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Use of Mobile Apps and Wearables to Monitor Diet, Weight, and Physical Activity: A Cross-Sectional Survey of Adults in Poland

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Background: Mobile health technologies (mHealth) such as mobile applications (mobile apps), and wearables are gaining popularity. Regular monitoring of public attitudes toward the use of mHealth is crucial to effectively implementing mHealth in healthcare. Therefore, this study aimed to assess the level of use of mobile apps and wearables to monitor diet, weight, and physical activity among adults in Poland and to identify factors associated with the willingness to use new technologies for health monitoring.

Material/Methods: This cross-sectional survey was carried out on a representative sample of 1070 adult inhabitants of Poland, between 1 and 4 July, 2022. A computer-assisted web interview (CAWI) technique was used. The study questionnaire included 20 closed questions on eating habits, lifestyle, and the use of eHealth mobile apps and wearables.

Results: Almost one-quarter of respondents (23.2%) used wearables (a band or a watch) to monitor physical activity and 14.4% had a smart bathroom scale at home. Among adults in Poland, 16.3% used mobile apps to monitor physical activity and 13.3% used mobile apps to control their diet. Out of 19 different socioeconomic and lifestyle factors analyzed in this study, younger age, healthy diet, regular physical activity, and participation in organized sports activities were significantly associated ($P<0.05$) with the use of mobile apps and wearables.

Conclusions: A lack of socioeconomic barriers to accessing mobile apps and wearables presented in this study suggests that mHealth technology can be used to promote a healthy lifestyle in different socioeconomic groups and can reduce health inequalities.

Keywords: Body Weights and Measures • Fitness Trackers • Food Habits • Health Promotion • Internet of Things • Mobile Applications • Poland • Telemedicine

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3347 4 — 20

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Background

Chronic non-communicable diseases (NCDs) are the leading cause of death globally [1,2]. It is estimated that NCDs kill over 40 million people each year [3]. Cardiovascular diseases, cancers, and respiratory diseases account for most of the NCDs deaths [3]. Most of the NCDs are the results of modifiable behavioral risk factors [1-3]. Physical inactivity, unhealthy diet, and substance use (tobacco/alcohol) are the major risk factors contributing to NCDs [3,4]. Findings from the Global Burden of Disease Study showed that in 2019 approximately 8 million deaths were attributable to dietary risk factors [5]. The Lancet Physical Activity Series Working Group showed that physical inactivity causes 9% of premature mortality worldwide [6]. In 2013, 6% of the global burden of coronary heart diseases, 7% of type 2 diabetes, and 10% of breast cancer were attributable to physical inactivity [6]. Physical inactivity is responsible for a markable economic burden, with $53.8 billion USD in healthcare systems expenditures and $13.7 billion USD in productivity losses [7].

Due to the markable global burden of lifestyle-related NCDs, numerous NCDs prevention programs were implemented [8-10]. In 2004, the World Health Organization (WHO) adopted the "Global Strategy on Diet, Physical Activity and Health", which aimed to promote and protect health through healthy eating and physical activity [8]. In the global strategies, numerous countries have implemented national policies on physical activity and a healthy diet. School-based physical education and infrastructural policies are considered one of the most effective policies to promote physical activity [9]. Moreover, national food-based dietary guidelines, food systems, agricultural policies, educational campaigns, and nutrition education programs were implemented to promote healthy dietary practices [10,11].

Despite the widespread actions on a healthy diet and physical activity promotion, the global prevalence of lifestyle-related risk factors remains high [12]. In recent years, mobile health technologies (mHealth) such as mobile applications (mobile apps), web-based technologies, telecommunication services, and wearable technology have been gaining popularity [13,14]. It is believed that the implementation of digital health interventions may improve disease prevention, but randomized controlled trials are still ongoing [15,16]. In 2022, more than 80% of the world's population used a smartphone [17] and over 60% had Internet access [18]. Mobile apps are one of the most popular mHealth services [19,20]. In 2022, there were more than 52 000 different healthcare and medical apps available on the Google Play Store and more than 51 000 available on the Apple App Store [19,20]. Mobile apps to control diet and physical activity are one of the most popular digital health tools that support users in their lifestyle improvement [14,19,20].

Nutrition-related mobile apps influence consumers' healthy food behavior and dietary intake with web-based food recalls, provide personalized health tips, and allow them to set individual goals to increase motivation and track changes in dietary behaviors [21]. Mobile apps also deliver accessible and appealing physical activity interventions that effectively increase physical activity [22]. A growing number of mobile apps are designed and dedicated to patients with chronic diseases [23].

Another group of technologies that is widely implemented in healthcare is Internet of Things (IoT) technology, which allows for collecting, monitoring, managing, and analyzing data from sensors [24]. One of the most popular applications of IoT are wearable devices with sensors placed on the body that collect data (eg, on daily habits, physical activity, and hydration) [25]. The most popular mHealth wearables are wristbands or smartwatches that can monitor an individual's activities in an accessible way [24,25].

The global mobile medical apps and wearables market is growing rapidly [19,20]. However, the implementation of mHealth varies across countries [26]. Public acceptance of mHealth services is necessary for the effective adoption mHealth interventions. Poland is an example of a European Union (EU) country with a relatively high level of use of information and communications technology (ICT) in the healthcare system [27]. However, there is a lack of nationally representative data on public attitudes toward the use of mHealth services such as mobile apps and wearables among adults in Poland. Mobile apps and wearables can significantly increase the effectiveness of health policies and preventive programs on NCDs. Regular monitoring of public attitudes toward the use of mHealth services is crucial to provide public health interventions on lifestyle changes that will be based on mobile health technologies.

Therefore, this study aimed to assess the level of use of mobile apps and wearables to monitor diet, weight, and physical activity among adults in Poland and to identify factors associated with willingness to use new technologies for health monitoring.

Material and Methods

Ethics

The study protocol was reviewed and approved by the Ethical Board at the Medical University of Warsaw, Poland (no. AKBE/176/2022). Participation in the study was voluntary and anonymous. Informed consent was obtained by the Nationwide Research Panel Ariadna on recruitment of respondents.

