THE ROLE OF IGNORED MOTIVATORS: INTRINSIC MOTIVATIONS' EFFECTS ON INTENTION OF USING MHEALTH APPS[1]

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ABSTRACT

With regard to developments in information technology and mobile technology, the healthcare industry has witnessed tremendous changes such as personal analytics, personal informatics etc. mHealth is an area that is emerged from electronic health and the procurement of health services and information via mobile technologies such as mobile phones and personal digital assistants. Healthcare industry and individuals become more interested and curious about the potential benefits of using mHealth. Previous research has mainly studied external motivators of intention to use mHealth apps, thus intrinsic motivations of users which are very critical in directing of behavior are ignored. Therefore, the conceptual model of intrinsic motivators such as self-design, self-discipline, self-entertainment, self-association and self-healing of mHealth app usage intention was tested with 214 respondents by the use of Structural Equation Model (SEM). Self-design, self-discipline and self-entertainment motivations were found to affect behavioral intention positively. Academic and managerial implications were also discussed.

Keywords: self-entertainment, self-design, self-discipline, mHealth apps, healthcare industry

GÖZ ARDI EDİLEN MOTİVE EDİCİLERİN ROLÜ: İÇE YÖNELİK MOTİVASYONLARIN MSAĞLIK UYGULAMALARINI KULLANMA NİYETİNE ETKİLERİ

ÖZ

Bilgi teknolojisi ve mobil teknolojideki gelişmelerle birlikte sağlık sektörü; kişisel analitik, niceliksel benlik veya kişisel bilişim gibi muazzam değişikliklere şahit olmuştur. Mobil sağlık uygulamaları elektronik sağlık ve sağlık ve bilgi hizmetlerinin mobil telefonlar ve kişisel dijital asistanlar gibi mobil teknolojiler aracılığıyla temininden ortaya çıkan bir alandır. Sağlık sektörü ve bireyler, bu uygulamaların potansiyel faydalarına daha fazla ilgi duymakta ve faydalarını merak etmektedirler. Önceki araştırmalar, çoğunlukla mobil sağlık uygulamaları uygulamaları kullanma niyetinin dışa yönelik motivasyonlarını çalışmış, dolayısıyla davranışları yönlendirmede çok kritik olan kullanıcıların içsel motivasyonlarını göz ardı etmiştir. Böylece, mobil sağlık uygulamaları kullanma niyetinin öz-tasarım, öz-disiplin, öz-eğlence, öz-birliktelik ve öz-iyileşme gibi içsel motivasyonları kavramsal modeli, 214 katılımcı ile Yapısal Eşitlik Modeli kullanılarak test edilmiştir. Öz-tasarım, öz-disiplin ve öz-eğlence motivasyonlarının, davranışsal niyeti olumlu yönde etkilediği bulunmuştur. Aynı zamanda, akademik ve yönetimsel ugulamalar tartışılmıştır.

Anahtar Kelimeler: öz-eğlence, öz-tasarım, öz-disiplin, mobil sağlık uygulamaları, sağlık sektörü

1. Introduction

Ensuring accessible health services is one of the top priority of international organizations like the World Health Organization who is encouraging the use of telecommunication infrastructure along with health technologies that cause the huge increase in smartphones usage (Pindter-Medina, 2015). Advancements in the technology enable individuals to manage their own health by self-monitoring their health via their smartphones with GPS and Internet technology and the latest cutting-edge technology of wearables (smart watches, wristbands, etc.) that Industry 4.0. has given rise to, Internet of Things (IoT). With the tremendous advancements in information technology, smaller sensors inside smartphones, cheaper and simpler technology, and an increase in mobile application (app) quantity and use; recording of personal information such as weight, physical activities and exercises, information about mood, sleep and overall health have also increased (Gimpel et al., 2013; The Economist, 2012). Therefore; patients, healthcare professionals, academia and health-conscious individuals are getting more and more interested in healthcare information systems' potential benefits of willingness to monitoring one's health (Gimpel et al., 2013). Hence, the responsibility of healthcare industry to preserve and monitor individuals' health have started to switch to individuals and patients themselves (Kagermann, 2015; Pindter-Medina, 2015). According to Gfk's (2017) survey which is conducted in 16 countries, one third (33%) of people have reported that they track or monitor their health or fitness via smartphones, fitness band, clip or smartwatch. In spite of several potential benefits of mobile health apps (mHealth: an area that is emerged from electronic health and the procurement of health services and information via mobile technologies such as mobile phones and personal digital assistants), not only wearable technologies with sensors but also mHealth app usage is still relatively low. Therefore, there is a need for more research to understand consumer motivations behind monitoring of health deeper. Due to the importance and phenomenon growth of the health app industry, this study focuses on revealing the motivations behind consumers' health app usage. Particular from the past studies, we discuss the intrinsic self-tracking motivations such as self-entertainment, self-association, self-design, self-discipline, and self-healing of health app usage instead of extrinsic (e.g. perceived usefulness, perceived ease of use) ones because of their explanation power of basic human needs of individuals.

