysis and Hypotheses Verification

3.1 Model Results Analysis:

<Table 6> Correlation and Influence Coefficients of Path Model Variables

	Influence coefficient	T Statistics (O/STDEV)	P Values
promoting health awareness → health behavior	0.679	7.805	0.000
easy for use → promoting health awareness	0.071	1.083	0.279
convenience → promoting health awareness	-0.052	0.699	0.485

real-time monitoring -> promoting health awareness	0.16	1.861	0.063
personal -> promoting health awareness	-0.032	0.385	0.701
instant connectivity -> promoting health awareness	0.19	2.725	0.007
health self-efficacy -> health behavior	0.411	2.741	0.006
health self-efficacy -> promoting health awareness	0.346	4.137	0.000
technical self-efficacy -> health behavior	0.083	1.002	0.317
technical self-efficacy -> promoting health awareness	0.303	3.951	0.000

(1) Promote the impact of health awareness on health behavior

Promote health awareness is an important factor in healthy behavior .It can be seen from the <Table 6> that the values of T and P of health promotion awareness on health behaviors meet the conditions of $P < 0.001$ at $T > 3.29$, indicating that the impact of promoting health awareness on health behavior is significant. The correlation coefficient between health awareness and health behaviors was 0.679. Therefore, assuming that H1 is established, the promotion of health consciousness has a positive effect on health behaviors and the stronger the health awareness, the more healthy behaviors it produces.

(2) The impact of ease of use on health promotion awareness

We can see that the T value for ease of use and health promotion awareness is 1.083, which is less than the critical value of 1.96, so the relationship between the two is insignificant, so H2 is not valid. This shows that ease of use does not directly affect the promotion of health awareness. Although the easier it is to use it, the higher the penetration rate and usage rate is. However, if the user only uses a smart watch / sports wristband but

does not often use it, it can not achieve the health promotion effect. So easy to use to promote health awareness did not have a direct impact.

(3) The impact of convenience on promoting health awareness

T value of convenience and health promotion awareness is 0.699, less than the critical value of 1.96, so the relationship between the two is not significant. At the same time, the correlation coefficient between the two is -0.052, indicating that there is a negative impact between the two, and the impact is not significant, so assuming H3 not valid. Convenience does not have a positive effect on promoting health awareness; on the contrary, being overly convenient can at times make people more dependent on machines and equipment, and the degree of concern for health has actually decreased.

(4) The impact of real-time monitoring on health promotion awareness

The T value of real-time monitoring and health promotion awareness was 1.861. Although it was less than the critical value of 1.96, the correlation coefficient between the two was 0.160, so that real-time monitoring had a positive effect on promoting the formation of health awareness, although, the positive effects less significant but also one of the factors that can't be ignored, assume H4 is established.

(5) The impact of personalization on promoting health awareness

The T value of personalization and promotion of health awareness was 0.385, much less than the critical value of 1.96, and the correlation coefficient between the two was -0.032. So assuming H3 not valid, the impact between the two is not significant, and does not have a positive impact, This also shows that although personalized will meet more users, to increase the purchasing power of the smart watch / sports wristband, but also led to a lot of users to buy a smart watch / sports wristband is not used to develop good health habits, not in order to promote the healthy, but because out of

fashion, beauty and so on.

(6) The impact of instant connectivity on promoting health awareness

The T value of instant connectivity and health promotion awareness is 2.725, which is greater than the critical value of 1.96, and the path coefficient between the two is 0.190, assuming that H6 is established. This shows that the faster the connection, access to effective health information more comprehensive, more conducive to promote the formation of health awareness. It also shows that the effect of instant connectivity on health promotion is significant.

(7) The impact of health self-efficacy on health behavior

The T value of healthy self-efficacy and health behavior was 2.741, with a correlation coefficient of 0.411. Therefore, assuming that H7 is established, the effect of health self-efficacy on health behavior is significant. It can be seen from the above analysis that the stronger one's self-confidence in one's own health is, the stronger the self-confidence is in fulfilling or making certain healthy behaviors and the easier it is to have healthy behaviors.

