

The interest of primary care patients in using health applications for mobile devices

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Abstract

Mobile health technologies and applications installed on smart devices still represent new and relatively understudied phenomena in Poland. At the same time, a multitude of applications and their accessibility cause the increase of opportunities for their use for health purposes.

The aim of the present study was to evaluate the interest in applications supporting health and healthy lifestyle as well as monitoring health and disease among 718 adult patients in primary health care. It was found that there is a considerable potential for the increase of future use of health applications. Women, young respondents, respondents who hold an undergraduate degree and assess their health status well were observed to be more likely to potentially use applications related to lifestyle, health monitoring and combating disease.

Key words: mobile health applications, smartphone, primary health care, mHealth

Słowa kluczowe: aplikacje mobilne dedykowane zdrowiu, smartfon, podstawowa opieka zdrowotna, m-zdrowie



Ministerstwo Nauki
i Szkolnictwa Wyższego

Przygotowanie do wydania elektronicznego finansowane w ramach umowy 641/P-DUN/2018 ze środków Ministra Nauki i Szkolnictwa Wyższego przeznaczonych na działalność upowszechniającą naukę.

Introduction

The new technologies market is developing very fast, with mobility starting to play an increasingly important role. Users around the world have become enthralled with touchscreens and appreciated the opportunities they offer. These trends can also be seen in Poland. Thanks to decreasing prices and growing digitization processes, smart devices are making a bigger and bigger mark on the daily lives of Poles. At the end of December 2014, 69% of Polish internet users used smartphones, while 27% used tablets [1]. This constitutes a confirmation of global trends – International Data Corporation reports that in 2015, 1,433.9 million devices were sold on the smartphone market, a 10.1 per cent increase compared to

2014 [2]. It is also estimated that in 2021, sales will have reached around 2.1 billion units.

The reason for their omnipresence lies not so much in the attractive price and wide availability, but in the comprehensive response to the changing needs of the user. It is guaranteed by the main advantage of smart devices, i.e. access to the application. It is estimated that users of Android devices can choose from 1,600,000 applications in the Google Play Store, and Apple customers from 1,500,000 in the Apple App Store [3]. An important segment of the entire market, over 100,000 applications, are ones dedicated to health.

Therefore, owning a telephone opens unique possibilities in the field of health information distribution, broadly understood prevention, treatment and monitoring

of the health condition of patients with chronic diseases (e.g. diabetes) or shaping patient care [4]. According to the PEW Research Center report, as many as 62% of smartphone owners use their phones to search for information about their health [5]. And the commercial use of applications that support physical activity, improve mood, support smoking cessation or maintaining a healthy diet, increases very fast.

International health policy coordinators are not indifferent to the observed dynamic development of health-dedicated mobile services. They observe changes caused by the progress of technology and its dramatic penetration of everyday life, linking them with the possibility of reducing the costs of health care entities regardless of location. Successful attempts to combine the latent possibilities of mobile technologies with health economics and the use of global trends to meet the needs of local health systems, are gaining approval and seem to be decisive factors in the future of modern healthcare. However, despite the World Health Organization's definition of mHealth (as providing health services using mobile devices [6]), and the European Commission's clear indication of the directions of e-health activities, the Polish legal system lacks cohesion in this area [7–9]. At the same time, there is a lack of scientific counterweight to the enthusiasm enjoyed by people using widely available health applications, and research in the field of evaluation and verification of the effects of mHealth remains promising, yet still budding.

We want to fill the void with our research, aiming at assessing the interest in applications supporting health and healthy lifestyle among primary care patients (Pol. POZ) who have or intend to acquire mobile devices.

Material and method

Sampling and performing research

The research was carried out between 2 June, 2014 and 30 January, 2015 among 718 primary care patients. The test sample consisted of users of primary care health services (POZ), inhabitants of the Podkarpackie Voivodeship, divided into 25 poviats, and registered on active lists of doctors and nurses. The selection of people for the test sample was deliberate.

Inclusion criteria for the open population:

- users of primary care services on the active list of the primary care physician;
- people aged 18–60;
- inhabitants of the territories of the Podkarpackie Voivodeship (south-eastern Poland).

