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E-health applications in mobile phones (m-health): Greek university students' views on m-health applications

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Abstract
This article analyzes the functions and the benefits of e-health applications in mobile phones. More specifically, the present study investigates and measures the impact of e-health applications on University students' everyday lives. Data collection was conducted through printed and electronically provided questionnaires. The duration of the process of data collection was two weeks and the sample included 240 students. The issue under examination is innovative, as the concept of the so-called "mobile health" is relatively new in Greece, where the survey took place. It is also innovative as it reflects the views of students studying both in the health science school of the University of Patras in Greece and in other faculties of the same University. After collecting and analyzing this data we come to the overall conclusion that students are aware of electronic applications related to health, they consider as useful and use some of them and they are satisfied with some of them. However, we also retrieve important suggestions for the improvement of these applications, that are of great value for health-care providers and professionals.

Keywords: e-health, m-health, mobile applications, smart phones, health care professionals, university students' views

Introduction
The rapid development of technology in the IT industry, telephony services and health care has a positive impact on the daily lives of all people associated with these industries. Health care professionals, patients, companies who are active in these industries, and hospitals, benefit from the advantages that technological progress brings through applications which facilitate their activity.

The Oh, Rizo, Enkin and Jadad (2005) [8] argue that both e-health, as well as mobile health are neologisms, which are used by the business community and focus on the usefulness of new technologies in the health sector. This article clarifies the role held by eHealth nowadays and at the same time describes the European Union's actions on the matter. Moreover, the term of "mobile health" is conceptually classified into categories which share common characteristics and include a plethora of applications used by health care professionals, students of faculties of health sciences and patients. The advantages and benefits of mobile health applications for each party (healthcare professional, patient) and the wider community are also presented. Investigations on mobile health apps include global figures at a European and a national level. These studies clearly indicate the development of m-health applications in the world and the observed behaviors of users at different levels comparing the ones from developed countries with the ones from developing countries.

This research is important because it explores something new for the Greek reality. It examines the views and attitudes of students (medical and non-medical) on the use of electronic health services and specific mobile applications related to health in Greece. In addition, this topic is significant because of the intense use of mobile health applications globally and of the few related studies in Greece.

The purpose of this study, therefore, is the analysis of the major electronic health services and mobile health applications, their classification and their use by modern health care practitioners and patients. Specifically, the goal of the research project carried out is the study of the views of the University of Patras students on the use of e-health applications and specifically of mobile phone applications for health issues.

For this research, the collection of primary data through the use of a structured questionnaire was deemed necessary. After the data had been collected, their processing and analysis through the SPSS statistical package followed.

Literature Review
Defining e-health and m-health
According to the World Health Organization, e-health is characterised as "the economic and safe use of Information and Communication Technologies (ICT) to support health-related areas, including health support services, health monitoring, medical literature, medical education, knowledge and research". (WHO, 2005) [12]

At the same time, there are definitions that approximate the electronic health services as health applications based on electronic data processing and the Internet. (Oh *et al*., 2005) [8] There are also approaches which refer to the exclusive use of information technology in electronic health services. (Oh *et al*., 2005) [8] Significant is the European Commission's approach, according to which "e-health relates to tools and services based on information and communication technologies that aim at improving the prevention, diagnosis, treatment, monitoring and management of health". According to the European Commission, the use of eHealth can deliver significant results throughout society as well, as, due to the rapid technological development, it is possible to increasingly improve both the accessibility to, and even the quality of the care provided, in order to increase overall efficiency in the health sector. E-Health includes the following subcategories:

"Management of clinical information systems, telemedicine and home care, integrated regional/national health information networks and distributed electronic health record systems and secondary use of non-clinical systems." (European Commission, 2012)

E-health is based on applications that are associated with health, using information technologies. Below are some important applications (Zygouraki, 2015) [15]:

- Electronic Health Records: Applications include the identity of the health of each patient, which is unique and allows for easy access to patient data and easy communication between physicians.
- E-prescribing: Electronic Prescribing
- Clinical Decision Support: Applications that rely on large databases that include information that helps both the diagnosis and the treatment of patients.
- Telemedicine: Implementation of diagnosis and treatment of the patient remotely.
- M-health: Gathering information on patient health and disseminate this information to health care professionals, researchers and patients via mobile devices and phones. These applications offer the possibility to monitor in real time the status of vital organs and provide immediate care.
- Health Information Systems: Software through which appointments are planned, patients' data are managed and further issues related to health are treated.

