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Wearable Technology and Healthcare

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ABSTRACT: Over the past years, mobile health applications and specifically wearables have become able and available to collect data of increasing quality of relevance for mental health. Wearable technologies can be innovative solutions for healthcare problems. In this study, we conducted a literature review of wearable technology applications in healthcare. Some wearable technology applications are designed for prevention of diseases and maintenance of health, such as weight control and physical activity monitoring. The wearable applications can directly impact clinical decision making. This paper aims to discuss technical attributes, health attribute and consumer attributes and their roles in the adoption intention of healthcare wearable technology. Together with apps that capture and interpret data, and integrated enterprise and cloud data repositories, the networks of wearable devices and body area networks will constitute the healthcare's Internet of Things.

KEYWORDS : Wearable Technology , Internet Of Things , Healthcare , Digital technologies.

I. INTRODUCTION

Wearable technology are expected to have a main effect withinside the fitness sector. With wearables like Vital Connect's Healthpatch MD, physicians can remotely get hold of updates on affected person's vitals (Terry 2014). For sufferers with amyotrophic lateral sclerosis (ALS) or different neurodegenerative diseases, wearables beneath improvement should experiment their brainwaves, thoughts, feelings, and expressions and generate signals and instructions to digital gadgets withinside the room (e.g. televisions, lighting) (Blum and Dare 2015). Wearable gadgets also are converting healthcare for obesity, cardiovascular diseases, asthma, and Alzheimer's and additionally in-clinic monitoring. They allow higher affected person monitoring, drug management, asset monitoring, tracking, and early scientific interventions. In trendy physicians, insurers, sufferers, and caregivers are expected to have unprecedented get entry to facts (FTC Staff 2015). **ARTICLE HISTORY** Received 28 October 2016 Accepted 14 September 2017 **KEYWORDS** HIPAA; knowledgeable consent; Internet of Things; regulatory policy; wearables facts is regularly now no longer acknowledged whilst it's miles collected (i.e., whilst be aware and consent are usually given); additionally the connection among customers and processors of private records has end up more and more complicated, as datasets are combined, transferred, shared, or sold. Consent notices that don't divulge identification of 1/3 events who can get entry to consumer records stop clients' capacity to offer genuinely "knowledgeable" consent. Additionally, consent notices are regularly written so broadly, or in such voluminous detail, that they inhibit the consumer's comprehension, and hence render "aware choice" meaningless. Such notices, which create the phantasm of consent, regularly distract customers from their very own protection (Cate 2010). In effect, clients do now no longer absolutely proportion but "surrender" facts (Walker 2016). But wearables additionally pose grave risks, with doubtlessly very severe consequences, which includes discount in existence chances. On the only hand, organizations can acquire and change records gleaned from phone sensors and wearables to study of moods, pressure levels, habits, well-being, sleep patterns, exercise, movement, etc. to make credit, insurance, and employment selections compromising and in all likelihood even ensuing in boundaries to healthcare. On the opposite hand, facts overload receives withinside the manner of knowledgeable consent (Cate and Mayer-Schonberger 2013).



Wearable technologies : Definition and classification

Wright and Keith (2014) give more details on the different types of portable devices and the main players in the market. Portable devices have a wide range of uses for individuals and companies. Its various uses include communication, information, and education. Entertainment, fitness and health tracking, navigation, games and support services. One of the most important uses of wearables is marketing. These devices can be used to monitor information about users and their environment; Therefore, they can collect data on the shopping behavior, hobbies, activities and location of consumers. According to et al. (2016) two standards can be used to classify portable devices. These devices can be classified according to: 1 product forms (whether manual use, shoes, glued to the body or attached to the head) 2 product functions (e.g. health and wellness, information advice, etc.). Park et al. (2014) proposed a more comprehensive taxonomy to classify wearable technologies based on characteristics such as functionality (single versus multiple), type (active versus passive), implementation mode (invasive versus non-invasive), communication mode (wired versus wireless), Area of Use and Reuse (Disposable versus Reusable) In a Cognizant Technology Solutions Corp. published market study (Bhat et al., 2014), wearable devices were divided into five different groups according to their functionality: fitness, medicine, lifestyle, games and infotainment.