A proportional representation of all social groups in the south-eastern area of Poland was ensured, characterized by a small number of doctors and long distances to medical entities, which was assumed to be important in the research results. It is worth mentioning that – as of 31 December, 2014 – the area of the Podkarpackie Voivodeship was inhabited by 2,129,218 people [10]. The study group of 718 people was considered large enough to have a small impact on the error of estimate.

Participation in the study was completely voluntary and anonymous. The subjects had been informed about the study verbally and received written information about its purpose and voluntary nature. The subjects were assured that their consent or refusal to participate would not affect their care. For confidentiality purposes, the questionnaires were number coded. Correctly completed questionnaires equalled consent to study participation.

Tool

The research material was obtained using an interview questionnaire prepared by a doctor, nurse and Polish philologist, based on a literature analysis [11, 17–19]. The questionnaire consisted of two close-ended questions, five questions with the possibility of answer grading, and four questions with the possibility of multiple choice answers.

The questions in the questionnaire concerned:

- the possession of mobile devices;
- interest in health-related applications (the study included: an application to measure blood pressure, an application to perform and preliminarily assess ECG, an application to measure blood sugar level, an application with tips on how to provide first aid, an application that forms the basis of reliable knowledge on health-related topics, an application that facilitates understanding of analytical tests, eg. blood test results, an application that is a mobile drug database, an application that reminds you to take medicine, an application that allows you to get an initial 'virtual diagnosis' of your condition, an application that informs and supports pregnant women during pregnancy, an application that makes it possible to make an appointment at an outpatient clinic, an application that allows contact with a doctor "direct voice call, video call, e-prescription, e-leave", an application that allows interpretation of images "X-ray, ultrasound, CT, MRI"; e-nurse care application; e-rehabilitation care application; application (so-called 'red button') used in a situation of sudden malaise; application for remote care of the elderly);
- interest in applications related to a healthy lifestyle (the study included: an application to track and monitor sport activities, an application to control body fat, an application to control the amount of calories in the products consumed, an application that after connecting an additional device to a phone/tablet can serve to analyze the entire body, an application that facilitates control of calories burned during gym/fitness exercises, e-dietetics application, an application that allows localizing children);
- opinions on solving health and disease problems using mobile devices;
- the type of health information that is sought on the internet;
- health self-assessment, which was based on a four-grade scale (very good, good, sufficient, insufficient).

The questionnaire also included sociodemographic questions (gender, age, place of residence, education) (**Annex 1**).

The analysis was carried out depending on the sociodemographic characteristics of the respondents. In the selection of the sample, the study of patients between 18 and 60 years was included. It was assumed that these people belonged to the group who have the most contact with mobile devices. Data relating to age were divided into age ranges.

To obtain preliminary knowledge and to develop the final version of the questionnaire, in December 2012 a trial test was carried out among 50 primary care patients. The pilot allowed to check the level of understanding of the questions and to eliminate vague formulations. The results of the pilot studies did not reveal any structural defects of the tool. The statistical analysis at this stage also showed no irregularities. After stylistic adjustment, it was prepared and duplicated for proper research.

The collected data were compiled using the statistical package STATISTICA 11.0. The statistical analysis uses the chi-square independence test. The level of significance was $p < 0.05$. Qualitative data are presented in percentages.

Financing

The research was financed from the statutory activity of the Medical Department of the University of Rzeszów – Institute of Nursing and Health Sciences – in 2015, item 1 (2a), as part of the project: ‘The development of mobile health applications in Poland’ conducted in the Natural and Medical Sciences Centre for Innovative Research of the University of Rzeszów. The bioethical committee of the University of Rzeszów accepted the study, which was carried out in accordance with the Helsinki Declaration.