2. Literature Review and Theoretical Background

Self-tracking is a concept that is also known as Quantified Self (QS), personal analytics and personal informatics (Lupton, 2014; Pfefifer et al., 2016). QS is a movement that had started in 2007 by Wolf and Kelly that enables its users to become more aware of their health-related behaviors by tracking their activities and monitoring their health via smartphone apps and wearable devices (Shin and Biocca, 2016). Tracking of health data is intrinsically motivated and goal-directed behavior since it requires physical and mental efforts of participants (Abuhamdeh

and Csikszentmihalyi, 2012). QS is also a form of community that its' members share their experiences and expertise about self-tracking in website's discussion forums, blog and social media (Lupton, 2014).

Nowadays; because of the obesity issues, the interest in maintaining a healthy living or wellness movement (doing exercise regularly, healthy eating, reducing stress with meditation etc.) has increased (Bloch, 1984; Kraft and Goodel, 1993; Tabacchi, 1987). Especially health-conscious consumers, who are inclined to get into action to improve their health conditions, may be potential users of mHealth apps and wearable devices. With this regard, assisting health-conscious consumers in maintaining a healthy life, using mHealth apps are both convenient and provide variety of services; exercise, fitness and heart rate monitoring; diet food, calorie counting; tracking of weight; monitoring period or menstrual cycle; tracking sleep quality; mood monitoring, meditation guide and stress management tool; medication management device; pregnancy monitoring; tracking of blood pressure; and blood sugar or diabetes monitoring.

This study investigates which intrinsic motivations of mHealth app users have the most significant effect on their intention to self-track their health data. Are they motivated by the entertainment aspects, healing functions, being a part of the community they operate in or taking responsibility for their life and overall health? Gimpel et al.'s (2013) self-tracking motivation model have formed a basis for our study, motivations developed are namely self-entertainment, self-association, self-design, self-discipline, and self-healing.

3. Hypothesis Development

3.1. Intrinsic Motivations and Intention to Use mHealth Apps

Besides mHealth apps' several functions such as tracking, monitoring or managing health condition by users themselves and using apps for seeking health information; marketers also highlight apps' entertaining and motivating aspects and the opportunity of sharing of one's success with the like-minded community of app users. Venkatesh (1999) has indicated that motivational perspectives have been adopted extensively to understand human behavior like the use of Theory of Reasoned Action (TRA) of Fishbein and Ajzen (1975) which explains the relationship between intention to use and actual behavior and effects of perceptions on intentions. If the user's attitude towards the behavior is positive, his/her behavioral intention of behavior will be more probable (Fishbein and Ajzen, 1975).

Individuals with higher intrinsic motivation to use technology are supposed to be pleased for the sake of using it and for the benefits of using it as well. Technology Acceptance Model (TAM) explains extrinsic factors (perceived ease of use and perceived usefulness) that affect users' actual use of technology positively based on TRA's attitude-behavioral intention-actual use link. Perceived enjoyment and hedonic motivation as an examples of intrinsic motivation are also mentioned as

a significant and confirmed driver of behavioral intention directly or indirectly through ease of use in established extended Technology Acceptance Models (Cho et al., 2017; Davis et al., 1992; Pfefifer, 2016, Venkatesh, 1999; Venkatesh et al., 2002; Venkatesh et al., 2012). Perceived enjoyment has found to increase the effect of perceived usefulness of technology on usage intentions (Davis et al., 1992).

3.1.1. Self-entertainment Motivation and Intention to Use mHealth Apps

Self-entertainment motivation refers to the motivation of app users for the purpose of having such entertainment that makes them totally immerse in the app and forget about time. A person with self-entertainment motivation keeps the record of personal health data due to entertaining experience that health apps provide while self-tracking health-related data. Intrinsic motivation to experience stimulation means that the individual engages in the activity for experiencing pleasant sensations (Vallerand, 1997) is also related to the entertainment aspect of the activity. Gimpel et al. (2013) associate self-tracking activity with the flow state of an individual (Csikszentmihalyi, 1993). Engagement with tracking activity evokes similar feelings in the consumer to the experience of flow as he/she forgets about time and immerses herself/himself in the activity (Csikszentmihalyi, 1993). Therefore, person's attention is at the optimum level and he/she does not notice the time is passing when engaging in the specific activity; both mind and the body of the person is devoted to this activity and the harmony between physical and psychic energy is achieved (Csikszentmihalyi, 1997). Moreover, the transition of services to experiences (Pine and Gilmore, 1998) highlights the importance of entertaining and fun aspects of mobile apps for consumer's adoption of these services. Nowadays, consumers seek experiences beyond products, services, and brands which are meaningful, appealing to their emotions and similar to their lifestyles as customers are both emotionally and rationally driven decision makers (Schmitt, 1999). Experience and entertainment go hand in hand for years as entertainment engages customers by creating a connection with them in a personal and memorable way (Pine and Gilmore, 1998). Therefore, feel marketing which appeals to inner feelings and emotions of consumers such as joy (Schmitt, 1999) is assumed to be related to self-entertainment motivations of health app users. As well, intrinsic motivations play an important role in entertainment, as people engage in entertaining behavior for the feeling and emotions felt during the activity and they do not expect any reward from it (Bandura, 1977). Additionally, gamification has also been found to be relevant to the entertaining aspect of health apps (e.g. Lister et al., 2014; Payne et al., 2015) as a means of increasing involvement and engagement of users with apps.