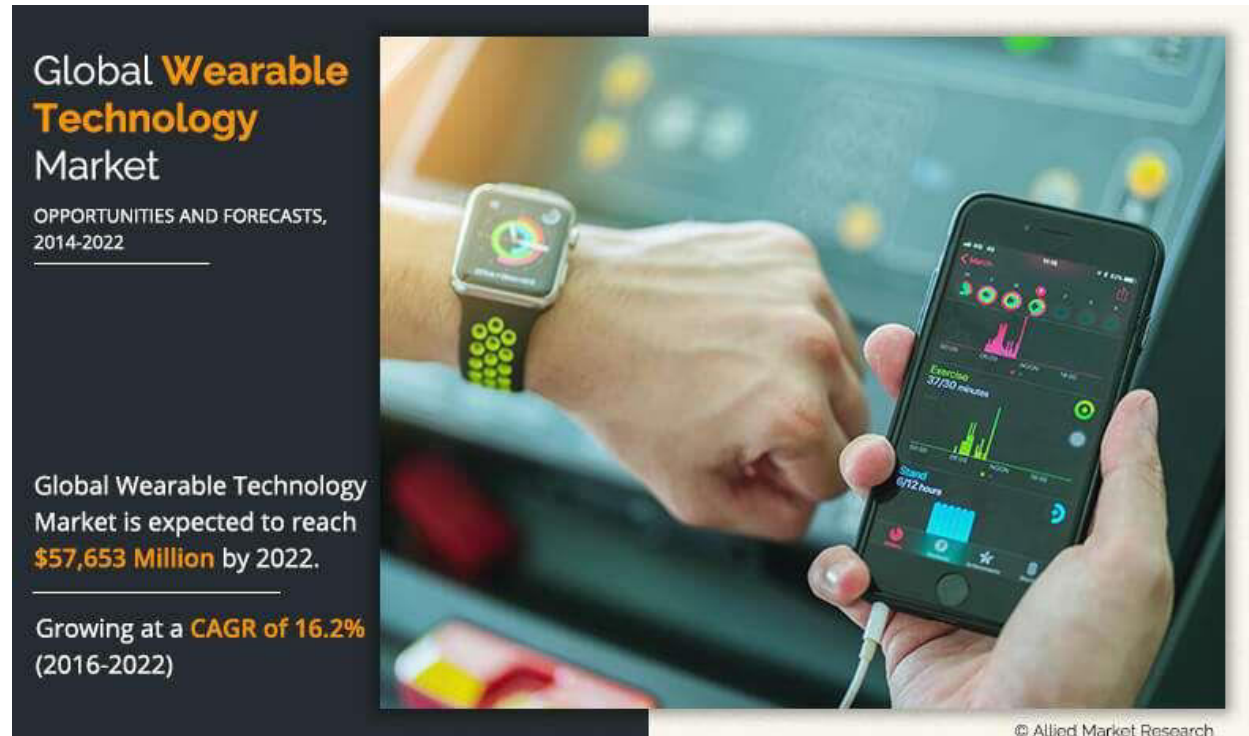
Weight Control and Tracking

Tracking physical activity using portable devices has become a popular method to help people assess the intensity of the activity and the calories consumed. There is a growing interest among healthcare consumers in the use of wearable devices, especially consumer wearable devices, to track weight management activities and results. A study by Dooley and Bartholomew (2017) compared and validated three consumer devices to measure exercise intensity. The devices in the study included Fitbit Charge HR, Apple Watch, and Garmin Forerunner 225. The project recruited 62 participants aged 18 to 80. They measured heart rate and energy expenditure using the three devices. An ideal hypothetical "gold standard" test had a sensitivity of 100% and a specificity of 100%. The study showed a high degree of errors on all devices compared to the gold standard. This study indicated that these devices could be useful as a stimulus to increase activity, but they have limitations as a method of monitoring and measuring results. Although there are studies that show that wearable devices can be used as a stimulus mechanism to increase user activities, there is still a lack of evidence-based studies to validate the use of wearable device for the outcome of weight loss. A recent randomized clinical trial was conducted in Korea to examine the effectiveness of using wearable devices and smartphones to reduce childhood obesity (Yang et al., 2017). The project aimed to enroll a thousand 5th- and 6th-grade students to assess a wearable device-based intervention system called "Happy Me." The outcome measures of the trial were behavioral changes (e.g. physical activity, healthy eating) and anthropometric changes (e.g. body weight, body mass index, waist circumference). The results of the study attempted to provide scientific evidence for the effectiveness of using a wearable device system for weight control.

II. FUTURE TRENDS

The wearable generation marketplace is developing rapidly and is predicted to be the subsequent megatrend that will dramatically reshape the manner we stay and do business. The Cognizant marketplace research (Bhat et al., 2014) shows that the marketplace for wearable electronics international is predicted to pass US\$8 billion in 2018 which shows a compound annual growth price of 17.7% from 2013 to 2018. The largest marketplace proportion can be attributed to client applications (US\$2 billion in 2012) while a 21% annual boom from 2013 to 2018 is additionally predicted for industrial applications. Furthermore, the complete wearable gadgets marketplace is predicted to pass US\$14 billion by 2018 which marks a compound growth price of more than 18% from 2013. Wearable gadgets are predicted to have an accelerating penetration price that money owed for 46% of the full addressable marketplace by 2018. Predictions additionally imply that the healthcare sector will continue to be the dominant sector in the wearable generation marketplace (Wright and Keith, 2014). Another industry forecast by CCS Consulting (Spencer, 2014) predicts that the smartwatch shipments by myself will exceed 68 million gadgets in 2018 compared to 4 million in 2013. Despite all the hype and enthusiasm about wearable gadgets, these technology have not yet long gone mainstream, and their diffusion has been slower than other technology such as smartphones. A PricewaterhouseCoopers (PwC) survey shows that 59% of the respondents expressed issues about these technology. Although customers well known that wearables provide great ability and endless opportunities, they're