Robert Istepanian was the initiator of the "mobile-health" term, as the emerging communication via mobile devices and technological networks for healthcare. (Istepanian, Laxminarayan, & Pattichis, 2006) [3] Mobile health is also defined as medical and public health practice, which can be performed through portable devices such as smart phones (Kahn, Yang, & Kahn, 2010) [4] According to Istepanian, Jovanov and Zhang (2004) [2], proponents of mobile health focus on mobile communication as a means to give access to populations living in inaccessible places to upgraded health services.

The European Commission has been extensively involved in mobile health and on April 10, 2014 published a Green Paper on this issue. In particular, the Green Paper thoroughly studied the potential of mobile health on maintaining and improving patient health and well-being and also examined the relative technological applications. According to the e-Health Action Plan 2012-2020, "the objective of the Green Paper is to launch a broad public consultation with stakeholders, by addressing the remaining barriers and issues associated with the use of mobile health and seek assistance in identifying the proper way to unlock the potential of mobile health" (Lianos, 2015) [6].

Classification of m-health applications

The mobile health applications are categorised according to the following (Istepanian *et al*., 2004; Stergiannis, Indas, & Christodoulou, 2015) [4, 9]:

- The administrative care in the health sector. An example is the electronic prescription, the maintenance of the electronic patient record and the electronic appointments.
- The financial services related to hospitals and other relevant areas. An example is applications that serve processes such as payments, purchases, pricing, etc.
- The medical science, through which the diagnosis and monitoring of diseases is supported.

Another classification is carried out in accordance with the functionality of the same health applications (Mosa, Yoo, & Sheets, 2012; Stergiannis *et al*., 2015) [9]:

- Assist in the diagnosis of different diseases.
- Inform about the characteristics of drugs, administration, dosage, side effects, interactions and the cost thereof.
- Contribute to the calculation of the parameters that are relevant to health.
- Assist in the search of biomedical databases of the world literature and are used by health-care providers mainly.
- Contribute to the communicate between departments of a hospital.
- Ensure physicians have access to hospital information systems and electronic patient records.
- Promote education on health issues and are constantly updated for new medical practices.
- Provide access to specialised educational material, addressed to medical students, nursing and paramedical disciplines.
- Help patients manage their chronic diseases.

The m-health application functions significantly differ, in terms of speed, usability and accessibility. However, it has been proven that 95% of mobile health applications have several common features, according to which (Patrick *et al*., 2008):

- They are technically simple applications which usually use the services of voice and short text.
- They serve an immediate need.
- They have a clear purpose and advantage over alternative, attracting the consumer to use.
- They are accepted by all parties, namely the users and the wider health system.

The following table classifies and briefly indicates the use and the benefits provided through m-health applications for: i) health-care providers and professionals, ii) students of the faculty of health sciences, and iii) patients.

Table 1: Classification of m- health applications per utility and per group of users

I. Applications for health-care providers and professionals	
▪ Johns Hopkins Antibiotic Guide (JHABx) ▪ 5 – Minute Infectious Diseases Consult (5MIDC) ▪ Sanford Guide to Antimicrobial Therapy (SG) ▪ ePocrates ID ▪ Infectious Disease Notes (ID Notes)	Applications for diagnosis and therapy of infectious diseases
▪ 5 – Minute Clinical Consult (5MCC) ▪ Up To Date	Applications for the diagnosis and treatment of various diseases
▪ Palm LabDX ▪ Normal Lab Values ▪ Lab Unit Converter ▪ Labs 360o ▪ Davi' s Laboratory and Diagnostics Tests ▪ Pocket Guide to Diagnostic Tests	Applications related to the physiological values of laboratory parameters and to the conversion of laboratory units