Findings

Sample characteristics

Of 718 examined adults, the majority were women (67.5%). The age ranges of the respondents were as follows: 30–49 years (40.4%); 18–29 years (32.9%); 50–60 years (26.7%). Over half of the respondents (66.0%) lived in the countryside, the remaining part came from cities (34.0%). The highest percentage of respondents had received secondary education (40.1%), followed by those who had received higher education (second degree studies) – 31.6% of the respondents, and done bachelor studies (*licencjat*): 11.6%. 16.7% of respondents had received vocational education. 63.0% of respondents were professionally active people. Every fifth person was still learning, and every tenth was a pensioner.

Almost half of the respondents evaluated their health condition as good (49.7%), very good – 23.5%, and average – 22.6%. Only 4.6% of respondents regarded their health condition as unsatisfactory. Most of the respondents (88.6%) were considered to be fully independent

people. 11.4% of patients required care of other people. The assessment of the frequency of using the services of a primary care doctor/nurse indicated that the majority of patients seek primary care counselling only in the case of symptoms – 70.5%, and 11.1% do so once a year or less frequently. The respondents who use primary care systematically, once a month, constitute 9.1%; more often than once a month – 5.3%. 29 people (4.0%) sought primary care assistance for the first time on the day of the study.

Interest in and acquisition of health information

A detailed analysis of the use of electronic devices and applications related to health and disease has shown that the overwhelming majority of respondents use smartphones and tablets (90.9% and 24.4%, respectively). Among them, people who currently use health-related applications and people interested in installing such applications in the future, as well as people interested in applications related to a healthy lifestyle, were selected. It was found that although health-related applications attract the interest of the respondents, they are used by only 5.3%. 75.5% of patients are interested in installing such applications, and 68.1% would like to have an application associated with a healthy lifestyle.

In order to examine the patients’ interest in their health, we asked about the types of health-related information they sought on the internet. It turned out that the respondents most often use search engines in obtaining information about the symptoms of diseases, their effects and treatment (66.7%). The second position was the search for opinions about doctors and medical institutions (52.2%), then – information on medicines and their effects (47.9%); nutrition, supplements and vitamins (32.9%); active lifestyle, sports, fitness (22.8%); the health of the child (21.0%); natural and unconventional medicine (18.2%). The main sources of health information for the patients were: the doctor (51.5%); Internet search engines (50.4%); family and friends (50.3%); medical TV programmes (32.5%) and the nurse (23.3%).

In the next part of the analysis, an assessment was made of the impact of such factors as: sex, age, education, place of residence, and health self-assessment, on attitudes, actions and activities in the use of and interest in health applications.

Gender and age vs. popularity of health applications

The presented research results indicate that men significantly more frequently report the use of health-related applications (8.2% vs. 3.9%, $p = 0.0176$). Among women, however, a statistically significant fact ($p = 0.017$) was noted of much greater interest in the potential use of applications related to health and a healthy lifestyle (**Table I**).

Looking at age, we can clearly differentiate both current use and potential interest in applications related to health and a healthy lifestyle (in both cases, $p < 0.05$). There is a clear tendency to reduce the frequency of us-

ing such applications over the years (in the following age groups their use is, respectively: 18–29 years – 10.6%, 30–49 years – 2.8%, and only 2.6% of people aged 50–60). Age significantly differentiates the potential interest in applications related to health and a healthy lifestyle. Also in this case, as the years go by, a decreasing interest in this type of applications is observed among the respondents (Table II).

Education and popularity of health applications

A significant statistical relationship was found between education and the use of health-related applications ($p = 0.038$). The percentage of people currently using such applications is higher among those with a bachelor and master degree (9.6% and 7.0%, respectively). Most interested in a future use of these applications are people

with undergraduate education (79.5% for applications related to health and 84.3% for applications related to a healthy lifestyle). The lowest interest in the subject is reported by people with secondary and vocational education (Table III).

Place of residence and popularity of health applications

The place of residence does not differentiate the frequency of using health applications ($p = 0.073$), although people living in cities are more likely to use health applications. A slightly higher interest in future use of such applications is visible among rural residents (68.4% in rural areas vs. 67.6% in urban areas). There were no significant differences between the place of residence and the interest in applications related to a healthy lifestyle (75.5% in rural areas vs. 75.4% in cities) (Table IV).

