Smartphone Applications and Wearables for Health Parameters in Young Adulthood: A Cross-Sectional Study with Public Involvement

Gaia Leuzzi, Mirko Job, Aldo Scafoglieri, Marco Testa

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Abstract

Background: Fostering innovative and more effective interventions to support active ageing strategies since youth is crucial to help this population adopt healthier lifestyles using technologies they are already familiar with. mHealth, especially apps and wearables, are promising tools for this aspect due to their versatility and ease of use.

Objective: The aim is to investigate if young adults (18-26 years old) use apps or wearables to monitor or improve their health variables (i.e., physical activity, diet and mental health), and how, also assessing most used apps and wearables. Finally, the importance of many characteristics and functions of apps and wearables will be evaluated.

Methods: This cross-sectional study used a public involvement framework and an anonymous web survey, created and disseminated on the Italian territory for 3 months. It was made of 5 sections: I) demographics, II) mobile apps and wearable devices for physical activity and sports, III) mobile apps and wearable devices for diet, IV) mobile apps and wearable devices for mental health, V) preferences about mobile apps and wearable devices.

Results: A total of 693 questionnaires were analysed and the sample presented an equal gender distribution (females: 52,4%). Participants using an app or a wearable for physical activity were 46,2%, while for diet and mental health were respectively 8,6% and 22,5%. Moreover, the frequency of use of these technologies was on a daily base, more prevalent for wearables. Apps and wearables characteristics identified as most important were user-friendliness, having all the contents for free, loading speed and icon clarity.

Conclusions: Apps and wearables, especially for physical activity, might be addressed as kick-off interventions for young adults to expand their interest in other health variables, such as diet and mental health. Moreover, further studies should deepen the factors behind the use and the motivation of young adults in adopting mobile apps and wearables, exploring possible barriers and facilitators.

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Abstract (307/350)

Background

Fostering innovative and more effective interventions to support active ageing strategies since youth is crucial to help this population adopt healthier lifestyles using technologies they are already familiar with. mHealth, especially apps and wearables, are promising tools for this aspect due to their versatility and ease of use. The aim is to investigate if young adults (18-26 years old) use apps or wearables to monitor or improve their health variables (i.e., physical activity, diet and mental health), and how, also assessing most used apps and wearables. Finally, the importance of many characteristics and functions of apps and wearables will be evaluated.

Methods

This cross-sectional study used a public involvement framework and an anonymous web survey, created and disseminated on the Italian territory for 3 months. It was made of 5 sections: I) demographics, II) mobile apps and wearable devices for physical activity and sports, III) mobile apps and wearable devices for diet, IV) mobile apps and wearable devices for mental health, V) preferences about mobile apps and wearable devices.

Results

A total of 693 questionnaires were analysed and the sample presented an equal gender distribution (females: 52,4%). Participants using an app or a wearable for physical activity were 46,2%, while for diet and mental health were respectively 8,6% and 22,5%. Moreover, the frequency of use of these technologies was on a daily base, more prevalent for wearables. Apps and wearables characteristics identified as most important were user-friendliness, having all the contents for free, loading speed and icon clarity.

Conclusions

Apps and wearables, especially for physical activity, might be addressed as kick-off interventions for young adults to expand their interest in other health variables, such as diet and mental health. Moreover, further studies should deepen the factors behind the use and the motivation of young adults in adopting mobile apps and wearables, exploring possible barriers and facilitators.

Keywords: Exercise, Mobile Applications, Diet, Mental Health, Young Adults, Health.

Introduction

Promoting healthy ageing, also defined as "active ageing"[1], is an effective way to prevent an excessive burden on medical systems in the forthcoming years[2], while concurrently improving individual and collective health variables[3]. This health promotion strategy requires both theoretical and practical interventions to teach people, starting from their youth, about health-related aspects and how to monitor and enhance them through a virtuous and sustainable lifestyle [4]. The successful implementation of this slow and consistent intervention hinges on the necessity for reaching a large population in real-time. In the last decades, mHealth[5,6] interventions have been employed for this purpose, providing both general and personalized information, indications and help in decision-making and behaviour change. In this context, mobile applications (apps) designed for smartphones emerge as one of the most popular and widely used solutions[7], among both young people and adults. This type of technology offers numerous advantages, being able to collect several types of data continuously by exploiting the built-in sensors embedded in smartphones. Furthermore, mobile apps are very versatile and can be implemented in different scenarios with various purposes[8,9]. Given the fast evolution of this technology, it is crucial to have a clear picture related to its use and its efficacy for ensuring a continuous improvement towards effective, sustainable and useful mHealth applications. In this context, to promote an effective and lasting change aimed at promoting active ageing, these applications should specifically target young adults[10] and adapt to their needs. The goal is to educate young adults (18 to 26 years old)[11] about the importance of a healthy lifestyle so that they can then maintain it over time, using familiar tools[12]. To achieve this, it is necessary to comprehend the modalities to which apps and wearables for health are used by this specific population.

Additionally, it is essential to learn about the most and the least appreciated features of these apps and wearables, and which functions are used to monitor health variables. This information is crucial for developing a preventive and educational intervention[13] that assists young people in monitoring and improving their health [14–16], well-being, and quality of life, through a familiar technology that adapts to their needs and expectations.