Gimpel et al. (2013) have studied the effects of self-trackers' motivations on their tracking intensity have found a positive effect on them. Lee and Cho (2017) have studied the relationship between entertainment and continuance intention of diet/fitness apps but do not have found a significant relationship. Yuan et al. (2015) have found a positive relationship between the hedonic motivation of using health

and fitness apps and continuance intention. Cho et al. (2017) have also supported the effects of entertainment-oriented aspects of new information technology on individuals' health and fitness apps adoption. So, the following hypothesis is asserted:

H1: Self-entertainment motivation is positively related to the intention to use health apps.

3.1.2. Self-association Motivation and Intention to Use mHealth Apps

Self-association is a motivation of app users for the purpose of making sense of their selves by comparing their health data with other people's in the community and being helpful for them in the same way (Gimpel et al.; 2013). A person with higher self-association motivation tends to use health apps for their connection providing a function with other people in his/her community. As Gimpel et al. (2013) have stated that each individual is a member of a specific community. The community consists of similar individuals with respect to values, social norms, beliefs, and philosophy of life. The only way the individual to understand his/her self is through comparison of others in the community (Gimpel et al., 2013). Self-association motivation may appear similar to subjective norm dimension in prior models that explain human behavior such as TRA and TAM. (Fishbein and Ajzen, 1975). Subjective norm directs the behavior of individuals since it promotes compliance to others' opinion and motivates the behavior of question (Venkatesh and Davis, 2000). Self-association motivation, the individual is not influenced by other people's opinion in the community to use health apps, rather the adoption of apps originates from intrinsic motivations. Self-association is a motivation deeper than satisfying social needs by belonging to the community or being expelled from it. Health app users assess their individuality within the community in order to make sense of it (Gimpel et al., 2013), so they may apprehend what their health data means. So, the process of recording health data is the primary concern of users (refers to intrinsic motivation), not the benefits or results of the recording process. Moreover, relate dimension of experiential marketing refers to individual's desire of relating to a reference group or culture, and a need to be perceived positively by others (Schmitt, 1999), which resembles social needs and norms. Besides, QS movement intends to encourage individuals to share their health data with their QS community, so that accumulated data will add value by helping or inspiring other individuals (Lupton, 2014). For example, some health apps enable sharing exercise performance in social media and comparing results with friends. Therefore, the following hypothesis is proposed:

H2: Self-association motivation is positively related to the intention to use health apps.

3.1.3. Self-design Motivation and Intention to Use mHealth Apps

Self-design motivation of app users refers to the motivation to manage their health by one's own (including optimizing their physical and cognitive performance) and have control over their body and life. A person with a high self-design motivation of