▪ Epocrates ▪ FDA Drugs ▪ Medscape	Applications related to Medication
▪ PubSearch ▪ PubMed on Tap ▪ MEDLINE Database on Tap ▪ askMEDLINE ▪ PICO ▪ Disease Associations	Applications for research of Medical Literature
II. Applications for students of the Faculty of Health Sciences	
▪ Netter Atlas of Human Anatomy ▪ I – Surgery Notebook ▪ iSilio ▪ Mobipocket Reader	Educational applications, which provide information on medical issues and health issues
III. Applications for Patients	
▪ Cardiomobile ▪ Pulmonary Rehabilitation ▪ Asthma Peak Flow Monitoring ▪ Sleep Aid	Applications through which the management of chronic diseases is achieved, as special items related to each condition are recorded.

The benefits of m-health applications

For healthcare professionals, the use of mobile health applications offers fast and efficient access to test results, the history of patients and medications and generally provide them with useful information related to the health of their patients by facilitating in this way their work. At the same time, they offer flexibility and the ability to monitor their patients from anywhere located (Yu, Wu, Yu, & Xiao, 2006). Equally significant advantage of the m-health applications for health care professionals is the facilitation provided regarding the communication with pharmaceutical representatives. Finally, doctors are able through specialised applications to directly calculate the correct dose of medication for their patients and administer any medication (Zygouraki, 2015) [15].

Regarding the benefits and advantages of the mobile health applications to patients, they are considered very important. In particular, due to the portability of the devices through which patients use applications that meet their needs, they are given the option to be notified and informed at all times about the state of their health (Tachakra, Wang, Istepanian, & Song, 2003) [10]. Another advantage for patients is the economic benefit, as the personal contact of the patient with the doctor decreases and the patient does not have to pay for a visit to the doctor. Finally, in many cases, the degree of patient hospitalization decreases; the patients are not introduced to hospitals for observation but are automatically observed through specialised applications in their own personal space, instead (Zygouraki, 2015) [15].

The social benefits of mobile health applications are summarised in the following (Istepanian *et al.*, 2004) [2]:

- They allow a rapid response to urgent and critical medical situations without the problem of the geographical distance.
- They promote healthy lifestyles in daily life.
- They promote preventive health care.
- They create personalised health monitoring systems and provide alerts for any complication.
- They raise awareness on crucial issues, such as epidemics and pandemics and promote the conditions and behaviors that reduce their transmission.

Mobile Health Research in Europe

According to Koumbouro (2015) [5], in 2017 an estimated 3.4 billion people on the planet will be mobile users and 1.7 billion of them will use applications related to mobile health. At the same time, according to the study, it is estimated that the m-health applications will exceed 97,000 and 70% of these will relate to the well-being and the healthy lifestyles of consumers, while the remaining 30% will be directed mainly to healthcare professionals, and will offer the possibility of easy access to patient data, of remote monitoring and of providing useful advice, and even diagnosis.

The categories of m - health applications vary and are quite different from each other, each offering different facilities to cover the widest range of needs arising. As part of an investigation, we examined 80 academic articles that deal with more than 100 mobile health applications during the 2004 - 2014 period. In this research, mobile health applications were classified into nine categories as follows (Lianos, 2015) [6]:

1) Various applications
2) Diagnostic Applications
3) Compliance with medication\
4) Management of chronic diseases
5) Remote monitoring
6) Health and healthy lifestyle
7) Access to medical information
8) Education
9) Contact

According to the results of the above study, the applications that are most frequently used and gather the largest percentage, which is around 59%, is the telephone health helplines centers (Health call centers), that is, the support lines for people with addictions to addictive substances or for those who have a chronic illness. Then the free emergency telephone services (Toll Free Emergency) occupy 55%, emergencies, including updates pandemics, at 54% and telemedicine (Mobile Telemedicine) at 49% follow. It is worth noting that the least developed, researched and established mobile health applications are the ones related to health, health surveillance, awareness on health issues and decision support systems. (Lianos, 2015) [6].