Therefore, this study aims to:

(i) understand if and how young adults use mobile apps and wearable devices to monitor and improve their health variables (i.e., physical activity, diet and mental health);

(ii) assess the most used mobile apps and wearables in terms of brands, and the most monitored variables both via apps and wearables;

(iii) evaluate the most important functions and characteristics of mobile apps and wearable for health-variables based on young adults' opinion.

Material and methods

Study Design

This work consists of a cross-sectional study performed via anonymous web-survey distributed on the Italian territory. The ethical approval was guaranteed by the Ethical Committee of University Research of the University of Genoa (CERA: University Ethical Committee for Research - CERA2023.24, date of approval April 27, 2023). The anonymous web-survey was created according to the International Handbook of Survey Methodology[17] and the Declaration of Helsinki[18], and its distribution was performed via Microsoft Forms (Suite Office 365) that guarantees safety and ease of data collection, as well as anonymity in compliance with the GDPR[19] policies. Before accessing the web-survey, each participant was presented the informative note of the study and the data treatment.

Participation in the study was completely voluntary and the filling in of the web survey could be interrupted for any reason at any time, without the need to explain it. In this case, data would not be saved. The reporting of this manuscript follows the STROBE guidelines (Strengthening the

Reporting of Observational Studies in Epidemiology)[20]. In each phase of the research, a habitual mobile app user was involved to ensure the "public involvement", as discussed below.

Web-survey

The web survey was created by a panel of 5 professionals working in different fields such as sports science and health, psychology, engineering, physiotherapy, and a habitual mobile app user attending a master's in communication sciences. Already existing questionnaires were consulted to search for relevant questions, but they were considered not suitable for this specific research. Consequently, a preliminary draft of the web survey was developed for evaluation and subsequent validation. The web survey was divided into 5 sections: 1) demographic, 2) mobile apps and wearable devices for physical activity and sport, 3) mobile apps and wearable devices for food and diet, 4) mobile apps and wearable devices for mental health, 5) preferences about mobile apps and wearable devices. Once the web survey was imported into Microsoft Forms, the questions were organized with ramifications to let the participants skip the sections about unused mobile apps or wearable devices, enabling a faster and smarter filling of the questionnaire. Following the completion of the demographics, subsequent sections were characterized by an initial yes-or-no question, providing participants with the option to either skip that specific part or proceed to fill it in. The estimated total compilation time was about 5 minutes.

The web-survey was validated[21] by 10 potential participants that use mobile apps to monitor their physical activity, diet or mental health. Specifically, each participant had a face-to-face meeting or a videocall with the same professional who explained the research aims, provided documents about both informative note and informed consent, and once the consent was received the web-survey filling in started. Afterwards, questions about the characteristics of the web-survey were asked and every participant's note or suggestion was registered. Suggestions and opinions received were further discussed by the panel of experts to elaborate a final version of the web survey.

Public-involvement

Our work employed the "study-focused" public-involvement framework [22], considering the point of view of the target population across all the phases of the study[20]. The selected representative of the target population was: I) a young female student aged 23; II) enrolled in the first year of the master's degree program in Communication Science, III) actively engaged with a mobile app for physical activity and possessing previous experience in using a mobile app for diet.

The public representative actively participated in formulating the research question and played a crucial role in creating, validating, and distributing the web survey. After the data collection period, she was further involved in the data analysis and the overall interpretation of the results. This part was fundamental to better understanding the needs of the target population and to maximize the results collected. Moreover, the public representative took part in the writing and review process of the final draft of this paper.

Participants

Participants were considered eligible to partake in the study if they were young adults (i.e., 18-26 years old) using at least one mobile app or wearable device for physical activity, diet or mental health and could read and understand the informative note and the web survey. No other limitations were set for the population as well as for the type of app or wearable device used.

Setting

The web survey was distributed via Microsoft Forms (Suite Office 365) in July and from September to October 2023. Potential participants were reached through different modalities, including face-to-face, digital and printed invitations. Social media platforms (e.g., Facebook, Instagram, WhatsApp), emails, university mailing lists, and other modalities of contact were used to send invitations to fill in

the web survey.

Statistical analysis

Sociodemographic data were analysed via descriptive statistics, also indicating a percentage, while continuous variables were presented as mean values ± standard deviations (SD). Binomial logistic regressions analyses were performed to detect gender and level of education influence on the use of apps and wearables. The last section of the questionnaire was analysed using different methods. The first method involved a consensus that was considered reached for each statement when present 2 conditions[23]: 1) the 51% of participants responding to the category "quite important" and "very important", 2) median over 2,5. In our case, considering the interquartile ranges and if the median is over 2,5 it can be assumed that at least 75% of the responses relies in the neutral or positive category (i.e., 2, 3 and 4). The second method included the calculus of a ratio value between positive and negative answers collected. Moreover, a descriptive evaluation of results obtained from the Likert-type scale was adopted.