not convinced that those technology will have an added-price for them. Many people consider that those gadgets are costly toys that do not have a meaningful software and hence are dispensable. Therefore, researchers and enterprise professionals are interested to discover consumers' adoption decision process and decide the elements that could inspire individuals and companies to adopt and use wearable gadgets. In the next section, an advent and overview of the technology diffusion and acceptance theories that have been carried out in the literature so as to recognize the underlying elements that affect consumers' selections to adopt wearable technology will be provided.



ADVANTAGES OF WEARABLE TECHNOLOGY:

1. Wearables help increase employee productivity.

Experts at Goldsmiths, University of London, have discovered that wearable technology can help increase employee productivity by 8.5% by enabling users to solve problems faster. For example, in the healthcare industry, some wearable devices allow doctors to look inside patients' veins. In the construction industry, some workers use portable devices that allow them to view inside walls and pipes. Retail workers get their jobs done faster because they can search for the information they need through wireless headphones, tech cords, or portable wrist screens. They don't have to leave the client to get the information they ask for.

2. Wearable technology helps increase employee satisfaction.

According to a study conducted by Human Cloud At Work (HCAW) in collaboration with Rackspace, the wearable increases job satisfaction by 3.5%. Since wearables improve employee productivity, job satisfaction usually increases simultaneously.

3. Wearable technology enables companies to monitor the health and fitness of employees as part of their wellness programs.



According to Kelly Fenol, CEO of Spire Wellness, a company that designs and manages corporate wellness programs, 40 to 50 percent of employers with wellness programs use trackers. The data collected by these devices is often linked to incentive programs to help reduce health care costs.

4. Wearable devices can help protect employees.

Wearable technology can help solve workplace safety issues. For example, in Australia, truck drivers in coal mines used SmartCap. The device looks like a regular baseball cap, but the manufacturer describes it as "a fatigue monitoring tool for vehicle drivers or heavy vehicle operators that provides real-time, measurement-based fatigue measurements. direct physiological, rather than an estimate.

DISADVANTAGES OF WEARABLE TECHNOLOGY:

1. Wearables are expensive.

A 2016 COLLOQUY survey of 1,060 Americans showed that 63 percent consider wearable technology to be too expensive. Since most wearables are designed to be compact, functional, and fashionable at the same time, these devices tend to come with a steep price. The high price for both individual and corporate consumers is one drawback for the wearable trend.

2. Some wearables are not stand-alone devices.

Wearable technology is usually linked to separately standing smart devices due to the smaller processor size in the wearable device. Think of the fitness trackers which must be coordinated with a corresponding app on a Smartphone, tablet. Again, this may mean further expense for a business owner if they are to be provided to employees.

3. Wearables can have health risks.

Experts have expressed concern that wearables may pose serious health risks to users of these devices. Wearables increase exposure to radio waves to those who are already carrying Smartphones, laptops, and tablets.

4. Wearable technology may pose security risks.

Since wearables are always connected to the internet, this makes them more vulnerable to attacks. These gadgets are not always intact with rigorous encryption that protects personal data. If you are planning to provide your employees with wearables, make sure that they come with cloud-based security solutions to protect your data from hacking and cybercriminals.

III. CONCLUSION

This research is primarily related to existing studies that have examined user acceptance of wearable healthcare devices. The existing literature has shown that users generally show a positive attitude towards the wearable healthcare device product (Steele et al., 2009; Fraile et al., 2010). In particular, Hensel et al. (2006) demonstrated that perceived ease of use is more important in determining consumer adoption of wearable healthcare devices. Claes et al. (2015) stated that the goal of elderly users to adopt portable healthcare devices is to live independently and safely at home for a long time. However, these studies have only conceptually affirmed the factors that would influence individual adoption of wearable healthcare devices or have simply empirically examined a limited number of technologically critical factors. An integrated framework for explaining the adoption by individuals of wearable healthcare devices has not been merged and validated. Therefore, we will empirically examine consumer adoption of wearable technology in healthcare from several perspectives. We hope to provide the theoretical basis for future research on the adoption of wearable healthcare devices.



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