As can be seen from the table, T value of health self-efficacy and health promotion awareness is 4.137, P value is 0, assuming H7a is established. It shows that the effect of health self-efficacy on promoting health awareness is very significant. In theory, the sense of health self-efficacy and the promotion of health awareness are inextricably linked. The degree of self-confidence in maintaining their own state of health promotes their concern and attention to health, and their awareness of health promotion will be stronger.

(8) The impact of technical self-efficacy on health behavior

The T value of technical self-efficacy and health behavior is 1.002, less than the critical value of 1.96, so it is assumed that H8 not valid. Then, the correlation coefficient between technical self-efficacy and health behavior is

0.083, which shows that the self-efficacy of technology has a certain influence on the health behavior but is not significant. Because the technical self-efficacy can only increase users' confidence and utilization rate of using the smart watch / sports bracelet, it can not directly affect the health behaviors.

The self-efficacy of technology can influence the formation of health awareness. The T value of technical self-efficacy and health promotion awareness is 3.951, which is larger than the critical value of 1.96. Therefore, it is assumed that H8a is established. The correlation coefficient between the two was 0.303, indicating that the self-efficacy of technology has a significant impact on promoting health awareness. Because there will be more ways to use and health promotion under the self-confidence of the use of smart watches / sports wristbands to promote healthy awareness.

3.2 Hypotheses Verification Summary and Impact Path Analysis

Through the above calculations and conclusions of the analysis, the model proposed by the research hypothesis test results are summarized in <Table 7>.Of the 10 proposed hypotheses, H2, H3, H5 and H8 did not pass the hypothesis test. That is, ease of use, convenience and personalization have no significant effect on health behaviors by promoting health awareness and self-efficacy of technology. From the theoretical analysis, the conclusion obtained by the research is reasonable.

<Table 7> Hypothesis test result

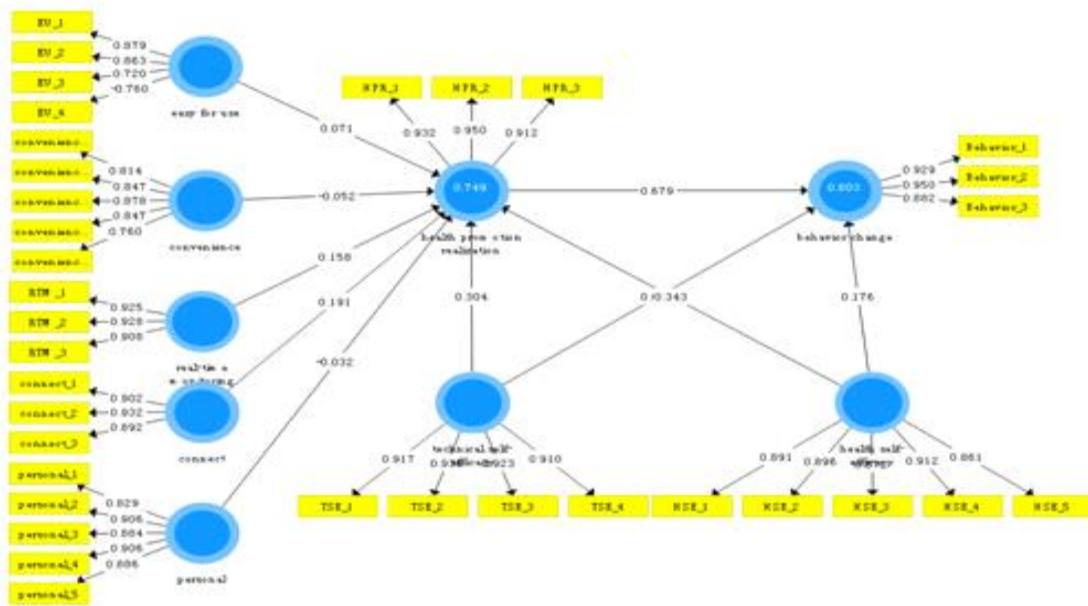
Number	Research hypothesis	Test result
H1	The stronger the awareness of health promotion, the more healthy behaviors it produces.	Approved