Global Mobile Health Research

According to another study conducted by the World Health Organization, in which 112 countries of the world participated, 83% of the countries implement initiatives related to mobile health. A significant percentage of the states, which reaches three quarters of the participants, carries out four or more actions related to mobile health. (WHO, 2011) [13] Only 19

countries implement no action related to mobile health. A study of the World Health Organization, has also found that 75% of the countries of the sample implements at least one mobile health action. Small percentages are found in countries of the African continent, while larger percentages of actions related to mobile health are observed in Southeast Asian countries. (WHO, 2011) [13]

Another related research globally implemented by the World Bank, indicates that countries with lower incomes use less applications related to m-health compared to countries with high income. More specifically, 77% of the low-income countries of the sample use at least one m-health application, while this figure increases by 10 percentage points and is formed at 87% in countries with high income, which use at least one m-health application. (Zygouraki, 2015) [15]

Mobile Health in Greece

Mobile health in Greece is still in its infancy compared to its use in other developed European countries. Although the introduction of mobile phones in the Greek market operates as an increasing trend, it does not show the same trend in the healthcare industry. This is due to two main reasons. The first reason concerns the conservatism and bureaucracy that exist in the Greek territory, creating significant barriers to the growth and increase of the use of m-health applications (Tasopoulos, 2011) [11]. The second reason for the low development of mobile health applications is related to the lack of Greek developers, as there are few Greek software companies leading to difficulties in the deployment and the use of Greek applications in the health sector (Tasopoulos, 2011) [11]. Finally, most mobile health applications available are in foreign languages and some of them do not meet the health-care conditions of Greece.

Methodology

Therefore, the aim of the research is to study the views of the University of Patras students on the use of e-health applications and specifically on mobile phone applications for health-care (m-health). More specifically, the study focuses on the:

1) Investigation of the use of the Internet for health reasons by students
2) Identification of whether students know and use applications and services provided through mobile phones (m-health)
3) Identification of the significance of the existence of these applications and the trust put on the use of these applications
4) Identification of suggestions for improving these applications
5) Identification of differences in medical school students' and non-medical students' opinions.

For the examination of the above, a structured questionnaire - whose details are provided in the appendix- has been utilised.

The questionnaire emphasises the anonymity of the survey participants, all of which are students of various faculties, both medical as well as non-medical faculties of the University of Patras. The m-health applications are mainly used by the youth and for this reason the specific sample has been chosen and 240 questionnaires have been collected.

The design and construction of the questionnaire follows all the necessary steps required. Initially we studied and defined the appropriate measurable variables to be used. Then, a first questionnaire was created in which a pilot application (pilot test) was carried out to confirm the effectiveness of the synthesis of the questions, so as to give a general picture of the results, conclusions and make the necessary changes. In this way, any corrections can be made to clarify the questions and to fill in some additional questions. A few corrections were made to clarify two questions in order to be better understood by the respondents. A Cronbach a (Alpha) test of the questionnaires that were tested was also performed and the results showed a Cronbach a> 0.764 questionnaire reliability in all variables. The variables are 43 and the population is 240 people. Subsequently, the construction of the final questionnaire followed, including an introductory note explaining to the respondents the reason for conducting the specific research.

The structure of the questionnaire consists of 13 questions and is divided into three sections. In Part A, there are demographic questions that relate mainly to the attributes of the sample. In Part B there are questions about e-health and m-health applications, as well as the knowledge and perceptions of the respondents about these applications. Part C is a question for troubleshooting and identifying possible suggestions for improving m-health applications.

Students were asked to state their degree of agreement or disagreement with some suggestions on m-health applications. The responses are structured on a five-level Likert-type interval measurement scale, with values from 1 to 5, where 1 equals "very much", 2 equals "a lot", 3 equals "moderately", 4 equals "a little" and 5 equals "not at all".