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Study Design and Participants

This cross-sectional survey was carried out among adult inhabitants of Poland, between 1 and 4 July, 2022. Data were collected by a specialized and certified survey company (the Nationwide Research Panel Ariadna) on behalf of the authors, who provided the scientific context of this study [28]. A computer-assisted web interview (CAWI) technique was used. Respondents filled the questionnaire through the dedicated IT system managed by the survey company. A representative sample of the adult Polish population was selected from more than 100 000 registered and verified individual users of the survey company web platform [28]. A non-probability quota sampling technique was used. The stratification model included gender, age, and place of residence (size of the city and location) and was based on the nationwide demographic data provided by the Central Statistical Office, Warsaw, Poland.

As this study aimed to assess the level of use of mobile apps and wearables to monitor diet, weight, and physical activity in a representative sample of adults, a dedicated survey company was contracted to collect the data. Due to technical reasons and a lack of databases that provide representativeness of the population, the authors were not able to collect data on their own. Similar methods were used in previously published studies on tobacco use [29] and vaccine hesitancy in Poland [30].

Study Questionnaire and Measures

The study questionnaire included 20 closed questions on eating habits, diet-related non-communicable diseases, the use of eHealth mobile apps and smart devices, lifestyle, and sociodemographic characteristics. The questionnaire was self-prepared by the authors and based on previously published studies on mobile health technology use as well as market research on the top consumer mHealth services/devices available in Poland [13-15].

The Use of Mobile Apps

Respondents were asked about their attitudes towards the use of mobile apps, using the following question: "Have you used any of the following weight management and/or physical activity methods in the last 12 months: What do you think are diet-related diseases: (1) mobile application on the phone or tablet to monitor physical activity level (eg, Endomondo); (2) mobile application on the phone or tablet to control the diet (eg, counting calories, checking the caloric value of meals or recipes for meals)?" with 2 possible answers: "Yes" or "No".

The Use of Wearables and Internet of Things Technology

Respondents were asked about their attitudes toward the use of wearables and the Internet of Things technology, using the following question: "Have you used any of the following technologies in the last 12 months: (1) a band or a watch to monitor physical activity level (eg, FitBit, Xiaomi Mi Band, Garmin) in the last 12 months; (2) smart bathroom scale with a mobile application that, in addition to body weight, allows you to assess selected parameters of the body composition (eg, the level of adipose tissue, muscle tissue)?" with 2 possible answers: "Yes" or "No".

Moreover, respondents were asked about their diet, regular weight control physical activity level, gym/fitness club passes, and participation in organized/group sports activities. Questions on tobacco use and alcohol consumption were also addressed.

Data Analysis

The raw datasets received from the survey company were analyzed by the authors with SPSS v. 28 (IBM Corp., Armonk, NY, USA). The distribution of categorical variables was shown by frequencies and proportions. Cross-tabulations and chi-squared tests were used to compare categorical variables.

Associations between sociodemographic/lifestyle factors and the use of mobile apps and wearables to monitor diet were analyzed using logistic regression analyses. The use of (1) mobile apps to monitor physical activity; (2) mobile apps to control the diet; (3) band or watch to monitor physical activity; and (4) smart bathroom scale was considered separately as dependent variables in the model. Nineteen different sociodemographic/lifestyle factors were considered independent variables. In simple logistic regression analyses, all variables were considered separately. Multivariable logistic regression models included all significantly significant variables identified in simple regression analyses. The strength of association was presented with an odds ratio (OR) and 95% confidence intervals (95% CI). Statistical inference was based on the criterion $P<0.05$.

Results

Characteristics of the Study Population

Data were received from 1070 individuals; 52.6% were females and the mean age of respondents was 45.1±16.1 years (**Table 1**). Most of the participants were married (50.5%), 43.4% had higher education, and almost two-thirds had children (63.3%) and were currently employed/self-employed (62.2%). Among the participants, 45% had at least 1 chronic disease. More than one-quarter of the respondents (28.7%) were following a diet (**Table 1**). Almost half of the respondents (48.9%) declared regular self-control of weight, 2.1% had a regular weight check-up by healthcare professionals, and 7.5% declared both weight self-control and check-ups by the healthcare professional (**Table 1**). Almost one-fifth of respondents (18.4%) did

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Table 1. Characteristics of the study population (n=1070).

Variable	n	%
Gender		
Female	570	53.3
Male	500	46.7
Age (years)		
18-29	236	22.1
30-39	214	20.0
40-49	182	17.0
50-59	190	17.8
60+	248	23.2
Educational level		
Primary	24	2.2
Vocational	107	10.0
Secondary	475	44.4
Higher	464	43.4
Marital status		
Single	229	21.4
Married	540	50.5
Informal relationship	174	16.3
Divorced	43	4.0
Widowed	84	7.9
Having children		
Yes	677	63.3
No	393	36.7
Number of household members		
Living alone	147	13.7
Living with at least one person	923	86.3
Children under 18 years in home		
Yes	372	34.8
No	698	65.2
Place of residence		
Rural	357	33.4
City below 20,000 residents	135	12.6
City from 20,000 to 99,999 residents	227	21.2
City from 100,000 to 499,999 residents	202	18.9
City above 500,000 residents	149	13.9

Variable	n	%
Occupational status		
Active	666	62.2
Passive	404	37.8
Self-reported economic status		
Rather good, good or very good	410	38.3
Moderate/difficult to tell	430	40.2
Rather bad, bad or very good	230	21.5
Presence of chronic diseases		
Yes	481	45.0
No	589	55.0
Self-reported health status		
Rather good, good or very good	472	44.1
Moderate/difficult to tell	502	46.9
Rather bad, bad or very good	96	9.0
Having diet		
Yes	307	28.7
No	763	71.3
Regular weight control		
Yes, self-control	523	48.9
Yes, a regular check-up by the healthcare professional	23	2.1
Yes, both self-control and check-up by the healthcare professional	80	7.5
No	444	41.5
Physical activity		
Everyday	176	16.4
3-4 Times per week	193	18.0
1-2 Times per week	220	20.6
2-3 Times per month	98	9.2
Once per month	43	4.0
Less than once per month	143	13.4
Never	197	18.4
Tobacco use		
Daily smoker	256	23.9
Occasional smoker	86	8.0
Non-smokers	728	68.0

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Table 1 continued. Characteristics of the study population (n=1070).