H2	Ease of use has a positive effect on promoting health awareness.	Not approved
H3	Convenience has a positive effect on promoting health awareness.	Not approved
H4	Real-time monitoring has a positive effect on promoting health awareness.	Approved
H5	Personalization has a positive impact on promoting health awareness.	Not approved
H6	Instant connectivity has a positive effect on promoting health awareness.	Approved
H7	Healthy self-efficacy has a positive effect on health behavior.	Approved
H7a	Healthy self-efficacy has a positive impact on promoting health awareness.	Approved
H8	Self-efficacy of technology has a positive effect on health behaviors.	Not approved
H8a	Self-efficacy of technology has a positive effect on promoting health awareness.	Approved

In the light of running results, adopting Smart PLS3.0 output of the entire smart watch / sports wristband on the health impact factor model of the path coefficient map. The description of the path coefficient diagram is as follows:

(1) The circular representation of the nine implicit variables in the model, the value of each implied variable between the arrow is called the path coefficient, reflecting the impact exerted by the size of the hidden variables. There is no arrow connection between two implicit variables indicating that there is no direct contact in the model.

(2) The rectangle represents the observed variable for each implied variable, 9 implicit variables were designed with 35 observed variables. Observational variables fail to be directly measured and are required to be reflected by observational variables. The value of the arrow between the implied variable and the observed variable is called the factor load factor. The higher the value, the higher the degree of reflection of the observed variables.



<Figure 5> Path Model Coefficient Diagram

3.3 Correlation and influence factor analysis:

In the light of the path coefficient can be acquired for each potential variable on the direct impact exerted by health behavior, indirect effects and overall impact, as exhibited from <Table 8>:

<Table 8>: Direct, indirect effects and total effects on health behavior

Factors Affecting Health behavior	Direct effects	Indirect effects	Total effects
Promote health awareness	0.679	0	0.679
Technical self-efficacy	0.176	$0.343 \times 0.679 = 0.233$	0.409
Health self-efficacy	0	$0.304 \times 0.679 = 0.206$	0.206
Ease of use	0	0	0
Convenience	0	0	0
Real-time monitoring	0	$0.158 \times 0.679 = 0.107$	0.107

Instant connectivity	0	$0.191 * 0.679 = 0.130$	0.130
Personal	0	0	0

It is evident from <Table 8> that, the most influential factor in the promotion of health behavior is the promotion of health awareness, followed by technical self-efficacy, the third denotes the health of self-efficacy, and the fourth is instant connectivity. Eventually, real-time monitoring, the ease of use, convenience, and personal exert no direct and indirect impact on health behavior changes.

4. Evaluation model to be correct

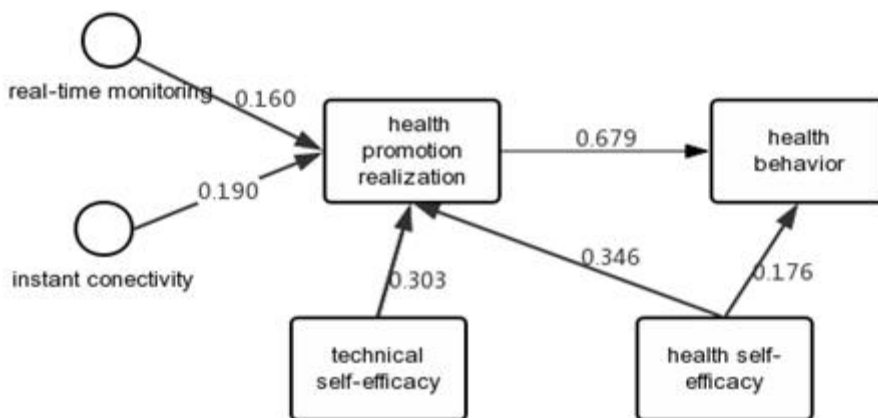
The description of the above chapter is the findings of the evaluation model of the health impacts exerted by the smart watch / sports wristband constructed in the third chapter, Goodness of fit analysis, model checking. The findings indicate that the model is basically passed the test.

