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Extracting factors of Physical Activity Tracking Technology using Wordcloud and Relevancy Ranking

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Extracting factors of Physical Activity Tracking Technology using Wordcloud and Relevancy Ranking

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Abstract. In eHealth, physical activity (PA) tracking technology can assist people in monitoring their PAs. However, continuance usage is the cornerstone of PA product success; otherwise it is a failure. There is limited knowledge of IS continuance in this domain called PA tracking devices and apps with social media (PATT-SM). The purpose of this study is to analyze the factors that drive users to continue using PATT-SM. From literature, 33 prior studies were found to have included 315 variables in research. This study uses Wordcloud as to pinpoint which variables are to be highlighted. There are 19 variables in Wordcloud that received higher hits than others and these variables are ranked the importance based on experienced users. Then, the top ranks are used to form a model for further analysis on their impact on continuance intention (CI). The first 10 variables are Health Consciousness, Perceived Ease of Use, Privacy Concerns and Security, Habit, Perceived Value, Facilitating Conditions, Social Support, Price, Attitude, and Hedonic. The identified variables can be grouped as cognitive belief, value, social, and health related.

1. Introduction

The world population is approximately 7.5 billion [1] and many are being challenged by the immense rate of physical inactivity [2] thus this decimates the people's wellness. Each individual has to perform MVPA fitness physical activity (PA) at least 30 minutes per day and 5 or more days a week as the recommended rate by Troiano et al., (2008) [3] to maintain decent healthy and fit. Various factors involving with PA adherence from individual, environment, social, behavior and psychology are taken place both on a large scale and an individual unit [4].

Sedentary lifestyle activities such as watching television, working with computers or playing games may consequently lead to unwanted chronic diseases [5]. The reduction of screen time has been studied for the effect of lessening the sedentary issue, in fact, these scholars tried to detect the relationship between cause and effect [6],[7]. In addition, inactivity is harmful to an individual as it introduces obesity and diseases thus reduces the quality of life. In eHealth, physical activity (PA) tracking technology exists that can assist people in monitoring their PAs. Further, Social media (SM) can offer huge advantages. Still, continuance usage is the cornerstone of information technology products and

services; otherwise it is a failure. There is limited knowledge of information system continuance in this domain called PA tracking technology with SM (PATT-SM).

PA tracking technology plays the important role in assisting and improving their health behaviors for examples tracking, monitoring, visualizing, and archiving PA. Even though the immense benefits from PA tracking technology many users failed to constantly use it in the long-term rather they try and use it intermittently. The CI of information technology (IT) goods and services has intrigued researchers for decades in tackling the issue of the long-term use [8],[9]. Despite the increasing popularity of PA tracking technology, it is being challenged with the high rate of abandon [10]. Therefore, the improvement of this situation can be accomplished from research focusing on the CI of physical activity tracking technology with social media (PATT-SM).

2. Literature review
The definition of PA Tracking Technology with SM (PATT-SM)
PATT equips with internet connectivity and is not a "stand alone" with the SM feature. In addition, it can be a device, phone app or web-based app used for PA purposes such as: step count; calorie expenditure; distance travel; heart rate and hydration. It requires a database system to store activity logs. Wearability is prevailing but not a concern. As state of the art, wearability, and Internet of Thing (IoT) play important roles in the study of [11], they are known as health and fitness wearables. For instance, the used of both Fitbit and Twitter to implement PA interventions hence, users posted challenging messages thus that competitions contributed to the increase in PA [12].

PA Tracking Technology
The most renowned web-based system is SuperTracker. It is a PA tracking and recording system provided for individuals to access via a computer or smartphone or other devices, also can be accessed worldwide regardless of their geolocations [13],[14] have built up a system with the Internet, an email, and a cell-phone. They utilized a Bluetooth connected a wrist-worn accelerometer to measure PA. Wearable technologies are very minimal and limited at present. Some research uses the term, Wearable Fitness Technologies (WFT) and utilizes Wearable Activity Trackers (WAT) in their research studies for wearability [15, 16].