Variable	n	%
Alcohol consumption		
Everyday	51	4.8
3-4 Times per week	110	10.3
1-2 Times per week	235	22.0
2-3 Times per month	186	17.4
Once per month	116	10.8
Less than once per month	215	20.1
Never	157	14.7
Having gym/fitness club passes		
Yes	120	11.2
No	950	88.8
Participation in organized/group sports activities		
Yes	116	10.8
No	954	89.2

not undertake any physical activity. Approximately one-tenth had a gym/fitness club pass (11.2%) or declared participation in organized/group sports activities (10.8%). Among the respondents, 23.9% were daily smokers and 4.8% consumed alcohol every day (**Table 1**).

The Use of Mobile Apps and Wearables to Control Diet, Weight, and Physical Activity

Almost one-quarter of respondents (23.2%) used wearables (a band or a watch) to monitor physical activity and 14.4% had a smart bathroom scale at home (**Table 2**). Among adults in Poland, 16.3% used mobile apps to monitor physical activity and 13.3% used mobile apps to control their diet. Younger respondents (age 18-39 years), those who were single or in an informal relationship, respondents who do not have children, and currently employed/self-employed individuals more often ($P<0.05$) used mobile apps to control diet, weight, and physical activity (**Table 2**). Moreover, respondents with good health status, those who lived in cities population 20 000-99 999 residents or the biggest cities above 500 000 residents more often declared the use of mobile apps to monitor physical activity ($P<0.05$).

There were no statistically significant differences in the prevalence of use of mobile apps and wearables/smart devices by gender, educational level, and tobacco use (**Table 2**). Respondents who followed a diet, those who declared regular weight control, those with regular physical activity, and respondents who had gym/fitness club passes or attended organized/group sports activities more often declared ($P<0.05$) the use of mobile apps and wearables/IoT technology to control diet, weight, and physical activity (**Table 2**).

Factors Associated with the Use of Mobile Apps

In multivariable logistic regression analyses (**Table 3**), age 18-29 (OR: 3.77; 95% CI: 1.84-7.75; p<0.001) or 30-39 years (OR: 2.57; 95% CI: 1.26-5.24; p=0.01), living in cities from 20 000 to 99 999 residents (OR: 1.92; 95% CI: 1.17-3.16; $P=0.01$) or above 500 000 residents (OR: 2.14; 95% CI: 1.22-3.74; $P=0.008$), following a diet (OR: 1.54; 95% CI: 1.04-2.28; p=0.03), regular weight control (OR: 1.76; 95% CI: 1.16-2.67; $P=0.008$), at least minimal physical activity (p<0.05), occasional alcohol consumption ($P<0.05$) and participation in organized/groups sports activities (OR: 1.70; 95% CI: 1.04-2.76; $P=0.03$) were significantly associated with higher odds of use mobile apps to monitor physical activity level (**Table 3**). Age 18-49 years ($P<0.05$), following a diet (OR: 2.71; 95% CI: 1.77-4.14; $P<0.001$), regular weight control (OR: 2.19; 95% CI: 1.36-3.53; $P<0.001$), alcohol consumption 2-3 times per month (OR: 2.25; 95% CI: 1.14-5.58; $P=0.02$), having gym/fitness club passes (OR: 1.94; 95% CI: 1.16-3.23; $P=0.01$), and participation in organized/groups sports activities (OR: 2.29; 95% CI: 1.36-3.87; $P=0.002$) were significantly associated with higher odds of use mobile apps to control the diet (**Table 3**).

Factors Associated with the Use of Wearables and Internet of Things Technology

In multivariable logistic regression analyses (**Table 4**), age 18-29 years (OR: 2.60; 95% CI: 1.53-4.39; $P<0.001$), good financial status (OR: 1.63; 95% CI: 1.07-2.54; $P=0.03$), regular weight control (OR: 1.54; 95% CI: 1.10-2.16; $P=0.01$), daily physical activity (OR: 2.28; 95% CI: 1.27-4.09; $P=0.006$) or physical activity for 3-4 times per week (OR: 1.90; 95% CI: 1.05-3.42; p=0.03), and participation in organized/groups sports activities (OR: 1.79; 95% CI: 1.15-2.80; $P=0.01$) were significantly associated with higher odds of use wearables to monitor physical activity (**Table 4**). Out of 19 different factors analyzed in this study, regular weight control (OR: 3.15; 95% CI: 1.96-5.06; $P<0.001$), daily physical activity (OR: 3.91; 95% CI: 1.77-8.66; $P<0.001$) or physical activity 3-4 times per week (OR: 4.17; 95% CI: 1.88-9.29; $P<0.001$) and daily alcohol consumption (OR: 3.40; 95% CI: 1.41-8.24; $P=0.007$) were significantly associated with higher odds of use of a smart bathroom scale (**Table 4**).

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Table 2. Respondents' attitudes towards the use of mHealth technologies to control diet, weight, and physical activity (n=1070).