Population's sample

73, 3%, that is, 176 people are women and 26, 7%, that is, 64 people are men. Most respondents, at a percentage of 35%, that is, 84 people belong to a Health Science School, either Medicine or Pharmacy. Students who took part in the survey are students aged 18 to 49, with an average age of 24.8 years and most of them in the third year of their studies at an average of 3.21 years.

Findings

General Findings

The findings of the survey on the views of the sample on e-health applications, and in particular on m-health applications, as they emerged from the processing and analyzing of the data collected, are presented.

Students are familiar with the Internet and with these applications. Most respondents said they have been using the internet to find information about health, at a high percentage of 92.5% (222 people), which means almost everyone. The internet is the most popular source of health information, as the sample uses it at 46.7%, having as a second option the direct contact with a specialist, at 45.8%. They are less likely to consult and receive health information from some electronic material, such as an electronic magazine or book, at a percentage of 4.2% and even less likely to consult printed material, such as a printed magazine or book, at a percentage of 3.3%.

57.5% of the sample is aware of the existence of e-health applications and 50% of the sample knows the existence of m-health applications. That means that several students are aware of these applications. However, the percentage of the knowledgeable ones is not as high as abroad. Probably because

it is something new in the field of new technologies in our country. The majority of the respondents, that is, 96.7%, has a smart phone and only 2.2% of the sample uses a simple mobile phone. Nevertheless, only a small percentage of 16.7% has installed an m-health application on the mobile phone. Probably, they are not aware of the services that these applications offer. In other countries, the relative percentages in the case of young people are much higher.

However, the students of the sample use more nutrition/fitness apps. They also use diary/file retention, medication reminder and physiological values measurement applications. Some apps have been installed by the users while some others, such as the i-health app on i-phones, already exist on the mobile devices. The application that is used or most known to the sample is s-health, at 15.1%. The application of "Galinos Medscape" follows at 13.4%. 13% of the sample does not use or know any m-health application. Moreover, several students at a percentage of 12.2% use my calendar to maintain a medical diary/file. The most popular mobile phone software, according to the survey, is the android, with 80.8%. The IOS software follows, with a percentage of 15.8% and other software with 3.3%.

Nearly half of respondents at 57.1% said they were satisfied with m-health applications. According to the students surveyed, m-health applications are quite significant, with an average of 4.74 (almost 4). This means that respondents agree with the proposal that m-health applications are important. They also agree with the usefulness of m-health applications (3.71) and the increase in the use of m-health applications (3.54). Neutral point of view they have on the electronic sending of tests for early diagnosis of disease (3.24) and even more for the electronic transmission of data (2.89), since they neither agree nor disagree with these statements. Regarding the suggestion that m-health applications are complex, the sample of the research holds a neutral stance, since they neither agree nor disagree with this view (2,65). Finally, students disagree with using m-health applications from their mobile (2,41) and paying for an m-health application (2,47). The students stated that they trust m-health applications very much for making appointments with their doctor (4,10) and for taking a medication (4,03). They also rely heavily on these applications for keeping a medical diary (3.73), nutrition / fitness (3,69) and file keeping in general (3,61). Moderate trust is shown in these applications for physiological values measurement issues (3.53), for instance for the measurement of sugar, calories, cardiac pulses and simple health issues (3,25). The sample only slightly trusts m-health for serious health issues (1.93).

47.6% of the sample uses or would use m-health applications for nutrition/fitness. A small percentage of 26.7% uses or will use m-health applications to keep a medical diary, 25% of the sample to recall an appointment with their doctor, 17.5% of the sample to receive a medication, 16.7 % of the sample to retain file and an even smaller percentage of 15% for measurements. Questions regarding the evaluation of the applications used by the survey participants were answered only by those who have used or those who know an m-health application. The sample number was thus limited to 160 students (n = 160). With m-health applications related to appointment reminder with a doctor, students are moderately satisfied (3,19). Moderately satisfied (3.05) are also the respondents with m-health applications associated with keeping a medical diary, such as applications for keeping a pregnancy or menstruation diary. Also, students are moderately satisfied (2.94) with m-health applications to receive a drug. Less satisfied, but still moderately satisfied are the students who participated in the research with m-health applications related to physiological values measurement (2,75), such as cardiac pulses or calories and with keeping a medical file, such as a sugar level record, etc.