using health apps enjoys tracking health data since it provides some kind of control over his/her body and life (Gimpel et al., 2013). Moreover, this kind of individual is captivated by optimizing everything in his/her life such as making use of their body and brain entirely to boost his/her performance (Choe et al., 2014; Gimpel et al., 2013). Therefore, he/she thinks that it is own responsibility to manage one's health condition (Gimpel et al., 2013). As well, Snyder and Fromkin's (1977) need for uniqueness concept is related to self-design motivation in a way that individuals have a desire to feel different than others by thriving to become the best version of themselves by the optimization of their health and other aspects in their life. Optimization of health is similar to health responsibility, which is one of the dimensions of health consciousness concept (Hong, 2009; Kraft and Goodell, 1993). Health conscious consumers are motivated intrinsically to make improvements in their health and their lifestyle, so they tend to engage in health preventive behaviors such as using mHealth apps more. Besides, self-actualization need of Maslow (1943) shares a similar point of view with respect to becoming the best version of an individual, that is; "What a man can be, he must be" (p. 382). As well, Herzberg's motivation-hygiene theory postulates that individual's job satisfaction is dependent on the existence of satisfiers like the outgrowth of achievement, verbal recognition, challenging work, having the certain responsibility, and opportunity to get a promotion (Miner, 2005), which refer to intrinsic motivations. Satisfying only extrinsic motivation of employees by providing job security, benefits and salary etc. is not enough to motivate them, so bringing intrinsic motivations of employees to light is a must (Miner, 2005). Intrinsic motivation toward accomplishments of Vallerand (1997) is also associated with self-design which refers to the feeling of pleasure and satisfaction of outperforming own capacity accomplishing something when engaging in a given activity. According to Ryan and Deci (2002), a need for competence is related to intrinsic motivation for the activity, since an individual is self-determined to perform the activity. In order to satisfy competency need, an individual seeks handleable challenges that will place great demands on his/her capacity, therefore looks for opportunities to master his/her skills and capacity through engaging in challenging activity (Ryan and Deci, 2002). Challenge is strongly effective on enjoyment for intrinsically motivated and goal-directed behaviors (Abuhamdeh and Csikszentmihalyi, 2012). The process of obtaining competency in health-related issues provide self-trackers a motivation to optimize their overall health conditions (from the quality of sleep to the improved body and brain performance). In the light of motivation theories and concepts that are discussed, the following hypothesis is presented:

H3: Self-design motivation is positively related to the intention to use health apps.

3.1.4. Self-discipline Motivation and Intention to Use mHealth Apps

Self-discipline motivation of mHealth app users is defined as the motivation to persist and reach self health-related goals. An individual with high self-discipline motivation tracks his/her health with the expectation of obtaining a reward or refraining from punishment as a result of attaining a goal (Gimpel et al, 2013), which seems to be

related to extrinsic motivations. If there is a probability of obtaining satisfaction and an individual has expectations about achieving the satisfaction, he/she chooses a goal and decides to perform the behavior to attain the goal accordingly (Deci, 1975). Besides, self-discipline motivation of an individual provides persistence to work for a goal and contributes to the maintenance of self-discipline of an individual in the path to success (Gimpel et al., 2013), which also seem to be related with extrinsic motivation as this motivation results in obtaining the reward in consequence of goal achievement. Moreover, mHealth apps look like an instrument in pursuance of being healthy or maintaining health, a form of preventive health behavior. An individual engages in the activity independent of the activity's enjoyment or interesting and involving nature of it, so self-discipline motivation provides the direction to the goal (Ryan and Deci, 2002). According to definitions and types of extrinsic motivations of Vallerand (1997), integrated regulation of individual's behavior means voluntarily performing of activity as it is the extension of the self. Despite Gimpel et al. (2013) emphasizes that self-discipline is a form of intrinsic motivation, this study positions it as almost as self-determined as intrinsic motivation. When individuals think of an activity is uninteresting and the outcome of the behavior does not instrumental to them, it is probable that they will not perform the behavior (Ryan and Deci, 2002). Doing regular exercise, following a healthy diet etc. may somehow be dictated by expert power holding people (e.g. physicians and dieticians) to the society. These significant others or reference groups are influential to encourage individuals to perform the activity by offering a reward, and highlighting the importance of the activity, so individuals have an expectation of visible and verbal approval of them (Ryan and Deci, 2002). Being in a healthy condition requires considerable effort and commitment to the goal and therefore individuals need to be disciplined to pursue their healthy living goal (the reward is personal health). Furthermore, self-discipline is said to be a facet of self-control, a dimension of personality which is broader than self-discipline including neuroticism dimension (Costa Jr et al., 1991). However, self-determination need is different from control concept, an individual has a need to control for his/her own sake, not for increasing the possibility of obtaining outcomes (Deci and Ryan, 1985). Additionally, self-discipline motivation of health app users is also associated with the state of flow, as tracking activity requires a certain level of skill, training, and discipline (Csikszentmihalyi, 1993). Flow is a state of mind when a person is competent to deal with a handleable challenge and engage with this challenge wholly (Csikszentmihalyi, 1997). Besides, the joy arising from the flow experience comes from the achievement together with mastering new skills and getting new knowledge (Abuhamdeh and Csikszentmihalyi, 2012; Csikszentmihalyi, 1993). Providing new things to learn motivates an individual intrinsically as challenge provides captivating experience engaging individual's self-esteem (Malone, 1981). An individual has to synthesize his/her health information accumulated with self-tracking in order to optimize the brain and body functions which requires him/her to master skills and knowledge. Correspondingly, the following hypothesis is established:

H4: Self-discipline motivation is positively related to the intention to use health apps.