The use of mHealth technologies to control diet, weight, and physical activity – percentage of respondents who answered "yes" by sociodemographic factors								
Variable	**Mobile application to monitor physical activity**		**Mobile application to control the diet**		**A band or a watch to monitor physical activity**		**Smart bathroom scale**	
	n (%)	**p**	**n (%)**	**p**	**n (%)**	**p**	**n (%)**	**p**
Overall	174 (16.3)		142 (13.3)		248 (23.2)		154 (14.4)	
Gender								
Female	90 (15.8)	0.7	84 (14.7)	0.1	136 (23.9)	0.6	78 (13.7)	0.5
Male	84 (16.8)		58 (11.6)		112 (22.4)		76 (15.2)	
Age (years)								
18-29	66 (28.0)	**<0.001**	59 (25.0)	**<0.001**	77 (32.6)	**<0.001**	36 (15.3)	0.7
30-39	45 (21.0)		38 (17.8)		57 (26.6)		36 (16.8)	
40-49	22 (12.1)		23 (12.6)		40 (22.0)		22 (12.1)	
50-59	20 (10.5)		13 (6.8)		42 (22.1)		27 (14.2)	
60+	21 (8.5)		9 (3.6)		32 (12.9)		33 (13.3)	
Educational level								
Primary	4 (16.7)	0.1	2 (8.3)	0.7	3 (12.5)	0.4	3 (12.5)	0.08
Vocational	11 (10.3)		11 (10.3)		20 (18.7)		7 (6.5)	
Secondary	72 (15.2)		64 (13.5)		113 (23.8)		77 (16.2)	
Higher	87 (18.8)		65 (14.0)		112 (24.1)		67 (14.4)	
Marital status								
Single	47 (20.5)	**0.006**	38 (16.6)	**0.002**	48 (21.0)	0.6	32 (14.0)	0.4
Married	70 (13.0)		63 (11.7)		123 (22.8)		77 (14.3)	
Informal relationship	40 (23.0)		34 (19.5)		48 (27.6)		32 (18.4)	
Divorced	7 (16.3)		1 (2.3)		9 (20.9)		5 (11.6)	
Widowed	10 (11.9)		6 (7.1)		20 (23.8)		8 (9.5)	
Having children								
Yes	90 (13.3)	**<0.001**	70 (10.3)	**<0.001**	153 (22.6)	0.6	94 (13.9)	0.5
No	84 (21.4)		72 (18.3)		95 (24.2)		60 (15.3)	
Number of household members								
Living alone	24 (16.3)	0.9	18 (12.2)	0.7	24 (16.3)	**0.03**	20 (13.6)	0.8
Living with at least one person	150 (16.3)		124 (13.4)		224 (24.3)		134 (14.5)	
Children under 18 years in home								
Yes	62 (16.7)	0.8	60 (16.1)	**0.04**	109 (29.3)	**<0.001**	55 (14.8)	0.8
No	112 (16.0)		82 (11.7)		139 (19.9)		99 (14.2)	

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Variable	**Mobile application to monitor physical activity**		**Mobile application to control the diet**		**A band or a watch to monitor physical activity**		**Smart bathroom scale**	
	n (%)	**p**	**n (%)**	**p**	**n (%)**	**p**	**n (%)**	**p**
Place of residence								
Rural	46 (12.9)	**0.03**	45 (12.6)	0.8	83 (23.2)	0.6	49 (13.7)	0.9
City below 20,000 residents	16 (11.9)		15 (11.1)		32 (23.7)		19 (14.1)	
City from 20,000 to 99,999 residents	46 (20.3)		34 (15.0)		57 (25.1)		33 (14.5)	
City from 100,000 to 499,999 residents	34 (16.8)		28 (13.9)		49 (24.3)		33 (16.3)	
City above 500,000 residents	32 (21.5)		20 (13.4)		27 (18.1)		20 (13.4)	
Occupational status								
Active	128 (19.2)	**<0.001**	103 (15.5)	**0.007**	180 (27.0)	**<0.001**	100 (15.0)	0.5
Passive	46 (11.4)		39 (9.7)		68 (16.8)		54 (13.4)	
Self-reported economic status								
Rather good, good or very good	78 (19.0)	0.1	65 (15.9)	0.1	116 (28.3)	**0.004**	59 (14.4)	0.8
Moderate/difficult to tell	61 (14.2)		48 (11.2)		92 (21.4)		59 (13.7)	
Rather bad, bad or very good	35 (15.2)		29 (12.6)		40 (17.4)		36 (15.7)	
Presence of chronic diseases								
Yes	62 (12.9)	**0.007**	57 (11.9)	0.2	109 (22.7)	0.7	81 (16.8)	**0.04**
No	112 (19.0)		85 (14.4)		139 (23.6)		73 (12.4)	
Self-reported health status								
Rather good, good or very good	97 (20.6)	**0.002**	75 (15.9)	0.06	117 (24.8)	0.4	69 (14.6)	0.4
Moderate/difficult to tell	62 (12.4)		54 (10.8)		107 (21.3)		67 (13.3)	
Rather bad, bad or very good	15 (15.6)		13 (13.5)		24 (25.0)		18 (18.8)	
Having diet								
Yes	71 (23.1)	**<0.001**	71 (23.1)	**<0.001**	89 (29.0)	0.004	65 (21.2)	**<0.001**
No	103 (13.5)		71 (9.3)		159 (20.8)		89 (11.7)	
Regular weight control								
Yes	129 (20.6)	**<0.001**	111 (17.7)	**<0.001**	172 (27.5)	**<0.001**	129 (20.6)	**<0.001**
No	45 (10.1)		31 (7.0)		76 (17.1)		25 (5.6)	

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Variable	**Mobile application to monitor physical activity**		**Mobile application to control the diet**		**A band or a watch to monitor physical activity**		**Smart bathroom scale**	
	n (%)	**p**	**n (%)**	**p**	**n (%)**	**p**	**n (%)**	**p**
Physical activity								
Everyday	40 (22.7)	**<0.001**	29 (16.5)	**<0.001**	53 (30.1)	**<0.001**	39 (22.2)	**<0.001**
3-4 Times per week	48 (24.9)		37 (19.2)		55 (28.5)		43 (22.3)	
1-2 Times per week	40 (18.2)		30 (13.6)		54 (24.5)		31 (14.1)	
2-3 Times per month	14 (14.3)		19 (19.4)		23 (23.5)		13 (13.3)	
Once per month	8 (18.6)		5 (11.6)		10 (23.3)		6 (14.0)	
Less than once per month	18 (12.6)		13 (9.1)		31 (21.7)		13 (9.1)	
Never	6 (3.0)		9 (4.6)		22 (11.2)		9 (4.6)	
Tobacco use								
Daily smoker	36 (14.1)	0.1	35 (13.7)	0.08	59 (23.0)	0.051	37 (14.5)	0.4
Occassional smoker	20 (23.3)		18 (20.9)		29 (33.7)		14 (16.3)	
Non-smokers	118 (16.2)		89 (12.2)		160 (22.0)		103 (14.1)	
Alcohol consumption								
Everyday	8 (15.7)	**0.04**	10 (19.6)	0.1	14 (27.5)	0.2	13 (25.5)	**0.03**
3-4 Times per week	20 (18.2)		18 (16.4)		25 (22.7)		14 (12.7)	
1-2 Times per week	48 (20.4)		30 (12.8)		61 (26.0)		37 (15.7)	
2-3 Times per month	34 (18.3)		31 (16.7)		52 (28.0)		32 (17.2)	
Once per month	16 (13.8)		15 (12.9)		25 (21.6)		21 (18.1)	
Less than once per month	36 (16.7)		27 (12.6)		45 (20.9)		22 (10.2)	
Never	12 (7.6)		11 (7.0)		26 (16.6)		15 (9.6)	
Having gym/fitness club passes								
Yes	42 (35.0)	**<0.001**	38 (31.7)	**<0.001**	47 (39.2)	**<0.001**	32 (26.7)	**<0.001**
No	132 (13.9)		104 (10.9)		201 (21.2)		122 (12.8)	
Participation in organized/ group sports activities								
Yes	37 (31.9)	**<0.001**	36 (31.0)	**<0.001**	46 (39.7)	**<0.001**	28 (24.1)	**0.002**
No	137 (14.4)		106 (11.1)		202 (21.2)		126 (13.2)	

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Table 3. Factors associated with the use of mobile apps to control diet, weight, and physical activity (n=1070).