For evaluating the main variables monitored through mobile apps and wearable, they were divided into each specific area of interest (i.e.., physical activity, diet and mental health) and aggregated into categories based on their similarities. PA-related variables were divided into "physical activity metrics" (i.e., daily steps, distance covered, daily activity, training, number of weekly trainings, calorie consumption, elevation, speed step/km) and "physiological parameters" (i.e., heart rate, weight, oxygen saturation, sleep, stress, rest, body composition, menstrual cycle monitoring, respiratory frequency). Diet parameters were grouped into "nutritional metrics" (i.e., calorie consumption, macro-nutrients count, water) and "body metrics" (i.e., weight, body composition). Finally, mental health parameters were categorised as "sleep", "mental well-being" (i.e., stress, mood, emotions management) and "mindfulness and meditation practices" (i.e., breathing, meditation, mindfulness). Additionally, the motivation behind the use of these mobile apps and wearables was presented, splitting results between the two types of mHealth.

The last section of the questionnaire investigated mobile app and wearables preferences and the results of each question were graphically reported. Participants had to define a level of agreement for each statement on a 5-point Likert-type scale. The possible answers were: 0) "not important at all", 1) "unimportant", 2) "neutral", 3) "quite important", 4) "very important") and the results have been aggregated to three levels of agreement, namely negative (i.e., 0 and 1), neutral (i.e., 2) and positive (i.e., 3 and 4). Moreover, an analysis of interquartile ranges was performed and medians and distribution of responses were reported.

Bias

Young adults, with different levels of education, were contacted to reduce any possible selection bias. Therefore, to better describe the target population, invitations were disseminated across the whole Italian territory without restrictions and with the intent to reach participants with diverse characteristics such as age, gender, occupation, and level of education. Other universities and many secondary high schools were also contacted to expand the number of responses.

Results

A total of 821 responses were received, and after applying the inclusion and exclusion criteria, a final sample of 693 questionnaires was analysed. Specifically, 42 questionnaires were excluded for not accepting the data treatment, 83 did not meet the age range for the study (i.e., 18-26) and 3 more questionnaires were excluded due to unusable data. Demographic data of the sample are shown in Table 1.

Table 1 - Demographic characteristics of the sample

Participants (n)	693
Age (years ± SD)	21,2 ± 2,5
Gender (n, (%))	
• Female	363 (52,4%)
• Male	329 (47,5%)
• Non-binary	1 (0,1%)
BMI (Kg/m^2)	22,3 ± 3,03
Last educational degree (n (%))	
• Secondary school diploma	95 (13,7%)
• High school diploma	414 (59,7%)
• Higher education	184 (26,5%)
Not using any mobile app	317 (45,7%)
Physical Activity (n (%))	
1 app	106 (73,6)
2 or more apps	38 (26,4)
Diet (n (%))	
1 app	45 (86,5)
2 or more apps	7 (13,5)
Mental Health (n (%))	
1 app	37 (82,2)
2 or more apps	8 (17,8)

***Legend**: N, numbers; SD, standard deviation**;** BMI, Body Mass Index.*

Data regarding the use of mobile apps or wearables for physical activity, diet or mental health variables are reported in Table 2.

Table 2 – Total number and percentage of participants using Mobile apps or Wearables for Physical Activity, Diet and Mental Health

N=693	**Yes (%)**	**No (%)**	**Eliminated* (%)**
Physical activity	320 (46,2%)	338 (48,7%)	35 (5,1%)
App and wearable	56	NA	
Only app	88	NA	
Only wearable	176	NA	
Diet	60 (8,6%)	622 (89,8%)	11 (1,6%)
App and wearable	15	NA	
Only app	37	NA	
Only wearable	8	NA	
Mental health	156 (22,5%)	524 (75,6%)	13 (1,9%)
App and wearable	19	NA	
Only app	26	NA	
Only wearable	111	NA	

***Legend:** NA, not available; Eliminated*, data eliminated from each section due to conflictual answers given by participants in that section.*

Table 3 ranks and details the most used mobile apps and wearables by brand and further divide them into each sphere of interest (i.e., physical activity, diet and mental health).

Table 3 – Ranking of the most used mobile apps and wearables by brand

	Physical Activity (N = 320)		Diet (N = 60)		Mental Health (N = 156)	
	App (N=144)	**Wearable (N =232)**	**App (N = 52)**	**Wearable (N = 23)**	**App (N = 45)**	**Wearable (N = 130)**
1 (N (%))	Apple Health (62 (43,0%)	Apple Watch (81 (35%))	Yazio (15 (28,8%))	Apple (8 (34,8%))	Apple Health (7 (15,5%))	Apple (39 (30%))
2 (N (%))	Samsung Health (25 (17,4%))	Xiaomi (37 (16%))	MyFitnessPal (11 (21,1%)) FatSecret (11 (21,1%))	Xiaomi (7 (30,4%))	Samsung Health (6 (13,3%)) Google Fit (6 (13,3%)) FitBit (6 (13,3%))	Amazfit (35 (27%))
3 (N (%))	WeWard (18 (12,5%))	Amazfit (25 (10,7%)) Garmin (25 (10,7%))	Samsung Health (7 (13,5%))	Samsung (4 (17,6%))	Calm (5 (11,1%))	Samsung (12 (9,2%)) Garmin (12 (9,2%))
4 (N (%))	Google Fit (14 (9,7%))	Samsung (20 (8,6%))	Apple Health (5 (9,61%))	Fitbit (1 (4,3%)) Garmin (1 (4,3%)) Huawei (1 (4,3%)) Redmi (1 (4,3%))	Garmin Connect (4 (8,9%)) Zepp Life (4 (8,9%)) Headspace (4 (8,9%))	Huawei (10 (7,6%))
5 (N (%))	Garmin Connect (11 (7,6%))	Fitbit 12 (5,2%) Huawei 12 (5,2%)	Macros (3 (5,8%)) Melarossa (3 (5,8%))		Flo (3 (6,7%)) Serenity (3 (6,7%))	Fitbit (9 (6,8%))
6 (N (%))	Zepp Life 9 (6,2%)	Honor 5 (2,2%)	Lifesum (2 (3,8%))			Honor (5 (3,8%))
7 (N (%))	Komoot 7 (4,9%)	Polar 4 (1,7%)	Google Fit (1 (1,9%)) Fitdays (1 (1,9%)) Lose it (1 (1,9%))		Daylio (1 (2,2%)) Stoic (1 (2,2%)) Mindshift (1 (2,2%))	Google (1 (0,8%)) Polar (1 (0,8%)) Oura (1 (0,8%)) Real me (1 (0,8%)) Liujo (1 (0,8%)) Suunto (1 (0,8%)) Whoop (1 (0,8%)) Xiaomi (1 (0,8%))
Others*	*1 52 (36,1%)	*2 11 (4,7%)				