3.1.5. Self-healing Motivation and Intention to Use mHealth Apps

Self-healing motivation of app users refers to managing their health by themselves without visiting hospital too often and having lack of trust in the healthcare system. Motivated by self-healing, an individual does not want to conform traditional healthcare system and want to independent from it, therefore seek for other individual therapy alternatives (Gimpel et al., 2013). It manifests a lack of trust in the healthcare system (Egede and Ellis, 2006) and self-trackers believe that mobile devices record data correctly. Users of self-tracking collect information of their health to attain self-awareness and use this information to improve their overall health; to achieve the higher quality of sleep; higher control over their mood; less stress and anxiety; increased performance in every aspect of life; better relationships with others (Lupton, 2014). Some QS community members seek for the root cause of their medical problems that physicians can not address and share their experiences with each other (Lupton, 2014). Through self-tracking with any device, it is possible to see patterns and trends exist in various health data (Li et al., 2010), since this information may be beneficial for discovering probable interactions and connections between activities and health problem or chronic illnesses (Lupton, 2014). For example, self-trackers may discover the principal reasons for their mood swings by collecting data about their exercise, sleep patterns, etc. in a day (Lupton, 2014). Also, self-tracking helps to get together the relevant information when visiting the physician, as an individual cannot remember to convey every detail when it is needed (Gimpel et al., 2013). This motivation also seems to be related to the inner curiosity of human beings (Li et al., 2010; Malone, 1981) and self-experimentation based on seeking for meaningful self-knowledge (Choe et al., 2014). Individuals feel curious about what their health data means and try to make sense of it when health-related data is accumulated with the use of mHealth apps. Moreover, self-healing is an intrinsic motivation as an individual performs self-tracking for pleasurable experiences while an individual intends to learn and explore new health-related information of the self and to understand what this accumulated health information means – which seems like intrinsic motivation to know (Vallerand, 1997; Vallerand and Ratelle, 2002). According to Gimpel et al. (2013), this motivation appears similar to increased health-awareness of an individual which is one of the dimensions of health consciousness (Gould, 1988; Hong, 2009), leads to higher tendency to focus on one's health. Besides, health-conscious people are more inclined to assess the healthcare industry's claims (Gould, 1988), and more willing to make investments on their health intrinsically (Gimpel et al., 2013). Based upon these insights, the following hypothesis is introduced:

H5: Self-healing motivation is positively related to the intention to use health apps.

4. Methodology

4.1. Sampling and Data Collection

To test our conceptual model and hypotheses, an online survey which was prepared with Google forms was shared on social media account of authors

and various questionnaire sharing platforms websites. The questionnaire was also posted on Facebook groups concerning dieting, healthy eating, losing weight and exercise. As the study intended to analyze intrinsic motivations of consumers regarding mHealth app usage intentions rather than actual behaviors; the constraint to participate in the survey was using mHealth apps at least once in their lives. Due to time limitations, convenience sampling was adopted. Before the data collection, the pilot test was conducted with 29 participants was mainly composed of academicians, and after some modifications, the final questionnaire consisted of 20 questions (including control variables and demographics). In total, 214 surveys were obtained which is 10 times larger than the items and sufficient to test the conceptual model (Hair et al., 2013). In Table 1, the demographic characteristics of the sample are presented.

Table 1. Demographic Characteristics of The Sample (n=214)

Characteristics	N	Valid %
Gender		
Male	72	33.6
Female	142	66.4
Age		
23 and younger	53	24.8
24-41	147	68.7
42-52	12	5.6
53 and older	2	.9
mHealth app Usage Intensity in a week		
Less than 1 hour	141	65.9
1-2 hours	39	18.2
2-4 hours	19	8.9
4-6 hours	7	3.3
6-10 hours	4	1.9
More than 10 hours	4	1.9

4.2. Measures

In order to measure constructs, the five-point Likert scale indicating that 1 for strongly disagree and 5 for strongly agree were used. In the first part of the questionnaire, respondents were asked to answer questions regarding their age, gender, the intensity of mHealth app usage in a week, and the types of mHealth apps used. In the second part, respondents were asked to answer questions regarding intrinsic motivations and behavioral intentions to use mHealth apps in consideration of their most frequently used apps. All of the scales used in this survey were adapted from previous research and reworded according to mHealth apps context. Gender and intensity of app usage in a week are controlled for the sake of isolating the effects on behavioral intention to use apps. In Table 2, measurement items are displayed.