Yet in the results of the model and the significance of the test, easy to use, convenience, real-time monitoring and personal of the path coefficient and the overall effect coefficient are very small, bespeaking that these implicit variables, inclusive of easy for use, convenience and personal for the promotion of health awareness. Easy for use, convenience and personal relevance to health behavior changes, are not evidently correlated with each other. Moreover, the T Statistics values between the implied variables in the Bootstrapping test are less than the critical value 1.96, having not passed the significance test. These path relationships can be canceled. Arising from the real-time monitoring T value slightly less than almost equal to 1.96, and P value is approaching to 0.05. In account of this, how the real-time monitoring and promotion of health awareness and behavior change are correlated with

each other is perceived to be negligible.

Yet in the results of the model and the significance of the test, easy to use, convenience, real-time monitoring and personal of the path coefficient and the overall effect coefficient are very small, bespeaking that these implicit variables, inclusive of easy for use, convenience and personal for the promotion of health awareness. Easy for use, convenience and personal relevance to health behavior changes, are not evidently correlated with each other. Moreover, the T Statistics values between the implied variables in the Bootstrapping test are less than the critical value 1.96, having not passed the significance test. These path relationships can be canceled. Arising from the real-time monitoring T value slightly less than almost equal to 1.96, and P value is approaching to 0.05. In account of this, how the real-time monitoring and promotion of health awareness and behavior change are correlated with each other is perceived to be negligible.

The revised path coefficient structure is as follows



<Figure 6> Modified Smart Watch / Sport wristband HPM and Path Coefficient scheme

Chapter 5: Conclusion

1. Conclusion

The promoting health model has been extensively employed in a growing number of fields currently, and additionally, the intelligent health devices are being boomed and embraced by a growing number of people. For this reason, it shall be inadequate to merely research the health interventions through adopting the promoting health models. It is of great necessity to incorporate the advanced science and technology with life, and accordingly the intelligent products turn out to be the effective auxiliary tools for HPM. In this regard, this paper is in the light of the smart watch / sports wristbands health promotion model to ascertain the factors affecting the research. This study primarily seeks to dig out the factors affecting the health promotion of smart watches / sports wristbands and to carry out the analysis and speculation judiciously.

Through this study found that most people are more concerned about their own health. Even 62% of people are willing to spend time, energy and money on their own health. Research surveys show that the popularity of smart watches and sports wristbands is widespread and accepted and used by many people at all levels of education at all income levels in all occupational areas of all ages. From the user's purchase reason and purpose of use, most people think that smart watches and sports wristbands on the health monitoring, fitness, the formation of good habits have a role.

From the results of research and data analysis:

Firstly, promote health awareness has a direct and significant impact on health behavior.

Secondly, the instant connectivity and real-time monitoring of smart watches and sports wristbands have a direct impact on the formation of health promotion awareness.

Thirdly, at the same time, in the use of smart watches and sports wristbands, health self-efficacy and technical self-efficacy have a direct impact on the promotion of health awareness, and health self-efficacy also has a direct impact on health behaviors.

2. Inspired

In accordance with the survey results and analysis, I think this study provides a reasonable and effective basis for the use of smart watches / sports wristbands in HPM. Especially in the context of today's smart society, this paper asserts that the smart watch / sports wristbands, acting as the representative of the smart portable device for the health of the public, is able to effectively monitor and supervise our health condition, becomes of crucial significance as nurturing public awareness of physical fitness and exercise behavior, forming the national fitness and health of the society, and playing an irreplaceable role. In this regard, the government shall encourage, guide and publicize the public from the perspective of policy and fund to nurture a healthy consciousness, establish a positive and healthy living environment, and proactively promote the development of healthy behaviors. The masses shall make full use of the characteristics of smart device and make rational use of the various functions of smart watches / sports wristbands so as to promote their own health awareness and healthy behaviors.

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<Appendix 1> : Questionnaire Items

Health self-efficacy

HSE_1: Using a smart watch / sports wristband, I am confident that I can do the health activities I need to improve my health

HSE_2: Using the smart watch / sports wristband, I am confident that I can have a balanced diet.

HSE_3: Using the smart watch / sports wristband, I am confident that I can overcome difficulties in performing healthcare.

HSE_4: Using the smart watch / sports wristband, I am confident that I can exercise regularly.