Legend: **1, SweatCoin, Strava, Fitbit, iSkiTracker, Pedometer, MyWellness, My workout plan, Huawei health, Hevy, Relive, Pokemon Go, Fitdays, Adidas Running, Nike training, GloryFit, Nike run, et al.; *2, Oppo, Google, Real me, Redmi, Suunto, Liujjo.*

Furthermore, the frequency of use of both mobile apps and wearables was evaluated and is reported in Table 4.

Table 4 – Frequency of use of Mobile Apps and Wearables

	Physical Activity (N (%))		Diet (N (%))		Mental Health (N (%))	
	Mobile App	**Wearable**	**Mobile App**	**Wearable**	**Mobile App**	**Wearable**
N total users	**144**	**232**	**52**	**23**	**45**	**130**
Everyday	53 (36,8%)	148 (63,8%)	31 (59,6%)	16 (69,5%)	16 (35,6%)	91 (70%)
5 or 6 times a week	20 (13,9%)	24 (10,3%)	10 (19,3%)	3 (12,9%)	4 (8,8%)	12 (9,2%)
3 or 4 times a week	31 (21,5%)	27 (11,6%)	2 (3,8%)	2 (8,7%)	8 (17,8%)	10 (7,7%)
1 or 2 times a week	20 (13,9%)	22 (9,6%)	4 (7,7%)	1 (4,3%)	9 (20%)	8 (6,2%)
Less than once a week	20 (13,9%)	11 (4,7%)	5 (9,6%)	1 (4,3%)	8 (17,8%)	9 (6,9%)

Legend: *N, number.*

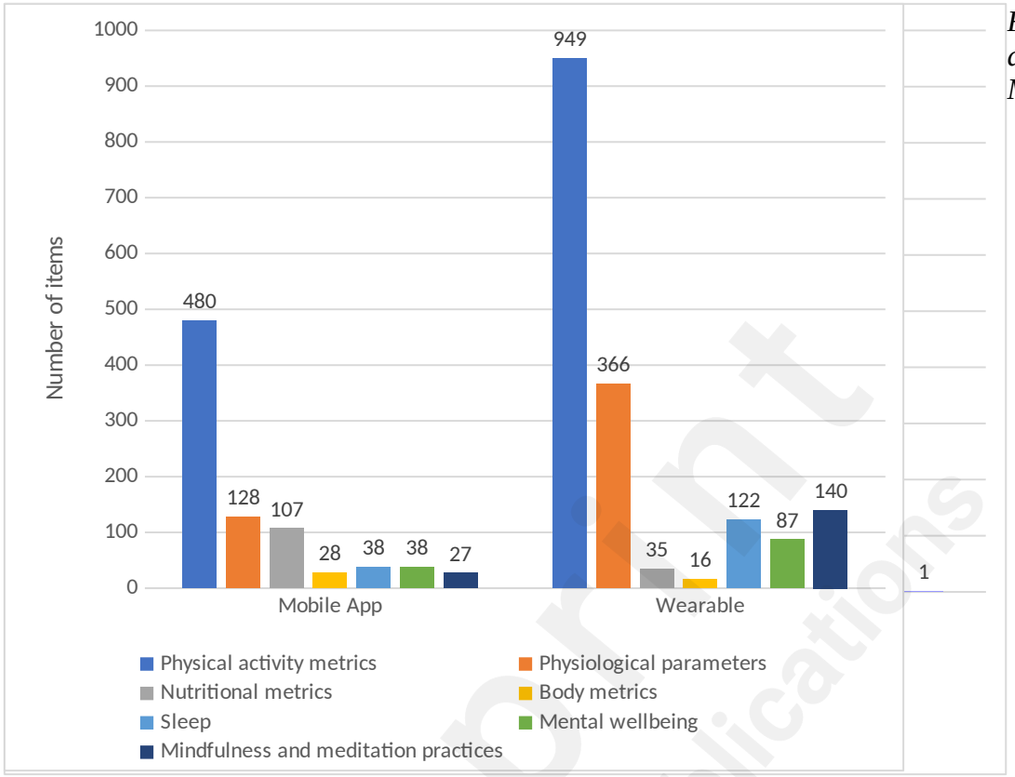


Figure 1 – Numbers of parameters monitored for Physical activity, Diet and Mental Health and Motivation of Use of Mobile Apps and Wearables

The vast majority of the sample did not report the use of premium or paid content (about 96%). Those who did utilise these additional functionalities primarily sought more information on specific aspects such as sleep, rest periods, training, macro- and micro-nutrients, or personalized advice based on their data. Moreover, about 90% of the participants reported not to use community function as well.