Independent variables	Sex				p
	female		male		
	N	%	N	%	
Current use of health-related applications	19	3.9%	19	8.2%	0.0176*
Interest in applications related to healthy lifestyle	336	69.3%	153	65.7%	0.3308
Interest in health-related applications	379	78.1%	163	70.0%	0.0170*

* $p < 0.05$ – statistically significant relationship.

Statistically significant results were marked in grey.

Table I. Use of and interest in applications related to health and healthy lifestyle vs. sex of the respondents. Source: Own elaboration.

Independent variables	Age [in years]						p
	18–29		30–49		50+		
	N	%	N	%	N	%	
Current use of health-related applications	25	10.6%	8	2.8%	5	2.6%	0.0001***
Interest in applications related to healthy lifestyle	183	77.5%	211	72.8%	95	49.5%	0.0000***
Interest in health-related applications	187	79.2%	230	79.3%	125	65.1%	0.0005***

*** $p < 0.001$ – very high statistically significant relationship.

Statistically significant results were marked in grey.

Table II. Use of and interest in applications related to health and healthy lifestyle vs. age of the respondents. Source: Own elaboration.

Independent variables	Education								p
	Vocational		High school		Undergraduate		Higher		
	N	%	N	%	N	%	N	%	
Current use of health-related applications	2	1.7%	12	4.2%	8	9.6%	16	7.0%	0.0384*
Interest in applications related to healthy lifestyle	66	55.0%	191	66.3%	66	79.5%	166	73.1%	0.0006***
Interest in health-related applications	77	64.2%	214	74.3%	70	84.3%	181	79.7%	0.0026**

* $p < 0.05$ – statistically significant relationship, ** $p < 0.01$ – high statistically significant relationship, *** $p < 0.001$ – very high statistically significant relationship.

Statistically significant results were marked in grey.

Table III. Use of and interest in applications related to health and healthy lifestyle vs. education of the respondents. Source: Own elaboration.

Independent variables	Place of residence				p
	City		Countryside		
	N	%	N	%	
Current use of health-related applications	18	7.4%	20	4.2%	0.0735
Interest in applications related to healthy lifestyle	165	67.6%	324	68.4%	0.8421
Interest in health-related applications	184	75.4%	358	75.5%	0.9723

Table IV. Use of and interest in applications related to health and healthy lifestyle vs. the place of residence of the respondents.

Source: Own elaboration.

Independent variables	Self-assessment of health								p
	Very good		Good		Average		Poor		
	N	%	N	%	N	%	N	%	
Current use of health-related applications	18	10.7%	16	4.5%	3	1.9%	1	3.0%	0.0027**
Interest in applications related to healthy lifestyle	126	74.6%	253	70.9%	89	56.0%	21	63.6%	0.0014**
Interest in health-related applications	129	76.3%	271	75.9%	115	72.3%	27	81.8%	0.6431

** $p < 0.01$ – high statistically significant relationship.

Statistically significant results were marked in grey.

Table V. Use of and interest in applications related to health and healthy lifestyle vs. self-assessment of the health of the subjects.

Source: Own elaboration.

Self-assessment of health status and popularity of health applications

There is a clear relationship between the self-assessment of health status and the use of health-related applications ($p = 0.002$). More often, these applications are used by people with better health. In this respect, the following results were obtained: very good (10.7%), good (4.5%), average (1.9%), unsatisfactory (3.0%). Perhaps this is due to the fact that the self-assessment of health status probably decreases with age, and the elderly – as is clear from the analyses presented above – are less interested in this type of services. Also, the potential interest in applications related to a healthy lifestyle varies with respect to health ($p = 0.001$). Persons better assessing their health condition are more often interested in such applications: very good health condition (74.6%), good (70.9%), average (56.0%), unsatisfactory (63.6%). However, the interest in health-related applications is not significantly differentiated between the compared groups ($p = 0.634$) (Table V).