Factors associated with the use of mobile apps to control diet, weight, and physical activity								
Variable	Mobile application to monitor physical activity level				Mobile application to control the diet			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Gender								
Female	0.7	0.93 (0.67-1.29)			0.1	1.32 (0.92-1.89)		
Male		Reference				Reference		
Age (years)								
18-29	**<0.001**	4.20 (2.47-7.13)	**<0.001**	3.77 (1.84-7.75)	**<0.001**	8.85 (4.28-18.33)	**<0.001**	7.73 (2.96-20.17)
30-39	**<0.001**	2.88 (1.65-5.01)	**0.01**	2.57 (1.26-5.24)	**<0.001**	5.73 (2.70-12.17)	**0.001**	4.70 (1.81-12.17)
40-49	0.2	1.49 (0.79-2.79)	0.4	1.41 (0.66-3.00)	**<0.001**	3.84 (1.73-8.52)	**0.006**	3.83 (1.46-9.99)
50-59	0.5	1.27 (0.67-2.42)	0.6	1.23 (0.59-2.57)	**0.1**	1.95 (0.82-4.66)	**0.1**	2.09 (0.81-5.43)
60+		Reference		Reference		Reference		Reference
Educational level								
Primary		Reference				Reference		
Vocational	0.8	1.15 (0.39-3.46)			0.8	1.26 (0.26-6.10)		
Secondary	0.8	0.89 (0.30-2.69)			0.5	1.71 (0.40-7.46)		
Higher	0.4	0.57 (0.17-1.98)			0.4	1.79 (0.41-7.80)		
Marital status								
Single	0.1	1.67 (0.91-3.05)	0.6	0.79 (0.36-1.72)	**0.004**	3.41 (1.48-7.88)	0.8	1.12 (0.41-3.05)
Married	0.9	0.96 (0.55-1.70)	0.2	0.66 (0.35-1.26)	**0.047**	2.26 (1.01-5.07)	0.4	1.50 (0.62-3.65)
Informal relationship	**0.04**	1.93 (1.04-3.59)	0.5	0.79 (0.37-1.68)	**<0.001**	4.16 (1.78-9.73)	0.5	1.41 (0.53-3.74)
Divorced/widowed		Reference		Reference		Reference		Reference
Having children								
Yes	**<0.001**	Reference		Reference	**<0.001**	Reference		Reference
No		1.77 (1.28-2.46)	0.8	1.07 (0.64-1.77)		1.95 (1.36-2.78)	0.1	1.69 (0.87-3.30)
Number of household members								
Living alone	0.9	1.01 (0.63-1.61)			0.7	0.90 (0.53-1.53)		
Living with at least one person		Reference				Reference		

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Table 3 continued. Factors associated with the use of mobile apps to control diet, weight, and physical activity (n=1070).

Factors associated with the use of mobile apps to control diet, weight, and physical activity								
Variable	Mobile application to monitor physical activity level				Mobile application to control the diet			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Children under 18 years in home								
Yes	0.8	1.05 (0.75-1.47)			**0.045**	1.45 (1.01-2.07)	0.4	1.25 (0.71-2.19)
No		Reference				Reference		Reference
Place of residence								
Rural		Reference		Reference	0.8	0.93 (0.53-1.64)		
City below 20,000 residents	0.8	0.91 (0.50-1.67)	0.6	0.84 (0.44-1.60)	0.6	0.81 (0.40-1.65)		
City from 20,000 to 99,999 residents	**0.02**	1.72 (1.10-2.69)	**0.01**	1.92 (1.17-3.16)	0.7	1.14 (0.63-2.06)		
City from 100,000 to 499,999 residents	0.2	1.37 (0.85-2.21)	0.3	1.33 (0.78-2.27)	0.9	1.04 (0.56-1.92)		
City above 500,000 residents	**0.02**	1.85 (1.12-3.05)	**0.008**	2.14 (1.22-3.74)		Reference		
Occupational status								
Active	**<0.001**	1.85 (1.29-2.66)	0.3	1.25 (0.79-1.98)	**0.007**	1.71 (1.16-2.53)	0.8	0.94 (0.58-1.53)
Passive		Reference		Reference		Reference		Reference
Self-reported economic status								
Rather good, good or very good	0.2	1.31 (0.85-2.03)			0.3	1.31 (0.82-2.09)		
Moderate/difficult to tell	0.7	0.92 (0.59-1.45)			0.6	0.87 (0.53-1.42)		
Rather bad, bad or very good		Reference				Reference		
Presence of chronic diseases								
Yes	0.007	Reference	0.2	Reference	0.2	0.80 (0.56-1.14)		
No		1.59 (1.13-2.22)		1.32 (0.88-1.98)		Reference		
Self-reported health status								
Rather good, good or very good	0.3	1.40 (0.77-2.53)			0.6	1.21 (0.64-2.28)		
Moderate/difficult to tell	0.4	0.76 (0.41-1.40)			0.4	0.77 (0.40-1.47)		
Rather bad, bad or very good		Reference				Reference		

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Table 3 continued. Factors associated with the use of mobile apps to control diet, weight, and physical activity (n=1070).