Additionally, an analysis of frequency in the distribution of answers based on gender and level of education was conducted. Moreover, on the same parameters, binomial logistic regressions were performed to explore possible connections between the use of apps and wearables with gender and level of education. Starting with gender, the percentage of females that monitor PA is higher than the males (respectively 31,2% and 19,9%), while the percentage of non-users is 27,6% for males and 21,2% for females. A slight difference can also be found for people who do not monitor diet (46,9% for females and 42,9% for males). Regarding mental health, gender differences are found in people who monitor it accounting for 15,2% for females and 9,2% for males. Logistic regressions conducted for gender influence in the monitoring of PA, diet and MH revealed that in each of these spheres, a slight positive correlation exists for males. Specifically, the models account for 2,4% for PA, 1,0% for diet and 1,1% for MH. Considering the level of education, the percentage of frequency for females and males are quite different for each level: I) secondary school diploma (females: 3,3%, males: 10,4%), II) high school diploma (females: 32,9%, males: 26,7%), III) bachelor (females: 14,4%, males: 0,6%), IV) master (females: 1,7%, males: 0,6%). Logistic regression models based on the level of education explain PA the 5,0%, 0,5% for diet, and 2,3% for MH. Considering PA, having a bachelor’s or a master’s degree has a slight negative influence on using apps or wearables, and this is also true for MH, while for diet only the master's degree has a slight negative influence on using mHealth. Finally, none of the above-mentioned differences, neither gender nor level of education ones, were statistically significant.

For reporting the fifth and last part of the questionnaire and considering the analysis that was performed to assess the most important characteristics of mobile apps and wearables, four elements can be identified as important for young adults: I) user-friendliness, II) getting all content for free, III) loading speed and IV) icon clarity. In Figure 2 are reported the aggregated responses for each question based on their level of attributed importance.