Half of the sample, that is, 50%, said they would not want to make any changes to m-health applications either because they are satisfied with these applications or because they do not know them. 11.7% of the sample said they would like to have more detailed instructions for these applications and 10% of the sample said they would like to be more informed about these applications. A small percentage of respondents, 8.3%, said they would like these applications to be simpler, and the same percentage said they wanted more precision than m-health applications. Still less 4.2% said it would like these applications to be more functional. Some would like to recommend a 2.5% daily diet for these applications. A percentage of 1.3% would also like to be able to connect and install these applications on their computer. Finally, few said that they would like these applications to have more choices, to have a faster response and to be more specialised.

Variable Correlations

In order to determine the nature and intensity of the correlation that may exist between different variables, the Pearson (r) linear correlation coefficient was calculated. This factor gets values from -1 to 1. The gender variable is positively correlated with low intensity with the variable "using the Internet to find health information". The factor r is 0.172. This correlation is statistically significant at the level of 0.01 with sig = 0.008. The gender variable is positively associated with low intensity and with the variable "use m-health to keep a file". The factor r is 0.185. This correlation is statistically significant at the level of 0.001 with sig = 0.004. The gender variable is positively associated with low intensity with the variable "use m-health to measure physiological values". The factor r is 0.222. This correlation is statistically significant at the level of 0.01 with sig = 0.001. The gender variable is positively associated with low intensity with the variable "existence of m-health in mobile phones". The factor r is 0.135. This correlation is statistically significant at the level of 0.05 with sig = 0.037. This means that gender is associated with the use of the internet for health information, using m-health applications to keep a medical file and physiological values data, and is associated with the existence of an m-health application on the mobile phones of the students that participated in the survey. When the gender changes, the above variables change.

The gender variable is positively associated with low intensity with the variable "use m-health to keep a file". The factor r is 0.185. This correlation is statistically significant at the level of 0.001 with sig = 0.004. The gender variable is positively associated with low intensity with the variable "use m-health to measure values". The factor r is 0.222. This correlation is statistically significant at the level of 0.01 with sig = 0.001. The gender variable is positively associated with low intensity with the variable "existence of m-health in mobile phone". The factor r is 0.135. This correlation is statistically significant at the level of 0.05 with sig = 0.037. This means that gender is associated with the use of the internet for health information, using m-health applications to maintain file and physiological

values data, and is associated with the existence of a m-health application in the mobile phones of the students that participated in the survey. When the gender changes, the above variables change.

Result Differentiations per Faculty

Separate analyzes were then conducted for the health science school and for the other schools, in order to identify possible differences per school in students' views on m-health applications. Based on the analyzes made, there was no difference in the use of the Internet for finding health-related information. Students from both medical and other schools use the Internet to find information. The information source chosen by students differs per school. The most popular source of health information is the internet for all students. Students of the health science school often do not make direct contact with the doctor as a source of information, while students from other schools prefer it. A satisfactory percentage of students in the health science school chooses electronic and printed material as a source of health information, while students from other schools do not. Students from medical schools have installed some m-health in their mobile at a higher rate (23.8%) than students in all other schools (12.8%).

Regarding the m-health applications used by the students surveyed, there are no disagreements per faculty. They use the same applications. Students of the health science school are more satisfied with the m-health applications they have used compared to other college students. According to the analyzes made, there are some differences regarding the use of m-health applications per school. Students of medical schools are more likely to use m-health applications on nutrition issues than students in other schools. On the other hand, students from other schools are more likely to use m-health applications to keeping a medical diary than students in medical schools. It is reported that on the basis of the analyzes made there were no differences in the evaluation of the m-health applications per school of the sample, nor differences in the trust shown by the students in these applications.

Result Differentiations per Level of Studies

Subsequently, there were separate analyzes per respondent's status in order to identify possible differences in the views of undergraduate and postgraduate students. Only the cases that showed differences per status are mentioned. Students who have taken part in research use the internet to find information about health. Just postgraduate students use it a little more at 95.2% than undergraduate students who use it at 91%.