Factors associated with the use of mobile apps to control diet, weight, and physical activity								
Variable	Mobile application to monitor physical activity level				Mobile application to control the diet			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Having diet								
Yes	**<0.001**	1.93 (1.38-2.70)	**0.03**	1.54 (1.04-2.28)	**<0.001**	2.93 (2.04-4.21)	**<0.001**	2.71 (1.77-4.14)
No		Reference		Reference		Reference		Reference
Regular weight control								
Yes	**<0.001**	2.30 (1.60-3.31)	**0.008**	1.76 (1.16-2.67)	**<0.001**	2.87 (1.89-4.36)	**0.001**	2.19 (1.36-3.53)
No		Reference		Reference		Reference		Reference
Physical activity								
Everyday	**<0.001**	9.36 (3.86-22.70)	**<0.001**	5.58 (2.22-14.04)	**<0.001**	4.12 (1.89-9.98)	0.2	1.78 (0.76-4.19)
3-4 Times per week	**<0.001**	10.54 (4.39-25.30)	**<0.001**	5.53 (2.21-13.86)	**<0.001**	4.95 (2.32-10.58)	0.1	1.97 (0.85-4.55)
1-2 Times per week	**<0.001**	7.07 (2.93-17.09)	**0.01**	3.31 (1.31-8.36)	**0.002**	3.30 (1.53-7.14)	0.5	1.31 (0.56-3.07)
2-3 Times per month	**<0.001**	5.31 (1.97-14.28)	**0.04**	2.97 (1.06-8.35)	**<0.001**	5.02 (2.18-11.59)	0.06	2.40 (0.97-5.95)
Once per month	**<0.001**	7.28 (2.38-22.26)	**0.005**	5.34 (1.66-17.23)	0.08	2.75 (0.87-8.66)	0.5	1.54 (0.45-5.30)
Less than once per month	**0.002**	4.58 (1.77-11.87)	**0.009**	3.65 (1.38-9.70)	0.1	2.09 (0.87-5.03)	0.4	1.57 (0.62-3.99)
Never		Reference		Reference		Reference		Reference
Tobacco use								
Daily smoker	0.4	0.85 (0.57-1.27)			0.5	1.14 (0.75-1.73)	0.06	1.60 (0.99-2.60)
Occassional smoker	0.1	1.57 (0.92-2.68)			**0.03**	1.90 (1.08-3.34)	0.5	1.28 (0.65-2.53)
Non-smokers		Reference				Reference		Reference
Alcohol consumption								
Everyday	0.1	2.25 (0.86-5.86)	0.1	2.14 (0.76-6.02)	**0.01**	3.24 (1.29-8.15)	0.06	2.81 (0.99-7.97)
3-4 Times per week	**0.01**	2.69 (1.25-5.76)	0.05	2.32 (1.00-5.39)	**0.02**	2.60 (1.17-5.75)	0.09	2.17 (0.89-5.30)
1-2 Times per week	**<0.001**	3.10 (1.59-6.05)	**0.02**	2.46 (1.19-5.11)	0.07	1.94 (0.94-4.00)	0.5	1.34 (0.60-2.98)
2-3 Times per month	**0.005**	3.10 (1.59-6.05)	**0.03**	2.34 (1.10-4.97)	**0.008**	2.66 (1.29-5.48)	**0.02**	2.52 (1.14-5.58)
Once per month	0.1	1.93 (0.88-4.26)	0.2	1.83 (0.78-4.26)	0.1	1.97 (0.87-4.47)	0.3	1.68 (0.68-4.11)

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Table 3 continued. Factors associated with the use of mobile apps to control diet, weight, and physical activity (n=1070).

Factors associated with the use of mobile apps to control diet, weight, and physical activity								
Variable	Mobile application to monitor physical activity level				Mobile application to control the diet			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Less than once per month	**0.01**	2.43 (1.22-4.84)	**0.03**	2.26 (1.08-4.72)	0.09	1.91 (0.92-3.97)	0.1	1.96 (0.88-4.34)
Never		Reference		Reference		Reference		Reference
Having gym/fitness club passes								
Yes	**<0.001**	3.34 (2.20-5.07)	0.05	1.60 (0.99-2.58)	**<0.001**	3.77 (2.44-5.83)	**0.01**	1.94 (1.16-3.23)
No		Reference		Reference		Reference		Reference
Participation in organized/ group sports activities								
Yes	**<0.001**	2.79 (1.82-4.30)	**0.03**	1.70 (1.04-2.76)	**<0.001**	3.60 (2.31-5.60)	**0.002**	2.29 (1.36-3.87)
No		Reference		Reference		Reference		Reference

Discussion

This is the first nationally representative survey on the use of mobile apps and wearables among adults in Poland. In the past 12 months, almost one-quarter of respondents used wearables, and more than one-tenth used mobile apps to monitor diet or physical activity. Out of 19 different socioeconomic and lifestyle factors analyzed in this study, younger age, following a diet, regular physical activity, and participation in organized sports activities were significantly associated with the use of mobile apps and wearables. The lack of significant differences in the use of mobile apps and wearables by socioeconomic factors suggest that mHealth technologies are easily accessible and have a high potential for implementation for health management purposes.

The global prevalence of obesity has increased rapidly in the past decades, reaching pandemic levels [31]. The prevalence of diseases linked to obesity, such as cardiovascular diseases, type 2 diabetes, and cancer is also increasing [31]. Due to a high burden of lifestyle-related NCDs, effective interventions aimed to promote physical activity and healthy eating are a major public health challenge. Mobile health technologies, especially mobile applications (mobile apps) are considered easily accessible technologies that can significantly contribute to improvement of health status of the population [32]. Findings from several systematic reviews showed that mobile phone app-based interventions may be useful tools for weight control and loss [33-35]. Findings from this study showed that over one-tenth of adults in Poland used mobile apps to control diet (13.3%) or physical activity (16.3%). As the mHealth technology is relatively new, the percentage of adults in Poland who used mobile apps for health purposes seems to be high and has potential for further growth. As this is the first study to assess the prevalence of use of mobile apps for health purposes, comparison with other national studies from Poland is impossible due to limited data.