The issue of PATT-SM continuance usage
About the way people understand PA tracking technology (e.g. performance) would influence the summary of beliefs [17] and in turn affects their continuance use, for example if an individual purchases (acceptance) and tests (utilization) a PA tracking device to gain an experience, then when the person reaches the point of using all the resources at hand to decide if it is worth to continue using it in the next stage (satisfaction, not satisfaction). the continuance usage is the cornerstone of IT products and services otherwise it is a failure as described in a corporate context [18]. As in the cost-benefit paradigm, getting new customers is costlier than retaining the existing customers. Nevertheless, several questions remain regarding the use of the technology thus research is contending to find the most sustainable way of making people to continue using PATT-SM and, as the consequence of the study [19] proposed that the main focus should be on intelligent monitoring and personalization for better outcomes of the prolonged use. Products and services cannot count on only pre-consumption (adoption); in other words, developers and marketers must find the best possible channels to satisfy users and adhere to the continuance usage [20]. Furthermore, long-term use is the goal, generally speaking, for the high rate of product usage.

3. Methodology
This study searches for papers related to continuance use of PATT-SM. Based on related papers, we found that 109 related research papers in total but however slightly more than half of them are eligible for further processes. The focused papers available for the primary study at this stage are 63. Then, there are in total 315 variables extracted from 33 prior studies which discussed about factors for PATT-SM continuance use.

The identified variables are required to be further processed in data cleaning and trimming before applying Wordcloud technique. Wordcloud is an alternative to other graphical presentations to quantify a series of texts from unstructured data in other words Wordcloud is friendlier to compile unstructured data on which would save time spending on data preparation.

> The procedure:
> Step 1: One by one, 33 materials were checked to locate valid variables which are applied in these research studies.
> Step 2: Next, they are sorted in a spread sheet and the texts are arranged line by line and each line contains the minimum of 1 word and the maximum of 3 words. Any variables implicitly convey similar meanings will be assigned and used the same terminology.
> Step 3: The system service is set to read texts per line from the first to the last. Then, the system generates a pictorial format (Figure 1) and a report table (Table 1).

The extraction of 315 variables from SLR and then Wordcloud is used to generate the pictorial format of 19 variables in 3 steps described above. After that, the survey is accomplished through 13 experienced users. The proposed model is built from the final results consisting the 10 most relevant variables.

4. Results from Wordcloud Analysis and relevancy rating

Since the domain of this study is still immature, most of the analysts were to address the adoption. However, the result of locating contestant variables is much of favor to TAM constructs. For example, there are 17, 14, and 8 unique counts included perceived usefulness, perceived ease of use, and attitude respectively. In additional, the analysis reveals that Subjective Norm (10), Continuance Intention (8), Hedonic (7), Self-Efficacy (6), and Behavior Intention (5) are the other top variables used in prior PATT-SM studies to tackle the continuance issue. Figure 1 exhibits a Wordcloud view and Table 1 shows the ranking of all identified variables from prior studies of PATT-SM. All these variables can be classified as, for example cognitive belief, value, social, and health related. Consequently, the result can be further applied in building a research model.

Figure 1. A Wordcloud view of extracted variables in the SLR

Large texts mean they are more frequent in use and contains higher numbers compare with small texts which have less in numbers. Each colour represents a unique factor. In Figure 1, it is clear the most 5

factors are namely Perceived Usefulness, Perceived Ease of Use, Subjective Norm, Attitude, and Continuance Intention. The factor ranking is exhibited in Table 1 with more details. In addition, Wordcloud poses some benefits to audiences such as showing what to focus with the text size, providing the emotional feelings in connection, consuming a minimal of time to learn for research, and promoting the audience's engagement.