The most popular source of information for undergraduate students on health issues is the internet (52.6%), followed by direct contact with a doctor (42.3%) and the use of electronic and printed material at the same rate of 2.6%. On the other hand, the most popular way of finding information for postgraduate students is the direct contact with a doctor (52.4%), the use of the Internet (35.7%) and the use of electronic (7.1%) and printed material (4.8%).

Postgraduate students are more aware of e-health applications (71.4%) and m-health applications (57.1%), compared to undergraduate students who participated in the research. Undergraduate students are aware of e-health applications at 50% and m-health applications at 46.2%. Postgraduate students have installed an m-health application on their mobile at a higher rate (19%) than undergraduate students. There is a link between the use and knowledge of electronic health applications with the status as postgraduate students are more aware of their existence. Graduate students are more satisfied with the use of an m-health application (58.3%) than undergraduate students (56.4%).

Discussion of the Results

The majority of the respondents uses the internet to find information about health issues and also knows the existence of e-health and m-health applications. Moreover, most of the students of the sample have a smart-phone, but there is a small percentage of the sample that has installed an m-health application. Outside the borders of Greece, higher levels of knowledge and use of m-health applications are observed.

Significant conclusions arise from the correlation of the demographic characteristics of the sample with the use and attitude towards mobile health applications. In particular, gender is associated with the use of the internet for searching health information, for file keeping and physiological values measurement, and it is also associated with the existence of an m-health application in students' mobile phones; yet when the gender changes the above variables change. Regarding age, when it increases, there is also an increase in the respondent's trust in m-health apps on both serious and simple health issues. Also, when age increases, the use of m-health applications for keeping a medical diary increases. Finally, when the school in which they study changes, the knowledge they have about e-health and m-health applications, the existence of m-health on their mobile phones, as well as the satisfaction with the use of an m-health application change. Moreover when the school changes, the views of the sample on how important and useful m-health applications are change, too.

Finally, the students of the Health Sciences School of the University of Patras, who know the e-health applications at a higher percentage than the students of the other schools, were studied separately. Consequently, m-health applications are more widely known to the students of the health science school rather than to students of other schools. In addition, the former have installed an m-health application on their mobile at a higher rate than the students of all the other schools. Regarding the m-health applications used by the students surveyed, there are no disagreements per faculty; they use the same applications. However, students of the health science school are more satisfied with the m-health applications they have used compared to the other university students.

According to the study of 80 academic articles dealing with 100 mobile health applications over the period 2004-2014, as analyzed above, it is noted that the categories most used by users are related to the management of chronic diseases, well-being and healthy lifestyle and are followed by applications aiming at tracking medication and at health education. (Lianos, 2015) [6] At the same time, according to the measurements made for the present study, it is observed that the majority of the students of the sample are focused on nutrition and training applications as well as applications related to diary/file keeping, medication reminder and physiological values measurement. Consequently, users worldwide are using more mobile health applications that promote healthy lifestyles, but also applications that help them with their treatment, such as with their medication or their physiological values measurement.

Applications that are most recognised by users are applications that have either been installed by users or are already installed in the smartphone software. Such applications are i-health, s-health, Galinos Medscape, my calendar, google fit, first aid, endomondo pocket pill, etc. Regarding the trust level of the sample for m-health applications, it is noted that students trust m-health applications for making appointments with their physician, for remembering a medication, for keeping a diary, as well as for keeping nutrition/fitness archive in general. Moderate trust is shown in these applications for physiological values measurement issues, such as for the measurement of sugar, calories, heart rate, and for simple health issues. The sample puts little trust in m-health applications for serious health issues. M-health applications are considered significant for most of the participants of the sample, as they consider them useful. However, they are not willing to use an application that requires paying a fee.