Table 2. Factor Loadings and Reliability Scores

Construct	Standardized loadings	Cronbach's Alpha	CR	AVE
I'm self-tracking because…				
Self-entertainment (adapted from Gimpel et al., 2013)		.814	.816	.527
... it is fun and entertaining.	.718**			
... I like playing around with my smartphone/technical device etc.	.816**			
... I enjoy forgetting about time while doing so.	.707**			
…I enjoy getting lost totally in self-tracking activities.	.654**			
Self-association (adapted from Gimpel et al., 2013)		.809	.603	.819
… the way I'm doing it is interesting for others/might help others.	.735**			
… I want to compare my results to others.	.745**			
… I want to present myself to others.	.845**			
Self-design (adapted from Gimpel et al., 2013)		.830	.633	.836
… I try to manipulate certain aspects in my life.	.900**			
… I enjoy being my own master.	.693**			
… it helps me to optimize the way I'm living.	.780**			
Self-discipline (adapted from Gimpel et al., 2013 and Tangney et al., 2004)		.881	.724	.887
… It allows me to reward myself when I make progress in my goal of being healthy.	.766**			
… it facilitates my self-discipline in my goal.	.874**			
… I engage in healthy practices.	.906**			
Self-healing (adapted from Gimpel et al., 2013 and Egede and Ellis, 2008)		.731	.545	.768
I'm self-tracking because…				
… I don't trust in the healthcare system/classic therapies.	.894**			
… I want to be independent from traditional medical treatments.	.815**			
Sometimes, I do not trust my health care provider's opinion and therefore I feel I need a second one. *	.414**			
Behavioral Intention to use mHealth Apps (adapted from Venkatesh et al., 2003 and Cho et al. 2015)		.944	.812	.945
I intend to use mHealth apps in the following days.	.947**			
I predict I would use mHealth apps in the following days.	.903**			
I plan to use mHealth apps in the next 3 months.	.892**			
I want to use mHealth apps actively in my daily life.	.860**			

* Cross Coded, $\chi^2(155) = 249.30$, **$p < .001$; CMIN/DF= 1.61; GFI= .90, IFI= .96; CFI= .90; NFI= .91 and RMSEA= .05.

4.3. Measure Assessments

In Table 2, Factor loadings of each construct and the reliability estimates are presented. The composite reliability (CR) scores range from .545 to .816; which implies a reliable and consistent questionnaire (Hair et al., 2010). Besides, Cronbach's Alpha score range from .731 to 0.944; all of them are above .70 which indicates high overall internal consistency among the items in all constructs (Hair et al., 2010). Factor loadings also reveal that items in the constructs are larger than 0.33 and significant, ranging from .414 to .947. The Average Variance Extracted (AVE) values are also greater than .5 except self-healing, implying there is discriminant validity.

5. Findings

In order to test the conceptual model, AMOS 21 is used, Table 3 displays descriptive statistics and correlation estimates of the constructs in the model. All correlations are significant and are compatible with hypothesis development. Based on SEM, the conceptual model is determined and the values are estimated based on the data set. The model fits the measured data quite well (χ^2= 249.30; χ^2/df = 1.61; RMSEA= .05; GFI= .90, IFI= .96; CFI= .90 and NFI= .91). Besides, R^2 of the model is .24, which means intrinsic motivations make up the fraction of behavioral intention to use mHealth apps, however, they are the crucial part of the intention because of the direct effects on it.

Table 3. Descriptive Statistics and Correlations Estimates

	Mean	SD	1	2	3	4	5	6	7	8
1. Self-entertainment	2.66	.934	1.00							
2. Self-association	1.96	.838	.418**	1.00						
3. Self-design	3.88	.857	.342**	.120	11.00					
4. Self-discipline	3.52	1.021	.391**	.268**	.669**	1.00				
5. Self-healing	2.64	.819	.122	.199**	.110	.178**	1.00			
6. Behavioral Intention	3.89	.850	.239**	.039	.444**	.441**	.068	1.00		
7. Gender	1.34	.474	.028	.057	-.115	-.089	-.005	-.160*	1.00	
8. mHealth app usage intensity	1.63	1.101	.113	-.001	.234**	.274**	.102	.240**	.008	1.00

**p < .01; *p < .05

Figure 1 indicates proposed the model with the estimated path coefficients, and Table 4 shows structural parameter estimates for the hypotheses suggested. In regard to hypotheses testing, 3 out of 5 hypotheses are supported. H1 which suggests a positive relationship between self-entertainment motivation and the intention to use mHealth apps is supported (β, standardized path coefficient =.104*; t = 1.684; p < .05). However, H2 which is proposing the positive effect of self-association motivation and the intention to use mHealth apps is not supported (β = .151*; t = -1.458; p < .05). H3 and H4 which link self-design (β = .246*; t = 1.972; p < .05)

and self-discipline motivations (β = .201*; t = 1.729; p < .05) to the intention to use mHealth apps are supported. Among five motivations studied, self-design and self-discipline are found to have the strongest positive effect on users' behavioral intentions. The last hypothesis H5 that expects a positive relationship between self-healing and the intention to use mHealth apps is not supported (β = -.004*; t = -.056; p < .05). Moreover, the controlling effects of gender (β = -.205*; t = -1.878; p < .05) and intensity to use mHealth apps in a week (β = .97*; t = 2.065; p < .05) on the intention to use mHealth apps is also supported.