HSE_5: Using smart watch / sports wristband, I am confident that I can maintain my balance properly

Technical self-efficacy

TSE_1: With the manual, I can use the smart watch / sports wristband.

TSE_2: If someone else demonstrates / helps, I can use smart watch / sports wristband.

TSE_3: If I have used a similar system before, I can use smart watch / sports wristband

TSE_4: I have never used smart watch / exercise bands before, but I am confident that I can use smart watch / sports wristband.

Health Promotion Awareness

HPR_1: Smart watch / sports wristband have an interest in health care.

HPR_2: Using a smart watch / sports wristband, exercise for health care is needed.

HPR_3: The smart watch / sports wristband is a good health promotion tool.

Health behavior

HB_1: I want to continue to use the smart watch / sports wristband.

HB_2: I want to live a healthier life with smart watch / sports wristband.

HB_3: Using smart watch / sports wristband, I will invite healthy people to the surrounding people.

easy for use

EU_1: Easy to use smart watch / sports wristband

EU_2: There is no difficulty in using smart watch / sports wristband

EU_3: Various functions of smart watch / sports wristband are easy to use.

EU_4: The first time you use smart watch / sports wristband, you need someone else's help.

Convenience

Convenience_1 : Smart watch / sports wristband is portability .

Convenience_2: When I exercise, I want to carry more smart watch / sports

wristband than smart phone.

Convenience_3: If possible, I would like to use my smart phone as a smart watch / sports wristband instead.

Convenience_4: I use a smart watch /sports wristband almost every day

Convenience_5: I feel uncomfortable without a smart watch /sports wristband.

Real-time monitoring

RTM_1: I can get real-time personal health status through smart watch /sports wristband use

RTM_2:Smartwatch/sportswristbandhasmyhealthcheckandpromotioneffect.

RTM_3:SmartWatch/sportswristbandcanrecordreal-timehealthdata.

Personalized

Personalized_1: I can buy smart watches /sports wristband that I want among various smart watches /sports wristband.

Personalized_2:Thesmartwatch/sportswristbandcanbasicallysatisfywhatyouneed.

Personalized_3:Thesmartwatch/sportswristbandcanbeinstalledatmyrequestontime.

Personalized_4:Smartwatch/sportswristbandformeishommization

Personalized_5:Icancontrolmypersonallifemodelthroughsmartwatch/sportswristbandhealthdata.

Instant Connectivity

Con_1 Smart watch / sports wristband can connect mobile phone or external device immediately.

Con_2 I can immediately get health information or health knowledge through smart watch / sports wristband.

Con_3 I want to use smart watch / sports wristband for a long time (continuation).

<Appendix 2> Questionnaire Items

	그렇지 않다 보통이다 매우 그렇다
1.스마트 워치/운동 밴드를 이용하면 나는 건강상태를 증진시키기 위해 필요한 건강 행위를 할 수 있는 자신 있다.	①-----②-----③-----④-----⑤
2.스마트 워치/운동 밴드를 이용하면 나는 균형 잡힌 식생활을 할 수 있는 자신 있다.	①-----②-----③-----④-----⑤
3.스마트 워치/운동 밴드를 이용하면 나는 건강관리를 행함에 어려움이 있어도 극복할 수 있는 자신 있다.	①-----②-----③-----④-----⑤
4.스마트 워치/운동 밴드를 이용하면 나는 운동을 규칙적으로 할 수 있는 자신 있다.	①-----②-----③-----④-----⑤
5.스마트 워치/운동 밴드를 이용하면 나는 체중을 알맞게 유지할 수 있는 자신 있다.	①-----②-----③-----④-----⑤

A. 아래 문항을 보시고 자신의 생각과 일치한다고 생각되는 정도를 골라 √표해 주시기 바랍니다

(자기 효능감)

Health self-efficacy

Technical self-efficacy

	그렇지 않다 보통이다 매우그렇다
1.설명서 있으면,나는 스마트 워치/운동 밴드를 이용할 수 있다.	①-----②-----③-----④-----⑤
2.다른 사람의 실연/도와주면,나는 스마트 워치/운동 밴드를 이용할 수 있다.	①-----②-----③-----④-----⑤
3.전에 비슷한 시스템을 사용했으면,나는 스마트 워치/운동 밴드를 이용할 수 있다.	①-----②-----③-----④-----⑤

4.전에 스마트 워치/운동 밴드를 이용한 경험이 없지만,나는 스마트 워치/운동 밴드를 이용할 수 있는 자신 있다.	①-----②-----③-----④-----⑤
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B. 아래 문항을 보시고 자신의 생각과 일치한다고 생각되는 정도를 체크해 주시기 바랍니다.