Figure 2 – Mobile apps and Wearables function preferences

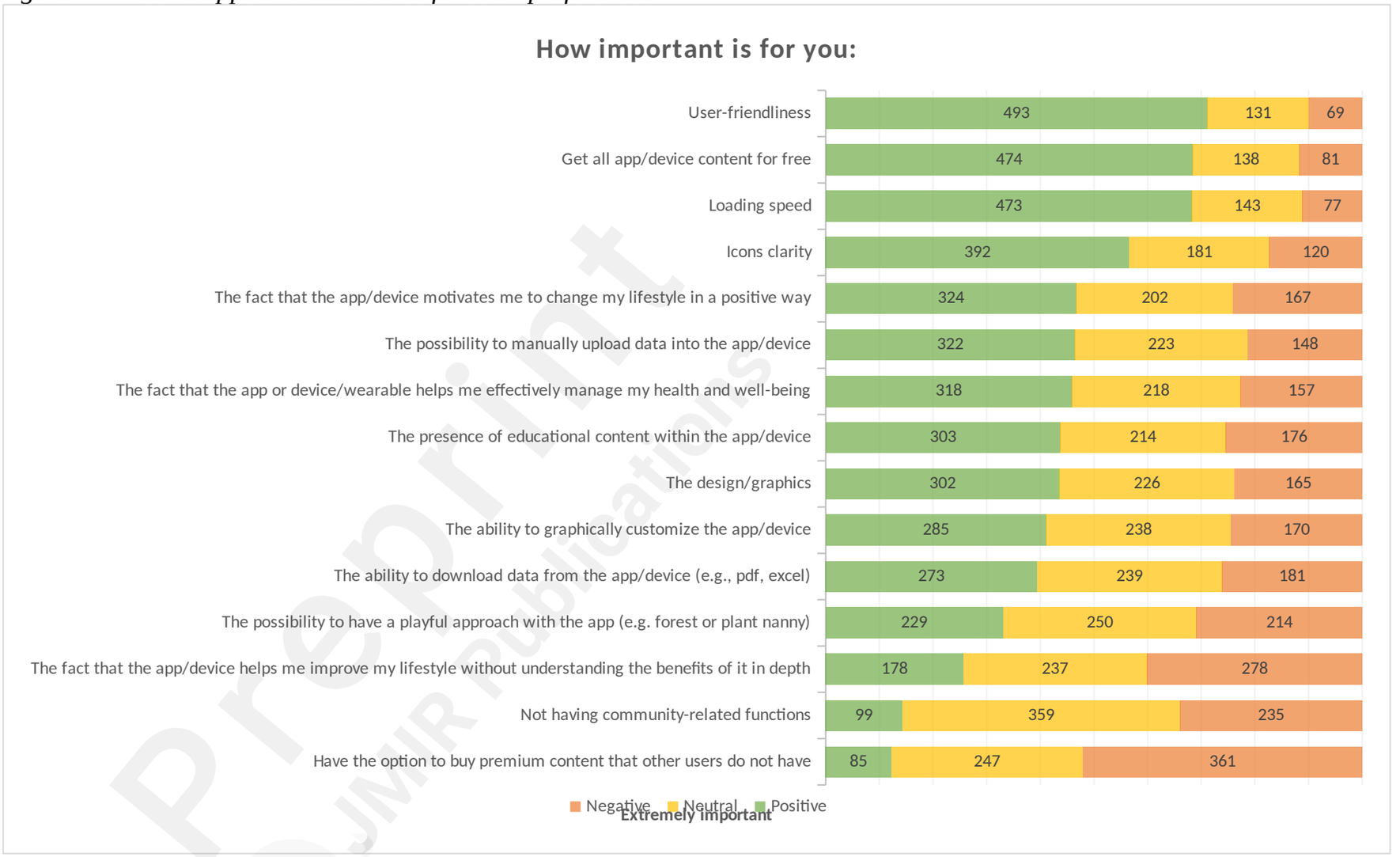
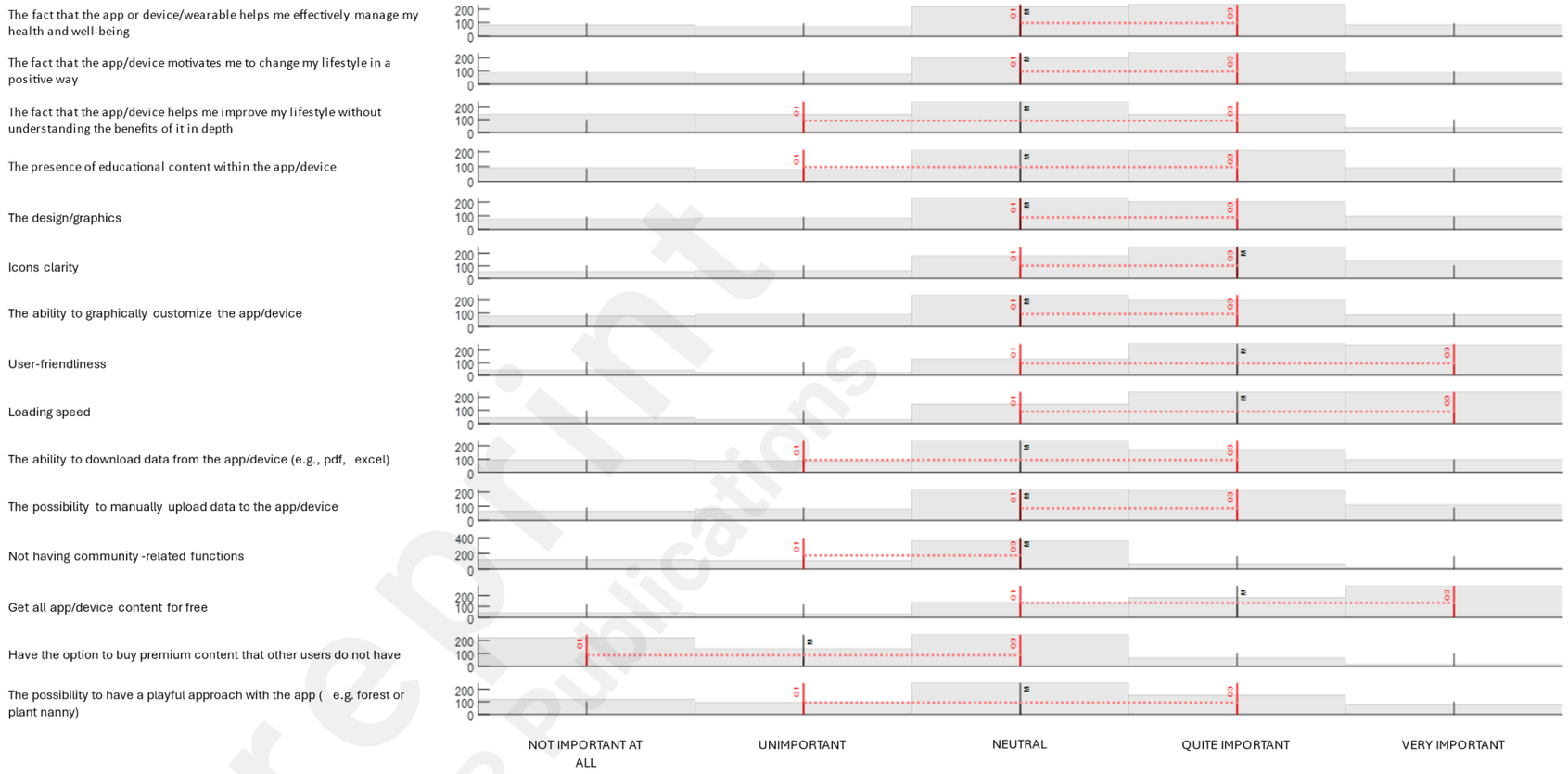


Figure 3 shows the responses distribution considering also IQR and medians. Results are displayed for each of the original 5-point Likert options the participants could choose between.