Out of 19 different socioeconomic and lifestyle factors analyzed in this study, there was no significant impact of economic status, educational level, or occupational status on the public attitudes towards the use of mobile apps, which shows the lack of socioeconomic barriers to accessing mobile apps. Numerous mobile apps are widely available and free of charge (often as a part of the smartphone's basic software) for smartphone users [19,20]. The lack of socioeconomic barriers to accessing mobile apps confirms its high potential to provide evidence-based public health interventions to different social groups. Moreover, the mHealth technology has potential for the implementation of personalized communication, which is crucial to improving the effectiveness of public health interventions [36]. However, the scientific credibility of mobile apps is one of the crucial barriers to the widespread implementation of mHealth technology in healthcare. Findings from studies on the agreement of popular nutrition-related apps with the national food-based dietary guidelines in Poland showed markable gaps in calculating energy and macronutrient intake [37]. Standardization of mobile apps and scientific verification of

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Table 4. Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity (n=1070).

Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity								
Variable	A band or a watch to monitor physical activity				Smart bathroom scale			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Gender								
Female	0.6	1.09 (0.82-1.44)			0.5	0.88 (0.63-1.25)		
Male		Reference				Reference		
Age (years)								
18-29	**<0.001**	3.27 (2.06-5.18)	**<0.001**	2.60 (1.53-4.39)	0.5	1.17 (0.70-1.95)		
30-39	**<0.001**	2.45 (1.52-3.96)	0.07	1.72 (0.96-3.07)	0.3	1.32 (0.79-2.20)		
40-49	**0.01**	1.90 (1.14-3.17)	0.2	1.44 (0.78-2.67)	0.7	0.90 (0.50-1.60)		
50-59	**0.01**	1.92 (1.16-3.18)	0.06	1.73 (0.98-3.06)	0.8	1.08 (0.62-1.87)		
60+		Reference		Reference		Reference		
Educational level								
Primary		Reference				Reference		
Vocational	0.5	1.61 (0.44-5.93)			0.3	0.49 (0.12-2.05)		
Secondary	0.2	2.19 (0.64-7.46)			0.6	1.35 (0.39-4.65)		
Higher	0.2	2.23 (0.65-7.61)			0.8	1.18 (0.34-4.07)		
Marital status								
Single		Reference			0.3	1.42 (0.72-2.83)		
Married	0.6	1.12 (0.66-1.88)			0.2	1.46 (0.78-2.72)		
Informal relationship	0.1	1.44 (0.91-2.28)			0.05	1.98 (0.99-3.94)		
Divorced/widowed	0.7	1.12 (0.66-1.88)				Reference		
Having children								
Yes	0.6	0.92 (0.68-1.23)			0.5	0.90 (0.63-1.27)		
No		Reference				Reference		
Number of household members								
Living alone	**0.04**	Reference		Reference	0.8	0.93 (0.56-1.54)		

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Table 4 continued. Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity (n=1070).

Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity								
Variable	A band or a watch to monitor physical activity				Smart bathroom scale			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Living with at least one person		1.64 (1.03-2.61)	0.7	1.11 (0.67-1.85)		Reference		
Children under 18 years in home								
Yes	**<0.001**	1.67 (1.25-2.23)	0.05	1.41 (1.00-1.99)	0.8	1.05 (0.74-1.50)		
No		Reference		Reference		Reference		
Place of residence								
Rural	0.2	1.37 (0.84-2.22)			0.9	1.03 (0.59-1.80)		
City below 20,000 residents	0.2	1.40 (0.79-2.50)			0.9	1.06 (0.54-2.08)		
City from 20,000 to 99,999 residents	0.1	1.52 (0.91-2.53)			0.8	1.10 (0.60-2.00)		
City from 100,000 to 499,999 residents	0.2	1.45 (0.86-2.45)			0.5	1.26 (0.69-2.30)		
City above 500,000 residents		Reference				Reference		
Occupational status								
Active	**<0.001**	1.83 (1.34-2.50)	0.3	1.22 (0.83-1.79)	0.5	1.15 (0.80-1.64)		
Passive		Reference		Reference		Reference		
Self-reported economic status								
Rather good, good or very good	**0.002**	1.87 (1.25-2.80)	**0.03**	1.65 (1.07-2.54)	0.7	0.91 (0.58-1.42)		
Moderate/difficult to tell	0.2	1.29 (0.86-1.95)	0.3	1.26 (0.82-1.95)	0.5	0.86 (0.55-1.34)		
Rather bad, bad or very good		Reference		Reference		Reference		
Presence of chronic diseases								
Yes	0.7	0.95 (0.71-1.26)			**0.04**	1.43 (1.02-2.02)	0.09	1.38 (0.95-2.01)
No		Reference				Reference		Reference
Self-reported health status								
Rather good, good or very good	0.9	0.99 (0.60-1.64)			0.3	0.74 (0.42-1.32)		
Moderate/difficult to tell	0.4	0.81 (0.49-1.35)			0.2	0.67 (0.38-1.18)		

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Table 4 continued. Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity (n=1070).

Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity								
Variable	A band or a watch to monitor physical activity				Smart bathroom scale			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Rather bad, bad or very good		Reference				Reference		
Having diet								
Yes	**0.004**	1.55 (1.15-2.10)	0.1	1.29 (0.92-1.82)	**<0.001**	2.03 (1.43-2.89)	0.2	1.26 (0.86-1.86)
No		Reference		Reference		Reference		Reference
Regular weight control								
Yes	**<0.001**	1.83 (1.36-2.48)	**0.01**	1.54 (1.10-2.16)	**<0.001**	4.35 (2.78-6.81)	**<0.001**	3.15 (1.96-5.06)
No		Reference		Reference		Reference		Reference
Physical activity								
Everyday	**<0.001**	3.43 (1.98-5.93)	**0.006**	2.28 (1.27-4.09)	**<0.001**	5.95 (2.79-12.68)	**<0.001**	3.91 (1.77-8.66)
3-4 Times per week	**<0.001**	3.17 (1.84-5.45)	**0.03**	1.90 (1.05-3.42)	**<0.001**	5.99 (2.83-12.67)	**<0.001**	4.17 (1.88-9.29)
1-2 Times per week	**<0.001**	2.59 (1.51-4.44)	0.2	1.50 (0.84-2.69)	**0.002**	3.43 (1.59-7.39)	0.06	2.20 (0.98-4.96)
2-3 Times per month	**0.007**	2.44 (1.28-4.65)	0.2	1.57 (0.79-3.09)	**0.01**	3.20 (1.32-7.76)	0.07	2.40 (0.95-6.06)
Once per month	**0.04**	2.41 (1.05-5.56)	0.3	1.66 (0.69-3.96)	**0.03**	3.39 (1.14-10.09)	0.1	2.37 (0.76-7.38)
Less than once per month	**0.01**	2.20 (1.21-3.99)	0.05	1.83 (0.99-3.39)	0.1	2.09 (0.87-5.03)	0.1	2.04 (0.83-5.02)
Never		Reference		Reference		Reference		Reference
Tobacco use								
Daily smoker	0.7	1.06 (0.76-1.49)	0.3	1.24 (0.86-1.79)	0.9	1.03 (0.68-1.54)		
Occassional smoker	**0.02**	1.81 (1.12-2.92)	0.2	1.38 (0.82-2.33)	0.6	1.18 (0.64-2.17)		
Non-smokers		Reference		Reference		Reference		
Alcohol consumption								
Everyday	0.09	1.91 (0.91-4.02)	0.3	1.56 (0.70-3.47)	**0.005**	3.24 (1.42-7.39)	**0.007**	3.40 (1.41-8.24)
3-4 Times per week	0.2	1.48 (0.80-2.74)	0.7	1.11 (0.58-2.15)	0.4	1.38 (0.64-2.99)	0.6	1.28 (0.57-2.88)
1-2 Times per week	**0.03**	1.77 (1.06-2.95)	0.3	1.32 (0.76-2.29)	0.08	1.77 (0.94-3.35)	0.3	1.48 (0.75-2.91)
2-3 Times per month	**0.01**	1.96 (1.15-3.32)	0.07	1.68 (0.96-2.96)	**0.04**	1.97 (1.02-3.78)	0.1	1.74 (0.87-3.47)