Table 1. The top 19 extracted variables used in PATT-SM

Rank	Variables	Hits	Rank	Variables	Hits
1	Perceived Usefulness	17	11	Intention to Use	4
2	Perceived Ease of Use	14	12	Privacy Concerns and Security	4
3	Subjective Norm	10	13	Habit	4
4	Attitude	8	14	Health Consciousness	3
5	Continuance Intention	8	15	Price	3
6	Hedonic	7	16	Technology Anxiety	3
7	Self-Efficacy	6	17	Attitude Towards Using	3
8	Behavior Intention	5	18	Perceived Value	3
9	Social Support	5	19	Fashion	3
10	Facilitating Conditions	4			

From this 19, we developed questionnaire to rank them. The question has been posted the group of PATT-SM experienced users. The relevancy scale is the range between Very Irrelevant (*1*) - Very Irrelevant (*5*). The total of 13 valid feedbacks used to finalize the ranking as show below:

Table 2. The top important variables of the CI in PATT-SM

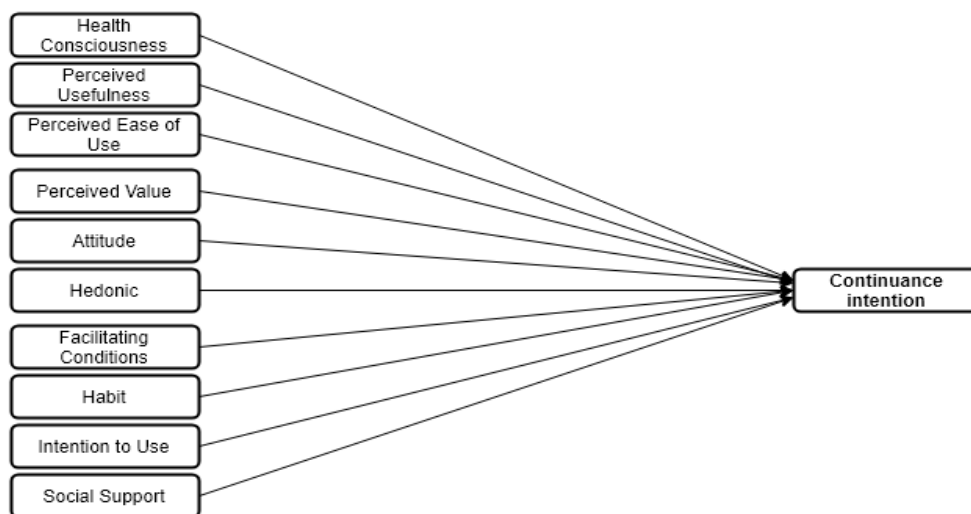| 1.Health Consciousness (*58*)	5.Attitude (*49*)	9.Intention to Use (*48*)
2.Perceived Usefulness (*56*)	6.Hedonic (*49*)	10. Social Support (*47*)
3.Perceived Ease of Use (*54*)	7.Facilitating Conditions (*49*)	
4.Perceived Value (*51*)	8.Habit (*49*)	

Figure 2. The proposed IS continuance model for PATT-SM

The above model is open new studies for other purposes such as:
1. Developing hypotheses and validating the model

2. Finding technical features for these variables so that can be integrated in PATT-SM.

3. Constructing an instrument to assess the usability, enhancement, and satisfaction.

5. Conclusion

The in-depth SLR was carried out to reach the point of the state of the art in PA tracking technology which is in the infancy stage and in the booming market. This research study has demonstrated the process of analyzing and acquiring the relevant factors. Then, the study result has made the research contribution in that although many studies have been conducted in PA tracking technology, however there is minimal knowledge found in connection with the continuance usage of PA tracking technology and SM. The variables used in prior studies are scattered and not in grouping categorization. It appears that there is a requirement to have more research on social, environment, and economics to fulfill what is missing to understand CI. Since cognitive belief and behavioral are the essential part of research to contribute and add knowledge to the literature. It is significant to include environmental, social, and economic factors to understand and predict the CI of a PATT-SM. All the aforementioned variables can represent the useful aspect of CI under the context of PATT-SM. This study provides the direction for future research from the synthesized information. PA tracking technology will take time to be fully flourished like other technologies such as a telephone, an automobile and a television. Conclusively, the direction of PA tracking technology is transforming into IoT wearables and mounted with SM technology.

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