Figure 3 – Interquartile ranges, medians and distribution of responses



A second method of analysis was used for the last section of the questionnaire and especially for data regarding elements considered important. The analysis included the evaluation of ratio values between positive and negative answers, with and without considering neutral answers, as reported in Table 5.

Table 5 – Ratio values

	Positives/Negatives	
User-friendliness	7,145	3,120
Get all app/device content for free	5,852	2,800
Loading speed	6,143	2,795
Icons clarity	3,267	1,904
The fact that the app/device motivates me to change my lifestyle in a positive way	1,940	1,469
The possibility to manually upload data into the app/device	2,176	1,429
The fact that the app or device/wearable helps me effectively manage my health and well-being	2,025	1,425
The presence of educational content within the app/device	1,722	1,350
The design/graphics	1,830	1,326
The ability to graphically customize the app/device	1,676	1,282
The ability to download data from the app/device (e.g., pdf, excel)	1,508	1,219
The possibility to have a playful approach with the app (e.g. forest or plant nanny)	1,070	1,032
The fact that the app/device helps me improve my lifestyle without understanding the benefits of it in depth	0,640	0,806
Not having community-related functions	0,421	0,771
Have the option to buy premium content that other users do not have	0,235	0,546

$\frac{positives+neutrals}{negatives+neutrals}$

From this analysis, it can be noted that the most confirms the user-friendliness, loading speed, having all the contents for free and the icons clarity as important elements for our sample. Moreover, the possibility to manually upload data and the efficiency of the app or device to effectively help the person manage his/her health might be indicated as important. Taking into account also the neutral responses now, it can be highlighted that the elements with higher ratio values are still user-friendliness, having all contents for free, loading speed and icon clarity. Other ratio values are lower so might not be considered for further investigations.

Discussions

This study comprehensively investigated different aspects of using mobile apps and wearables to track and improve health-related variables among young adults.

Our sample population exhibited a symmetric distribution of males and females, with ages evenly distributed between 18 and 26 years.

While nearly half of the participants (46,2%) reported using mobile apps or wearables to track physical activity-related variables, only a minority of the sample used this technology to monitor diet and mental health (respectively 8,6% and 22,5%). These findings regarding diet are similar to those obtained by Hahn in a study conducted on a comparable population[24]. In the same way, also the reported percentage of use for mental health apps was consistent with previous literature[25,26] except for Borghouts[26], which reported a higher usage rate.

The use of mobile apps and wearables for monitoring physical activity and mental health was more prevalent among females. This trend could be explained by the greater attention that women seem to dedicate towards prevention[27].

In contrast with other studies [28–30] , a very high frequency of use was found among the majority of participants (about 60%), who reported using mobile apps and wearables to measure their health variables on an everyday basis.

While most participants (about 84%) reported using only one mobile app to track their health status,

about 25% of those who monitored their physical activity used two or more apps. This might be related to the specificity of sport-related apps, as not all variables of interest can be adequately addressed by a single tool. Hence, developing novel solutions that integrate all necessary tools to monitor physical activity into a single, more comprehensive app could be beneficial in terms of practicality and overall health management. It is also arguable that the wider adoption of apps for physical activity might be due to their more prevalent presence on the market, supported by the widespread promotion of famous sports brands such as Nike® or Puma®.

The intrinsic characteristics of smartphones and wearable devices enable easy data collection without the necessity of continuous user interaction[31]. Contextually, wearable devices (e.g., smartwatches) offer greater possibilities and precision in providing information for health-related variables[32]. Survey respondents seemed to value these attributes, demonstrating a clear preference for wearables over simple mobile apps for assessing their physical activity and mental health. This evidence did not extend to monitoring diet variables, probably because this particular aspect cannot be automatically tracked via wearables. While smartphones and wearables rely on various sensors to automatically record variables associated with physical activity (such as accelerations, steps, speed, distance covered, and heart rate), information like calorie intake, water consumption, or weight require direct and continuous interaction with the user[33], worsening the frequency and quality of data collection[34,35]**.** In this regard, an exception in the mental health domain is the data provided by sleep and stress-related variables, which can be accurately and automatically acquired through smartwatches (via Heart Rate Variability - HRV)[36]. Nonetheless, further analysis of the ratio of the responses highlighted a positive interest of our population toward the possibility of manually uploading data, which might represent an additional personalisation option of the app or wearable.

Regarding the motivations of use in our population, both apps and wearables were mostly adopted for monitoring health variables, and additionally for receiving personal advice based on individual data collected. These results align with previous literature[31] on young populations[31], which also reported a similar rationale behind the use of technological tools to support their health.

Our findings indicate that physical activity was the most monitored health aspect in the sampled population, with a higher prevalence of usage for wearable devices. Future studies might consider these indications to deliver more targeted interventions tailored to these specific user preferences. Additionally, in our sample, wearables were also used to monitor sleep, mindfulness and meditation practices. The latter is an interesting aspect because in another study[37] a wearable was also used to assess meditation practices but only to identify abrupt movements during meditation, rather than monitor variables such as breathing or heartbeat measurements. Conversely, in our sample participants reported to monitor actual meditation and mindfulness practices.