Discussion

The aim of the article was to investigate the current use of and potential interest in installing mobile applications dedicated to health and healthy lifestyle among patients of primary health care in the area of south-eastern Poland (Podkarpackie Voivodeship). The results obtained seem to confirm the fact that the potential use of mobile services is also a great challenge for modern public health. It should be emphasized that this situation does not concern Polish residents only. There are various studies confirm-

ing the wide possibilities of mobile phones in supporting healthcare among representatives of various nations [11–13]. And the number of their users is constantly growing. Research conducted in 2014 confirms that 90% of Americans have a smartphone and 45% a tablet [14]. A similar trend is observed in Australia, where 76% of the population have a mobile phone, with an average of 33 applications installed [15]. Data from this study are in line with the above trends, since as many as 83.1% of respondents own a smartphone, and 28.7% use tablets. In a study by Torous et al. similar results were obtained: 97% of patients confirmed owning a mobile phone, of which 72% stated that the phone is a smartphone [16]. Bender et al. confirm the finding – of 904 respondents of Asian and Hispanic origin – 96.1% (869) owned a mobile phone [11].

The results obtained in our study confirm previous research indicating that, in general, smartphone users are interested in mobile applications; however, the current use of health-related applications is smaller. In our study, people using such applications constitute 6.6% of the entire studied group. Bender et al. note a similar tendency, indicating that only 19.8% of respondents installed a health-dedicated application on their device [11]. However, there are promising data about the reported willingness to use mobile health solutions in the future. The results obtained in our study indicate that 74.6% of primary care patients want to install a health application on their mobile device. Similar results were obtained by Ramirez et al., investigating the interest in using the application to improve their health among patients of primary care facilities in California. 86% of the 244 respondents reported such a willingness [17]. In addition, the results obtained by them also indicate that patients between 30–45 years of age show

the greatest willingness to download a mobile application to monitor their health. We obtained similar results – age differentiates the potential interest in applications related to a healthy lifestyle. The most willing to use or install them are young people (18–29 years old), and as the years go by, the interest is falling. This trend is confirmed by reports by Bauer et al., who report that interest in mHealth is lower among older patients [18].

In our study, women are ahead of men by 8% when it comes to buying health-related applications. The above tendency is confirmed by research conducted both by the American institute of public opinion Pew Research Center [14], as well as research on a narrower group of patients, conducted by Bender et al. [11]. Perhaps it is the role of mothers and wives that predisposes women to pay more attention to health issues that concern not only themselves but also their relatives. However, in order to determine the actual reasons for this, it seems justified to undertake further research on the issue of gender as a factor differentiating interest in mHealth.

In the light of the results – corresponding to the reports indicated above – younger people with higher education are the group that most frequently considers installing health applications. Although the issue of education does not meet the requirements of statistical significance, it was the subjects with the bachelor's degree who were most interested in purchasing an application supporting health and healthy lifestyle. The subjects with secondary and vocational education were the least willing to have such applications.

Linking active use of mobile applications with the assessment of one's own health and the presented level of health behaviours yielded a surprising, statistically significant result in our study. People who assess their health condition as very good, use this type of application more often. The higher the level of health behaviours, the greater the current use of health-related applications. Such results may point to the fact that consumers who feel healthier may be more open to innovations in the area of health. Similar assumptions are made by Rai et al. [19], indicating that the perception of one's health condition has a significant impact on the use of innovative mobile solutions. A similar topic was analyzed by Laing et al., showing that mobile utilities proved to be useful only in the group of patients consciously approaching issues related to nutrition (the effectiveness of commercially available applications monitoring caloric intake and aiding weight loss was examined) [20]. At the same time, the literature lacks research dedicated to similar motivation, linking health self-assessment with the use of new technologies. However, the benefits resulting from the use of health-dedicated applications among primary care patients are frequently indicated. Casey et al. demonstrated their usefulness in promoting physical activity and encouraging primary care specialists to recommend this type of application to patients [21]. In this context, further research seems to be necessary to analyze the potential of mobile health-dedicated applications, and to bring closer the challenges associated with new technologies used to improve health outcomes.