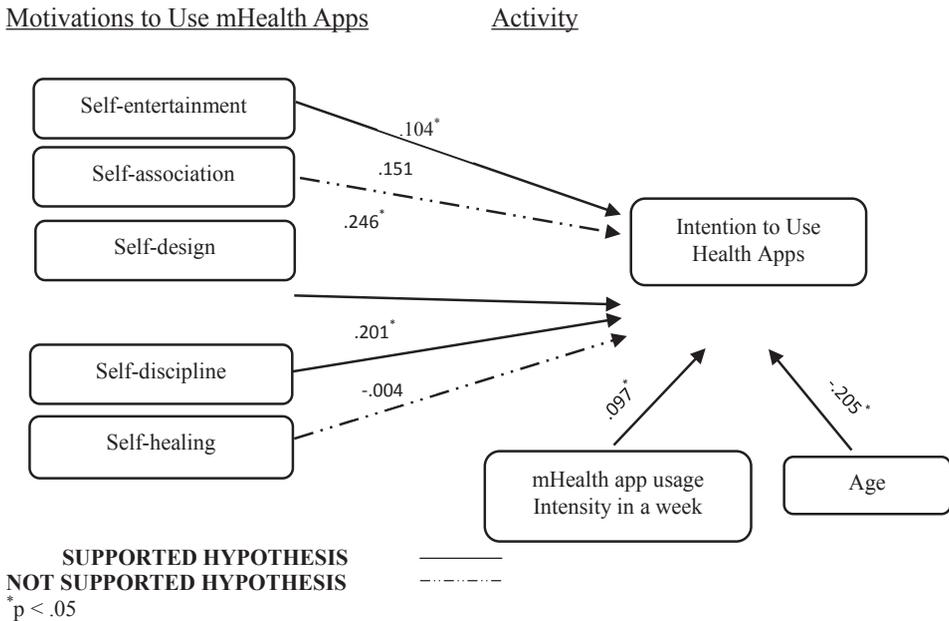Motivations to Use mHealth Apps   Activity

Figure 1. Structural Equation Model with Parameter Estimates

Table 4. Structural Parameter Estimates

Hypotheses	Path	Standardized estimates	t value	Results
H1	Self-entertainment → Behavioral Intention	.104	1.684*	Supported
H2	Self-association → Behavioral Intention	.151	-1.458	Not Supported
H3	Self-design → Behavioral Intention	.246	1.972*	Supported
H4	Self-discipline → Behavioral Intention	.201	1.729*	Supported
H5	Self-healing → Behavioral Intention	-.004	-.056	Not Supported
Control	Gender → Behavioral Intention	-.205	-1.878*	
Variables	mHealth app usage intensity in a week → Behavioral Intention	.097	2.065*	

$\chi^2_{(155)}$= 249.30; CMIN/DF= 1.61; GFI= .90, IFI= .96; CFI= .96; NFI= .91 and RMSEA= .05.

*p < .05.

6. Discussion

Taking into consideration of the lack of research that investigated users' intrinsic motivations of mHealth app use, the objective of this research was to determine which intrinsic motivational factors were more effective in their behavioral intention to use these apps. The majority of the literature had conceived mHealth apps usage from the technology usage perspective. Furthermore, a clear majority of research had investigated factors of behavioral intention or actual behavior with regard to mHealth apps and had studied extrinsic motivators that would promote the apps' benefits such as perceived ease of use, perceived usefulness, perceived credibility and facilitating conditions under the name of *motivation*. Some of the research had included intrinsic motivations such as perceived enjoyment, entertainment, hedonic motivation and personal characteristics (e.g. self-efficacy, personal innovativeness, health consciousness etc.) to their model.

The drive/motive lies behind a behavior may not be as it seems and the individual may perform the behavior because of varying levels of his/her intrinsic motivations. Some researchers have found no direct effect of intrinsic motivation on behavioral intention (Davis et al., 1992; Venkatesh et al., 2002). However, this study has supported the direct effects of different intrinsic motivations (self-entertainment, self-design, and self-discipline) on behavioral intention to use in a mHealth app context. Intrinsic motivations are hard to observe as human behavior is performed after complex processes.