(건강증진 의식)

	그렇지 않다 보통이다 매우 그렇다
1.스마트 워치/운동 밴드를 이용하면 건강 관리에 대한 관심이 있다.	①-----②-----③-----④-----⑤
2.스마트 워치/운동 밴드를 이용하면 건강 관리를 위한 운동은 필요하다.	①-----②-----③-----④-----⑤
3.스마트 워치/운동 밴드는 좋은 건강증진 도구라고 생각한다.	①-----②-----③-----④-----⑤

(건강행동)

	그렇지 않다 보통이다 매우 그렇다
1.스마트 워치/운동 밴드를 지속하게 사용 하려고 한다.	①-----②-----③-----④-----⑤
2.스마트 워치/운동 밴드를 이용하면 더 건강한 생활을 하려고 한다.	①-----②-----③-----④-----⑤
3.스마트 워치/운동 밴드를 이용하면 나는 주변인과 건강한 생활 권유할 것이다.	①-----②-----③-----④-----⑤

C. 아래 문항을 보시고 자신의 생각과 일치한다고 생각되는 정도를 체크해 주시기 바랍니다.

(사용 용이성)

	그렇지 않다 보통이다 매우 그렇다
1.스마트 워치/밴드 조작(사용)이 쉽다.	①-----②-----③-----④-----⑤
2.스마트 워치/밴드 사용할 때 어려움이 없다.	①-----②-----③-----④-----⑤
3.스마트 워치/밴드의 각종 기능이 쉽게 알 수 있다.	①-----②-----③-----④-----⑤
4.스마트 워치/밴드를 처음에 사용할 때 다른 사람의 도움이 필요하다.	①-----②-----③-----④-----⑤

(휴대 편리성)

	그렇지 않다 보통이다 매우 그렇다
1.스마트 워치/밴드는 간편하다.	①-----②-----③-----④-----⑤
2.운동할때,스마트폰보다 스마트워치/밴드를 더 휴대하고 싶다.	①-----②-----③-----④-----⑤
3.가능하면, 스마트폰이 스마트 워치/밴드로 대신 이용하고 싶다 .	①-----②-----③-----④-----⑤
4.나는 스마트 워치/밴드를 거의 매일 사용하고 있다 .	①-----②-----③-----④-----⑤
5.스마트 워치/밴드가 없으면 불편함을 느낀다 .	①-----②-----③-----④-----⑤

(실시간 감시성)

	그렇지 않다 보통이다 매우 그렇다
1.나는 스마트 워치/밴드 이용을 통해 실시간 개인 건강 상태를 알수 있다.	①-----②-----③-----④-----⑤
2.스마트 워치/밴드는 내 건강 체크와 증진 효과가 있다 .	①-----②-----③-----④-----⑤
3.스마트 워치/밴드는 실시간 내 건강 데이터를 기록 할수 있다 .	①-----②-----③-----④-----⑤

(개인 맞춤형)

	그렇지 않다 보통이다 매우 그렇다
1.나는 각종 스마트 워치/밴드중에 내가 원하는 스마트 워치/밴드를 구매할수 있다.	①-----②-----③-----④-----⑤
2.스마트 워치/밴드는 기본적으로 필요한 것을 만족시킬수 있다 .	①-----②-----③-----④-----⑤
3.스마트 워치/밴드는 내 요구에 따라서 설치할수 있다 .	①-----②-----③-----④-----⑤
4.나한테 스마트 워치/밴드는 인간적인 편이다 .	①-----②-----③-----④-----⑤
5.나는 스마트 워치/밴드의 건강데이터를 통한 개인 생활모델을 조절할 수 있다.	①-----②-----③-----④-----⑤