■ Limitations of the conducted research

The patient population studied came only from the south-eastern region of Poland (Podkarpackie Voivodeship), an area characterized by a lower ratio of doctors per 1,000 inhabitants and less access to health care services due to the type of terrain and long distances to primary care facilities, which could be reflected in the analysis and its results. It is recommended that the above issues be examined in other regions of Poland. The generalization of conclusions from this study is limited. The questionnaire is not a standardized tool, and the sample in question represents the population of primary care recipients from only one region of Poland. Nevertheless, the presented reports enrich the state of knowledge on the potential of future growth in the number of people using health mobile applications on a relatively large group of patients from one region of Poland.

■ Conclusions

The reported interest, high level of potential use and the possibilities offered by applications, confronted by the conducted research, lead to the following conclusions, the clearest being:

- 1) there is potential for future growth in the number of people using health-related mobile applications;
- 2) women, undergraduate younger people, and those assessing their health higher are more often interested in the potential use of applications related to health and healthy lifestyle.

The obtained results indicate that mobile applications can gain practical use in monitoring and improving health, treatment and diagnostics, and are a promising subject of future research.

■ Thanks

Thanks are due to Dr Mariusz Małecki, President of the Podkarpackie Zielona Góra Agreement, for help in organizing research in non-public family medicine facilities, subject to the authorities of the Agreement. We would particularly like to thank the participants of the study who consciously and willingly decided to take part in it.

References

1. IAB. *Strategic Report: The Internet in 2014*; <http://iab.org.pl/badania-i-publikacje/raport-strategiczny-internet-2014/> (accessed: 19.04.2016).
2. IDC Research. *Worldwide Smartphone Growth Expected to Slow to 10.4% in 2015, Down From 27.5% Growth in 2014*; <http://www.idc.com/getdoc.jsp?containerId=prUS25860315> (accessed: 19.04.2016).
3. Statista Inc. *Number of apps available in leading app stores*; <http://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/> (accessed: 19.04.2016).
4. Lustria M.L., Smith S.A., Hinnant C.C., *Exploring digital divides: An examination of eHealth technology use in health information seeking, communication and personal*