Concerning the characteristics of mobile apps and wearables, those identified as important by the respondents were I) user-friendliness, II) having all contents available for free, and III) the loading speed of the app/wearable and their contents. These indications might be a key point in the development process of new applications as their technical requirements should be addressed accurately by mHealth developers[38]. Interestingly, these aspects do not consider the specific types of content (i.e., educational, motivational, informative).[38] User-friendliness is also regarded as a crucial factor for the effectiveness of mHealth[39], as it encourages the adoption of such technology among younger people[40]. Having all contents for free was another important aspect identified by our survey. Considering that prices can range based on the single app and market[41], it might be underlined that accessing the app or the specific device features for free could help in reaching a broader population[42,43]. In line with this assumption, almost all participants were not interested in buying premium content. As for the importance of the loading speed, this particular characteristic has been emphasised in previous literature [44–46] as a crucial element for technology acceptance, as users typically spend very little time deciding whether to use an app on their devices [47].

[4744–46]Surprisingly, only half of the sample acknowledges the importance of the presence of educational content within the mHealth[48,49] as well as the importance of the technology aiding the user in understanding the benefits of improving health variables[44]. Similar results were obtained for

the motivational aspect: half of the users regarded it as important that apps or wearables could assist them in improving their health. This might be controversial given the nature of the mHealth investigated and the results obtained in previous studies indicating a positive attitude towards the technology's support role in improving health variables[50,51]. Nonetheless, this evidence is coherent with the obtained responses related to the motivation of use, which underscored a primary use of apps and wearables as tools for monitoring health variables.

Regarding the aesthetics of apps and wearable devices, the overall design and graphical aspects were not considered as significant as the clarity of the icons[52,53]. This particular element has been highlighted as a crucial factor in attracting users [54]towards the use of the technology [54]. Additionally, the possibility to personalise the app or the wearable interface was deemed quite important, in line with existing evidence[52,53,55].

Interestingly, just one-third of the respondents was interested in having a playful approach towards the app functionalities. Implementing "gamification" strategies in mHealth is reported to lead to higher engagement and better results in terms of improvements in health variables[56]. Gamification strategies are also reported to be effective among older adults to improve both their physical and cognitive functions, aiding in their engagement and exercise alongside peers.

While fostering physical and mental well-being through such techniques might be a promising approach, it might be assumed that it does not align with the requirements of our population, as respondents might not need additional strategies to engage with mHealth or to be more motivated in using them. Nonetheless, a deeper analysis of the response ratio underscores the significance of community functions. The latter may represent an equally positive strategy for enhancing challenging behaviours and motivation[57].

Given that mobile apps and wearables appear to be used by young adults for monitoring purposes and with a high frequency of use, they could be implemented as useful tools to be incorporated into strategies for early active ageing [58,59]. This technology could serve as valuable support in monitoring health variables and educating individuals about the importance of improving them. To further ensure the adoption and a more efficient use of mHealth, it would be important to involve young adults in their design and development process[52,60,61]. Finally, guidelines on how to develop effective mHealth should be provided[62].

Limits

Despite this study being the first one conducted in Italy on this population, some limits should be addressed. Focusing the research on a specific age range may limit the generalisability of the results to broader age groups. However, it allows for a more detailed description of the typical behaviours among young adults who utilise mobile apps and wearable devices for physical activity, diet, or mental health. In this study, the investigation encompassed not only commercial mobile applications, but the apps mentioned by participants predominantly belonged to renowned tech brands, and only a limited number of independent apps, devoid of profit motives, were reported. Collecting data through an exclusively digital procedure may have represented a barrier for people with poor digital literacy. However, given the young age of the participants and the nature of the topic under investigation, it was deemed improbable that such barriers would pose a significant hindrance. Finally, it can't be excluded that people who filled in the questionnaire were more interested in the topic investigated and this might have provided distortion in the results obtained.

Future perspectives

Further studies should assess the motivation, expectations, and user experience associated with apps and wearables for health variables, investigating other aspects that young adults might find helpful in these technologies to aid them in improving their health.

Conclusions

This study highlighted that young Italian adults monitor health-related variables via wearable

devices rather than using apps, but they consult both daily. They predominantly monitor physical activity-related variables and less mental health ones, while diet variables are consistently less controlled. Additionally, user-friendliness, having all contents available for free and the loading speed of the app/wearable software and contents were considered the most important features of these technological solutions.

Statements and Declarations

Authors' contributions: GL, MJ and MT performed study conceptualization; GL and MJ performed methodology. GL did investigation and data extraction. GL, MJ and AS conducted the analysis. GL did the writing for the original draft preparation; GL, MJ, AS, and MT did the reviewing and editing. All authors read and approved the final manuscript.

Ethical approval: The ethical approval was guaranteed by the Ethical Committee of University Research of the University of Genoa (CERA: University Ethical Committee for Research - CERA2023.24, date of approval April 27, 2023).

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Supplementary Files

Multimedia Appendixes

Survey.
URL: http://asset.jmir.pub/assets/9a80d329a50b71e0e0d15209a6eaac1e.docx

Table 6 – Use of premium contents and community functions.
URL: http://asset.jmir.pub/assets/ca03e805ca673a41c2a7b2e49cee3241.docx