With regard to user motivations to adopt mHealth apps, important findings were revealed from findings. Self-design is found to be the most effective intrinsic motivation; self-discipline and self-entertainment motivations are also effective to use mHealth apps afterward. This implies that, self-trackers like the idea of controlling and optimizing everything in their life, including their overall health, brain capacity, and physical performances. As well, self-trackers use mHealth apps because of helping them to internalize a healthy lifestyle by facilitating to maintain their discipline in order to attain their goal of being healthy. They feel responsible for improving and maintaining their health and quality of life simultaneously. Self-trackers enjoy the experience of entertainment and lost themselves in the activity as they forget about time while doing so and are interested in the activity of itself without expecting any reward or positive outcome. However, self-association and self-healing motivations do not have any effect on usage intentions of users. Since their data serves to society's well-being, self-association motivation requires total commitment to the data tracking activity. MHealth app users seem to be monitoring their health just for their own sake, they may not also be interested in others' well-being and the comparison of health data with other people. Health data may be beneficial to the community if only many people share their health data over time and these data is combined in a way that it makes sense. Once self-trackers share their health data with other people in social media via apps or in QS community website, they may have an opportunity

to compare their results with others. the reason behind ineffectiveness of self-association motivation on behavioral intention to use these apps may be that app users are uncomfortable with the idea that their personal data is visible to others due to privacy and security concerns. Self-healing motivation does not influence behavioral intention of mHealth app users since users may believe that mHealth apps are not trustable and record data properly. They are also inclined to trust traditional healthcare industry's advice and they do not think they need a second opinion. Besides, they may think that it is not their responsibility to maintain their health, it is a physician's job. Moreover, self-healing motivation relies on health-related information of the individual which shows health consciousness level. In order to manage their health by themselves without visiting the hospital too often, app users have to understand what this accumulated health information means.

7. Conclusion

The role of intrinsic motivations is crucial for maintaining the specific behavior, so engaging in healthy nutrition or a diet, exercising regularly require the inner commitment of users with self-determination and autonomy. In spite of its importance, intrinsic motivations' role in the adoption of mHealth apps is still lacking, as extrinsic motivators dominate most of the research. Therefore, this study investigated the effects of intrinsic motivations on mHealth app users' behavioral intention and revealed that self-design, self-discipline, and self-entertainment motivations were more effective to drive individuals to use these apps.

This study has provided several contributions to the on-going intrinsic motivation research, as previous TAM and UTAUT studies have also contributed (Davis et al., 1992; Venkatesh et al., 2002; Venkatesh et al., 2012). The effects of perceived enjoyment, perceived hedonicity, hedonic motivation, or entertainment on continuance intention or behavioral intention to use have been investigated in much research without distinguishing the intrinsic motivations of users. However, intrinsic motivations mean deeper than sole entertainment, there are other intrinsic motivations that encourage individuals to perform the specific behavior. Thus, this study highlights the importance of intrinsic motivations' effects on behavioral intention and asserts that these motivations should also be taken into consideration when analyzing behavioral intention of any activity.

Understanding intrinsic motivations behind mHealth app usage intention will guide app developers and marketers to promote their benefits. They should keep in their mind that users are motivated by the enjoyable experience that mHealth apps provide and enjoy using an app which enables controlling their health and lifestyle, facilitates their discipline towards their being healthy goals and provide rewards to them. So, app developers should appeal more to intrinsic motivations of users to extend app usage among the entire population. Marketers should promote not only the benefits of health apps but also their need basic human needs satisfying nature in order to extend its' use among all population including generation Y, and

Baby Boomers. These accumulated personal health data with the use mHealth apps all around the world might be used for medical purposes such as treatment of diseases, monitoring the progress of diseases, remote health monitoring, etc. (Gimpel et al., 2013). MHealth apps yield several potential benefits for its users; first of all, monitoring health conditions by oneself without going to healthcare institutions regularly. Due to feeling more responsible for their overall health, they will pay attention to their daily activity levels, amount of food intakes, sleep quality etc. and become more healthy. Besides, the new age of patient-driven healthcare outside of hospitals or medical practices have the potential to provide cost savings to the healthcare industry (Gimpel et al., 2013; Kagermann, 2015; Pindter-Medina, 2015) with the decreased costs because of the lower number of healthcare institution visits.

This study has some limitations, the main limitation is related to the sampling technique and the generalizability of the research. As self-tracking of information with wearable devices provide more accurate data, accessing to mHealth app users who also use wearable Technologies may provide more accurate findings. This study only assesses mHealth app user's motivations and intentions, not the ones that do not use it as the questions cannot be adapted to non-users. Behavioral intentions of entire population may reveal generalized findings. Furthermore, this study did not divide respondents into past and current users of mHealth apps and did not investigate if their motivations and intentions differ. Future studies may take into consideration of the group (current and past user) differences. Moreover, this study intended to look at the differences among generations, but could not reach generation X and Baby Boomers. Future studies may compare generations' differing motivations of mHealth app usage. Besides, there are different types of mHealth apps regarding their functions. Future studies may focus on specific types of apps such as diet, distance tracking apps to discover if intrinsic motivations differ accordingly. Also, measuring behavioral intentions may not represent the actual app usage, so different measures can be applied.

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