- health information management in the USA, "Health Informatics Journal" 2011; 17 (3): 224–243.
5. PEW Research Centre, *Internet, Science & Tech. U.S. Smartphone Use in 2015*; <http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/> (accessed: 19.04.2016).
 6. World Health Organization, *mHealth: New horizons for health through mobile technologies*; http://www.who.int/goe/publications/goe_mhealth_web.pdf (accessed: 19.04.2016).
 7. Bujnowska-Fedak M.M., Tomczak M., *Innowacyjne aplikacje telemedyczne i usługi e-zdrowia w opiece nad pacjentami w starszym wieku*, "Zeszyty Naukowe Ochrony Zdrowia. Zdrowie Publiczne i Zarządzanie" 2013; 11 (4): 302–317.
 8. Najbuk P., *Telemedycyna – aktualny stan prawny i perspektywy zmian w przyszłości*; <http://blog.dzp.pl/pharma/telemedycyna-aktualny-stan-prawny-i-perspektywy-zmian-w-przyszlosci/> (accessed: 19.04.2016).
 9. Bujok J., Gierek R., Olszanowski R., Skrzypek M., *Uwarunkowania rozwoju telemedycyny w Polsce. Potrzeby, bariery, korzyści, analiza rynku, rekomendacje*; <http://med-go.pl/wp-content/uploads/2014/08/Raport-telemedycyna-fin-22.07.2014.pdf> (accessed: 19.04.2016).
 10. *Stan, ruch naturalny i migracje ludności w województwie podkarpackim w 2014 r.*, Urząd Statystyczny w Rzeszowie, maj 2015; http://rzeszow.stat.gov.pl/download/gfx/rzeszow/pl/defaultaktualnosci/1558/1/8/1/demografia_2015.pdf (accessed: 19.04.2016).
 11. Bender M.S., Choi J., Arai S., Paul S.M., Gonzalez P., Fukuoka Y., *Digital technology ownership, usage, and factors predicting downloading health apps among Caucasian, Filipino, Korean, and Latino Americans: The digital link to health survey*, "JMIR mHealth uHealth" 2014; 2 (4): e43.
 12. Jeon E., Park H.A., Min Y.H., Kim H.Y., *Analysis of the information quality of Korean obesity-management smartphone applications*, "Healthc. Inform. Res." 2014; 20 (1): 23–29.
 13. Martínez-Fernández A., Lobos-Medina I., Díaz-Molina C.A., Chen-Cruz M.F., Prieto-Egido I., *TulaSalud: An m-health system for maternal and infant mortality reduction in Guatemala*, "J. Telemed. Telecare" 2015; 21 (5): 283–291.
 14. Pew Research Center, *Internet, Science & Tech. Mobile Technology Fact Sheet. 2014*; <http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet/> (accessed: 19.04.2016).
 15. *Communications Report 2013–14*, Australian Communications and Media Authority (ACMA), Sydney, Australia 2014; <http://www.acma.gov.au/theACMA/Library/Corporate-library/Corporate-publications/communications-report> (accessed: 19.04.2016).
 16. Torous J., Friedman R., Keshavan M., *Smartphone Ownership and Interest in Mobile Applications to Monitor Symptoms of Mental Health Conditions*, "JMIR mHealth uHealth" 2014; 2 (1): e2.
 17. Ramirez V., Johnson E., Gonzalez C., Ramirez V., Rubino B., Rossetti G., *Assessing the use of mobile health technology by patients: an observational study in primary care clinics*, "JMIR mHealth uHealth" 2016; 4 (2): e41.
 18. Bauer A.M., Rue T., Keppel G.A., Cole A.M., Baldwin L.-M., Katon W., *Use of Mobile Health (mHealth) Tools by Primary Care Patients in the WWAMI Region Practice and Research Network (WPRN)*, "J. Am. Board Fam. Med." 2014; 27 (6): 780–788.
 19. Rai A., Chen L., Pye J., Baird A., *Understanding Determinants of Consumer Mobile Health Usage Intentions, Assimilation, and Channel Preferences*, "J. Med. Internet Res." 2013; 15 (8): e149.
 20. Laing B.Y., Mangione C.M., Tseng C.H., Leng M., Vaisberg E., Mahida M., Bholat M., Glazier E., Morisky D.E., Bell D.S., *Effectiveness of a smartphone application for weight loss compared with usual care in overweight primary care patients: A randomized, controlled trial*, "Ann. Intern. Med." 2014; 161 (10 Suppl): S5–12.
 21. Casey M., Hayes P.S., Glynn F., ÓLaighin G., Heaney D., Murphy A.W., Glynn L.G., *Patients' experiences of using a smartphone application to increase physical activity: The SMART MOVE qualitative study in primary care*, "Br. J. Gen. Pract." 2014; 64 (625): e500–508.

Questionnaire

Date of filling:

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no. of questionnaire

Questionnaire addressed to patients of Primary Health Care

I kindly request you to take some time to complete this questionnaire. The study is anonymous, and the results will be used for scientific purposes, to assess the use of applications supporting health and healthy lifestyle among primary care patients who have or intend to acquire a mobile device. Filling in the questionnaire is voluntary. When completing the questionnaire, please write 'x' in the appropriate box. Due to the importance of the discussed topic, we kindly ask you to be sincere in completing this survey, providing real answers.

Part I

1. What type of mobile device do you use most often?

- smartphone
- tablet
- palm top – pocket computer
- portable game consoles

2. What is the brand of the mobile device you have?

Smartphone

- Samsung
- Nokia
- HTC
- Apple iPhone
- LG
- Sony
- BlackBerry
- other (specify)
- I don't have a smartphone

Tablet

- Samsung
- Apple iPad
- Sony
- ASUS
- Nexus
- Prestigio
- Pentagram
- other (specify)
- I don't have a tablet

3. What operating system is your mobile equipped with?

- Android (company producer Google)
- Symbian (company producer Nokia)
- iOS (company producer Apple)
- Windows Phone
- BlackBerry OS (company producer RIM – Research in Motion)
- other (specify)
- I don't know