Limitations of present study and suggestions for future research

The applications discussed above, work as assistants to doctors, nurses and patients as they monitor the health status of patients and each one performs accordingly. Therefore, the present research is of interest in the measurement of beliefs and attitudes of University students regarding the increasing use of e-health services. However, this study is limited to the views of students of a specific University in Greece. Future research could expand the sample examined, so as to include a wider geographical and age range as well as health care professionals.

Conclusion

Taking into consideration all the above, the present study offers insights on how useful mobile health applications are considered by University students from both the school of health science and from the other schools of University of Patras. It also offers insights on what kind of applications the students use or would use and to what extent they are satisfied by them. In this way, important feedback is provided to the professionals interested in examining the effectiveness of m-health applications, so as to consider improvements that will satisfy the needs of the specific sample of the population.

References

1. European Commission, Public Health. E-Health Policy. 2015. Retrieved from http://ec.europa.eu/health/ehealth/policy/index_en.htm
2. Istepanian RS, Jovanov E, Zhang YT. Guest editorial introduction to the special section on m-health: Beyond seamless mobility and global wireless health-care connectivity. IEEE Transactions on information technology in biomedicine. 2004; 8(4):405-414.
3. Istepanian R, Laxminarayan S, Pattichis CS. M-health. New York, NY: Springer Science+ Business Media, Incorporated. 2006.
4. Kahn JG, Yang JS, Kahn JS. Mobile health needs and opportunities in developing countries. Health Affairs. 2010; 29(2):252-258.
5. Kuburos I. I Technologies Pliroforias kai Epikinonion stin Igia. [Information and Communication Technologies in Health]. Association of Greek Academic Libraries. Kallipos, Athens. 2015. [In Greek].
6. Lianos V. Kinites Efarmoges ston Tomea tis Igias gia to Ef Zin [Mobile applications in the health sector for Well Being]. Postgraduate Dissertation, University of Macedonia, Interdepartmental Graduate Program in Information Systems, Thessaloniki. 2015. [In Greek]. Retrieved from: http://dspace.lib.uom.gr/handle/2159/17042
7. Mosa ASM, Yoo I, Sheets L. A systematic review of healthcare applications for smartphones. BMC medical informatics and decision making. 2012; 12(1):67.
8. Oh H, Rizo C, Enkin M, Jadad A. What Is eHealth (3): A Systematic Review of Published Definitions'. Journal of Medical Internet Research. 2005; 7(1):e1.
9. Stergiannis P, Indas G, Christodoulou E. Efarmoges Exipnon Kiniton Tilefonon schetizomenes me tin Igia. [Applications of Smart Mobile Phones related to Health]. Greek Periodical of the Nursing Science. 2015; 8(3):6-12. [In Greek]
10. Tachakra S, Wang XH, Istepanian RS, Song YH. Mobile e-health: the unwired evolution of telemedicine. Telemedicine Journal and E-health. 2003; 9(3):247-257.
11. Tassopoulos Ch. Technologies kai Efarmoges Pliroforikis ston Iatriko Klado – Anaptixi Efarmogis Diachirisis Asthenon stin Platforma iOS [Technologies and IT Applications in the Medical Industry - Development of patient management application for the iOS platform], University of Macedonia. 2011. [In Greek]. Retrieved from http://dspace.lib.uom.gr/handle/2159/14765
12. World Health Organization. 58th World Health Assembly, Resolutions and Decisions Annex. 2005. Geneva Switzerland.
13. World Health Organization. M Health. New horizons for health through mobile technologies. 2011, 3. Retrieved from http://www.who.int/goe/publications/goe_mhealth_web.pdf
14. Yu P, Wu MX, Yu H, Xiao GQ. The challenges for the adoption of m-health. In Service Operations and Logistics, and Informatics, 2006. SOLI'06. IEEE International Conference on. IEEE. 2006, 181-186.
15. Ziguraki Ch. M–Health και Pharmacy Informatics. Their Role, applications and their significance. Implementation of an E-learning Application. [Undergraduate Dissertation]. Alexandrio Technological Institution of Thessaloniki, School of Technological Applications, Informatics Department. 2015. [In Greek]. Retrieved from http://hdl.handle.net/10184/10649