(즉시 연결성)

	그렇지 않다 보통이다 매우그렇다
1.스마트 워치/밴드는 핸드폰이나 외부장치를 즉시 연결할수 있다.	①-----②-----③-----④-----⑤
2.나는 스마트 워치/밴드를 통한 건강정보나 건강지식이을 즉시 얻을 수 있다.	①-----②-----③-----④-----⑤
3.나는 스마트 워치/밴드를 장기간(계속) 이용하고 싶다.	①-----②-----③-----④-----⑤

D.개인상황에 대한조사:

1.성별

① . ② .

남 여	
2.연령:	
①. 18이하 ②. 18~25 ③. 26~30 ④. 31~40 ⑤. 41~50 ⑥. 51~60 ⑦. 60이상	
3.직업 :	
①. 학생 ②. 주부 ③. 근로자(사무직) ④. 근로자(영업직) ⑤. 근로자(생산직) ⑥.전문직 ⑦. 교사 ⑧.의료인 ⑨. 무직 ⑩. 기타	
4.학력:	
①. 중졸 이하 ②. 고졸 이하 ③. 대학 재학 ④. 대학 졸업 ⑤. 대학원 졸업 이상	
5.월 평균 소득:	
①.100만원 이하 ②.100-200만원 ③. 200-300만원 ④. 300-400만원 ⑤.500-700만원 ⑥. 700만원 이상 ⑦. 1000만원이상	
6.스마트 워치/밴드 사용 시간?	

7.스마트 워치/밴드 사용(구매) 목적?	
①. 건강 체크 ②. 운동 ③. 다이어트 ④. 유행 ⑤.가타	
8.개인 건강상태:	
	그렇지 않다 보통이다 매우 그렇다
나는 건강하다고 생각한다	①-----②-----③-----④-----⑤

<Appendix 3> Questionnaire Items

A. 請根据个人情况選擇合适的選項

(自我效能感)

Health self-efficacy

	非常不同意 一般 非常同意
1. 智能手表/运动手环的应用中，我会为了促进健康而进行一些有必要的健康行为（如减少熬夜，增强运动）	①-----②-----③-----④-----⑤
2. 智能手表/运动手环的应用中，我会调整我的作息时间，慢慢趋于均衡和规律	①-----②-----③-----④-----⑤
3. 智能手表/运动手环应用中，对健康管理虽然有很多困难和挑战，我有信心克服	①-----②-----③-----④-----⑤
4. 智能手表/运动手环的应用下，我会慢慢养成规律性的运动习惯	①-----②-----③-----④-----⑤
5. 智能手表/运动手环使用时，我会注意我的体重变化	①-----②-----③-----④-----⑤

Technical self-efficacy

	非常不同意 一般 非常同意
1. 在有说明书的情况下，我有使用好智能手表/运动手环的信心	①-----②-----③-----④-----⑤
2. 在别人的演示/操作下，我有使用好智能手表/运动手环的信心	①-----②-----③-----④-----⑤
3. 在之前有用过类似产品的基础下，我有使用好智能手表/运动手环的信心	①-----②-----③-----④-----⑤
4. 虽然之前没有任何使用经验，我还是有使用好智能手表/运动手环的信心	①-----②-----③-----④-----⑤

B. 根据个人情况選擇符合的選項

(促健康意識)

	非常不同意	一般	非常同意
1.在智能手表/运动手环的应用下，我对自身健康管理方面开始有关心	①-----②-----③-----④-----⑤		
2.在智能手表/运动手环的应用下，认为为了健康管理有必要进行一些适当的运动	①-----②-----③-----④-----⑤		
3.认为智能手表/运动手环是一种不错的促健康工具	①-----②-----③-----④-----⑤		

(健康行爲)

	非常不同意	一般	非常同意
1.有持续（继续）使用智能手表/运动手环的打算	①-----②-----③-----④-----⑤		
2.智能手表/运动手环的应用下，会渐渐计划更健康的生活方式	①-----②-----③-----④-----⑤		
3.我会劝导身边人应重视自身健康和管理	①-----②-----③-----④-----⑤		