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Table 4 continued. Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity (n=1070).

Factors associated with the use of wearables and Internet of Things technology to control diet, weight, and physical activity								
Variable	A band or a watch to monitor physical activity				Smart bathroom scale			
	Simple logistic regression		Multivariable logistic regression		Simple logistic regression		Multivariable logistic regression	
	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)
Once per month	0.3	1.38 (0.75-2.55)	0.6	1.18 (0.62-2.26)	**0.04**	2.09 (1.03-4.26)	0.07	2.01 (0.95-4.26)
Less than once per month	0.3	1.33 (0.78-2.28)	0.4	1.26 (0.72-2.22)	0.8	1.08 (0.54-2.15)	0.9	0.96 (0.47-1.98)
Never		Reference		Reference		Reference		Reference
Having gym/fitness club passes								
Yes	**<0.001**	2.40 (1.61-3.57)	0.1	1.41 (0.91-2.19)	**<0.001**	2.47 (1.58-3.86)	0.07	1.58 (0.97-2.58)
No		Reference		Reference		Reference		Reference
Participation in organized/ group sports activities								
Yes	**<0.001**	2.45 (1.64-3.66)	**0.01**	1.79 (1.15-2.80)	**0.002**	2.09 (1.31-3.33)	0.3	**1.28 (0.77-2.13)**
No		Reference		Reference		Reference		Reference

their content is crucial to increasing the use of mobile apps in healthcare settings.

In addition to the lifestyle mobile apps and wearables, there is a dedicated group of mHealth technologies targeted at patients with chronic diseases [23,38,39]. Findings from the systematic review on the use of mobile apps for the improvement of diabetic care showed that the use of mobile apps eases the management of the lifestyle of diabetic patients (including diet and physical activity) and improves short-term glycemic control [38]. Moreover, findings from the systematic review of 16 randomized control trials on the use of mobile apps in the management of cardiovascular diseases showed that this technology has an acceptable degree of usability and tended to increase medication adherence among patients with cardiovascular diseases [39]. In this study, there were no significant differences in the use of mobile apps and wearables by health status. Further actions are needed to promote the use of mobile apps and wearables among patients with chronic diseases.

Findings from this study showed that wearables such as bands or watches with sensors were the most common mHealth technologies used by adults in Poland. Similarly, as in the case of mobile apps, younger adults were more likely to use wearables. Age is an important barrier to accessing mHealth technologies. Cognition, motivation, physical ability, and perception were identified as the major categories of aging barriers influencing the usability of mHealth technologies [40]. In this study, good financial status was significantly associated with higher odds of using wearables. Contrary to mobile apps, wearables must be purchased. However, the variety of products and their price makes these products more and more available.

In this study, lifestyle factors such as following a diet, regular weight control, regular physical activity, the use of sports services such as gym passes, and group training were the most important factors associated with use of mobile apps and wearables. This finding suggests that mobile apps and wearables are currently used as lifestyle devices that facilitate monitoring of diet, weight, and physical activity, rather than as medical devices to manage health conditions. Further educational, organizational, and legal activities are needed to promote the development of mHealth technologies.

This study has practical implications for healthcare professionals and public authorities in Poland. Our study provides data on public attitudes on the use of mobile apps and wearables to monitor diet, weight, and physical activity. Findings from this study may be used by policymakers to improve mHealth services in Poland. The lack of differences in the use of mobile apps and wearables by health status suggests that there is a need to educate physicians and patients on the potential benefits of use of mHealth for chronic disease management. Moreover, this study revealed barriers to the use of mHealth

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services by age. In the face of an aging society, the elderly should be encouraged to use mHealth solutions. The available technologies are often tailored to the needs of seniors and their mHealth literacy level.

This study has several limitations. The study questionnaire was self-prepared and limited to the 4 most common mobile health technologies. The mHealth market is still developing, so the number of mHealth technologies is constantly increasing. Moreover, data on the products/brands were not collected. Questions on the frequency of use of mHealth solutions were also not included. This study was carried out on a representative sample of adults in Poland. Further research on mHealth technology use in subgroups of patients with chronic diseases is needed to assess the implementation of mHealth in the management of NCDs.

Conclusions

This study produced data on the use of mobile apps and wearables among adults in Poland. One-quarter of adults in Poland regularly used wearables and over one-tenth used mobile apps to monitor diet or physical activity. Significant age-related barriers to accessing mHealth technology were observed. The use of mobile apps and wearables depend on lifestyle factors such as diet, regular weight control, and physical activity. A lack of socioeconomic barriers to accessing mobile apps and wearables presented in this study suggests that mHealth technology can be used to promote a healthy lifestyle in different socioeconomic groups and can reduce health inequalities.

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