4. Have you recently installed on your mobile device an application related to health or its control?

- yes
- no

5 A. Which of the following mobile applications related to healthy lifestyle would you like to install on your-mobile device? (Number the following examples – from the most-important answer to the least-important answer 1 – most important 8 – least important)

- application to track and monitor sports activity
- application to control body fat
- application to control the amount of calories in the products consumed
- application that after my phone / tablet is connected to an additional device, is able to analyze my entire body
- application that makes it easy for me to control calories burned during gym/fitness training

- e-dietetics application
- application that allows to locate children
- other (specify)
- none, I'm not interested

5 B. Which of the health-related mobile applications would you like to have on your mobile device? (Number the following examples – from the most-important answer to the least-important answer 1 – most important 18 – least important)

- application to measure blood pressure (requires an additional device to be plugged into a mobile device)
- application to perform and preliminarily analyze ECG
- application to measure blood sugar levels
- application with tips that help provide first aid
- application that forms the basis of reliable knowledge on health-related topics
- application that facilitates understanding of analytical results, e.g. blood
- application that is a mobile drug database
- application that reminds me to take medication
- application that allows to get a virtual diagnosis of my health condition
- application that informs and supports pregnant women during pregnancy
- application thanks to which I can arrange an appointment at my clinic
- application using which I can consult a doctor
- application that allows interpretation of images (X-ray, ultrasound, CT, MRI and OTHER)
- e-leave application
- e-nurse application
- e-rehabilitation care application
- application used in a situation of sudden malaise, the so-called red button
- other (specify)
- none, I'm not interested

6. What, in your opinion, should be a good mobile application related to healthy lifestyle and health care (Number the following examples – from the most-important answer to the least-important answer 1 – most important 7 – least important)

- should cost between 5 and 10 zł
- service costs are calculated according to the time of conversation
- should be constructed so that its use is intuitive
- should inform what exercises to choose each day to take care of my health
- should give the possibility of contacting my doctor via voice and video transmission
- secure (encrypted connection + database – secure server)
- give the possibility of choosing and purchasing health insurance

7. What is your opinion about the forms of solving health and illness problems via internet (Number the following examples – from the most-important answer to the least-important answer 1 – most important 6 – least important)

- I like the idea of remote healthcare
- I would be willing to pay a monthly subscription fee for additional device/access to applications that remotely control my health
- I think it would be better to have more options related to medical care available through applications on a mobile device (registration for consultations with doctors, inspection of medical records, e-prescription, e-leave)
- reminders about the dates of tests and health checks in outpatient clinics realized via text messages (email/SMS) would be helpful
- I prefer health centres to communicate with me about appointments and reminders via email/SMS
- I am not interested in patient-based internet service, I prefer traditional visits to the clinic, hospital, pharmacy
- other (specify)

8. Whose recommendations are most important for you when choosing a medical service application?

(Number the following examples – from the most-important answer to the least-important answer 1 – most important
7 – least important)

- I do not pay attention to recommendations
- medical societies
- patient associations
- the Ministry of Health
- recommendations of telecommunications companies: Plus, Orange, T-mobile, Play
- Supreme or District Medical Chamber
- Chief or district Chamber of Nurses and Midwives
- other (specify)

9. What type of health-related information do you look for using a web browser on a mobile device? (you can give many answers)

- I am looking for symptoms of diseases, their effects and treatment
- I search for information about medicines, their action, composition and price
- I am looking for information on nutrition, diet, vitamins, and dietary supplements
- I am looking for doctors, medical facilities and opinions about them
- I search for information on active lifestyle, sports and fitness
- I am looking for information on the child's health
- I am looking for information about natural and unconventional medicine
- other (specify)

10. How do you get your knowledge about health and healthy lifestyle, news in the field of health care or additional information about health problems that you or your relatives have? (you can give many answers)

- in conversation with family and friends
- visit at the doctor's
- conversation with a nurse
- Internet search engines
- daily press (newspapers)
- radio broadcasts and programmes
- medical or healthy lifestyleTV programmes
- specialist medical magazines
- other (specify)

11. How do you assess the current state of your health?

- very good
- good
- average
- unsatisfactory

Thank you for completing the questionnaire.