C. 請根据个人情况選擇以下符合的選項：

(使用容易性)

	非常不同意	一般	非常同意
1.智能手表/运动手环操作/使用容易	①-----②-----③-----④-----⑤		
2.智能手表/运动手环操作/使用上没有困难的地方	①-----②-----③-----④-----⑤		

3.可以很容易熟悉智能手表/运动手环的各种功能	①-----②-----③-----④-----⑤
4.第一次使用智能手表/运动手环需要他人的帮助	①-----②-----③-----④-----⑤

(便携性)

	非常不同意 一般 非常同意
1.智能手表/运动手环很轻便	①-----②-----③-----④-----⑤
2.运动的时候，比起带手机，我更愿意只带智能手表/运动手环？	①-----②-----③-----④-----⑤
3.如果可以（在功能同样的情况下），我愿意携带智能手表/运动手环以替代其他智能产品？	①-----②-----③-----④-----⑤
4.我几乎每天都戴智能手表/运动手环	①-----②-----③-----④-----⑤
5.不戴智能手表/运动手环会觉得不方便	①-----②-----③-----④-----⑤

(实时监测性)

	非常不同意 一般 非常同意
1.可以通过智能手表/运动手环随时知道个人健康（运动）状态	①-----②-----③-----④-----⑤
2.智能手表/运动手环对我个人健康，运动有监测或促进的效果？	①-----②-----③-----④-----⑤
3.智能手表/运动手环可以实时记录我的个人健康	①-----②-----③-----④-----⑤

康或运动数据？	
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(个性化)

	非常不同意	一般	非常同意
1.我可以按着我的个人喜好在各式各样的智能手表/运动手环中买到合适的（不用考虑价格）	①-----②-----③-----④-----⑤		
2.使用/购买的智能手表/运动手环可以满足我的基本要求	①-----②-----③-----④-----⑤		
3.智能手表/运动手环可以根据我的喜好设置	①-----②-----③-----④-----⑤		
4.我认为智能手表/运动手环比较人性化	①-----②-----③-----④-----⑤		
5.我可以根据智能手表/运动手环的健康数据来调整我的生活方式及作息时间？	①-----②-----③-----④-----⑤		

(快速连接性)

	非常不同意	一般	非常同意
1.智能手表/运动手环可以快速的与外部设备连接（wifi, 蓝牙, 电脑, 手机等...）？	①-----②-----③-----④-----⑤		
2.我可以通过智能手表/运动手环可以快速（随时）的获得健康信息或者健身（养生）小知识？	①-----②-----③-----④-----⑤		
3.我愿意长期/一直使用智能手表/运动手环	①-----②-----③-----④-----⑤		

D. 个人情况调查：

1.您的性別：	
① . ② . 男 女	
2.您的年齡段：	
①. 18以下 ②. 18~25 ③. 26~30 ④. 31~40 ⑤. 41~50 ⑥. 51~60 ⑦. 60以上	
3.目前從事的職業：	
①. 學生 ②. 家庭主婦 ③. 財務/審計人員 (業務) ④. 文職/辦事人員 (營銷) ⑤. 技術/研發人員 (生產) ⑥. 醫療相關人員 ⑦. 教師 ⑧. 專業人士(如會計師、律師、建築師、醫護人員、記者等) ⑨. 無業 ⑩. 其他	
4.學歷:	
①. 中學以下 ②. 高中 ③. 大學 (中專, 高 ④. 大學 (技校, 中 職, 技校) 在讀 專, 高職) 畢業 ⑤. 研究生以上	
5. 月平均收入:	
①. 2000元以下 ②. 2000-5000 ③. 5000-7000元 元 ④. 7000-10000元 ⑤. 10000元以上	
6.智能手表/運動手环使用時間？ (從買到現在)	

7.智能手表/運動手环使用 (購買) 目的 [多選題]	
①. 健康監測 ②. 運動 ③. 督促減肥 ④. 流行 ⑤. 其他	
8.個人健康狀態	
	非常不同意 一般 非常同意
您認為您非常健康么？	①-----②-----③-----④-----⑤

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