IMPACT OF MOBILE HEALTH APPS ON STUDENTS' ENGAGEMENT IN DIGITAL HEALTH COMMUNICATION CAMPAIGNS AT HERITAGE POLYTECHNIC, EKET

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Abstract: This study investigated the influence of mobile health apps on students' participation in digital health communication campaigns at Heritage Polytechnic, Eket, using the Technology Acceptance Model (TAM) and the Uses and Gratifications Theory. A cross sectional survey design was employed, targeting National Diploma (ND) and Higher National Diploma (HND) students during the 2024/2025 academic session. The study population was made up of 4,300 male and female students, a sample size of 351 was drawn using Krejcie and Morgan's formula. A multistage sampling procedure was used, involving stratified sampling to represent various faculties and simple random sampling to select participants. A structured questionnaire, focusing on awareness, usage, and engagement with mobile health apps in digital health campaigns was used for data collection. Data were analysed using descriptive statistics like weighted mean scores. The findings showed that students were aware of mobile health apps and acknowledged their role in raising health awareness and promoting preventative behaviours. However, challenges such as limited access to smartphones, high subscription costs, and usability barriers affected students' engagement. While many students agreed that mhealth apps improved their understanding of health issues and encouraged healthier habits, privacy concerns and lack of awareness about reliable apps hindered optimal use. The study concluded that mhealth apps had the potential to enhance students' engagement in digital health campaigns, but accessibility and usability issues needed to be addressed. It recommended making these apps cheaper, easier to use, and widely promoted among students to maximise their impact on health awareness and behaviour.
Keywords: Digital health campaigns; Heritage polytechnic; Technology acceptance model; Uses and gratifications theory; Student engagement; Health communication; Mobile health apps

1 INTRODUCTION

The incorporation of digital technologies into health communication has brought remarkable transformation to how health communication information can be accessed, spread and utilised by anyone worldwide [1]. Among these innovations, the mHealth apps have gained currency as tools to improve health literacy, behaviour change and health care delivery. Mobile health apps are software applications meant for use on smartphones and tablets that are used for supporting health management, tracking, education, and disease prevention. With digital platforms, these apps have changed how health communication works by bridging the gap between health care providers and the users.

The origin of mHealth can be traced to the emergence of mobile phone and text message based health promotion services in developing countries in the early 2000s. In 2007, the mobile apps began to evolve which incorporated features like real time health monitoring and customised health advice. In 2008, the introduction of app marketplaces such as Apple's App Store and Google Play in 2012 allowed developers to spread the word about innovative health solutions all over the world. In Nigeria, the adoption of mobile health apps has grown steadily, driven by increasing smartphone usages and a rising demand for accessible health solutions [2].

Digital health communication campaigns leverage online platforms, for instance, web pages, social media as well as mobile smart phones to promote health awareness, behavioural change as well as public health intervention [3]. However, these campaigns employ multimedia content, interactivity and personalisation to get to a diverse audience. Similar to the global health goals, both infectious disease outbreaks and non-communicable and reproductive health are being addressed in digital health campaigns [4].

The majority of mobile health apps in Nigeria have become popular for the unique roles they play in health care delivery. For example, in 2017, Lifestores Healthcare developed the Lifestores Pharmacy App which seeks to push medication adherence while boosting access to cheaper drugs to patients with chronic conditions and health service providers. MOBicure's 2015 Omomi, similarly, targets maternal and child health awareness by helping pregnant women and nursing mothers. Another example is mDoc Healthcare, which created mDoc in 2016 for chronic disease management and wellness support for people with diabetes and hypertension. In addition, Hello Doctor, which launched in 2018 under the banner of Hello Doctor Nigeria, is dedicated to the health education and teleconsultation, both urban and rural populations. Clafiya

Technologies, developed the Clafiya, which released its product in 2020, is a community based healthcare delivery addressing the needs of underserved rural communities.

Mobile health apps can have functional significance in promoting health communication and outcomes and several researches supports this transformative role. By looking at how apps such as Omomi have been reducing maternal mortality in rural Nigeria through improving antenatal attendance also looked at the effectiveness of digital health campaigns in curbing the spread of COVID-19 in Nigeria, centred around the importance of mobile apps and social media in disseminating important information [5-6].

Okunade K S, et al. studied the adoption of mHealth app by Nigerian youths and concluded that Nigerian students primarily adopt for fitness monitoring [7], diet management and mental health support. However, challenges flagged in the study included low digital literacy and a high cost of data, which can make broader engagement less likely in health campaigns. Along the same line, Muhammad A A, et al. evaluated the effects of mobile apps on public health awareness on tertiary institutions finding that customised apps promote heightened app engagement in health communication initiatives [6].

At Heritage Polytechnic, Eket, various public health challenges still persist; some of which can only be properly addressed with innovative communication strategies. Mobile health apps represent a chance to fill the gaps in the health education, increase the participation in campaigns and promote more healthy lifestyle in students. However, despite the increasing relevance of mHealth technologies, limited research exist on their impact within the Nigerian polytechnic context, particularly as it concerns students' engagement in digital health communication campaigns.

This study seeks to fill this gap by examining the influence of mobile health apps on students' participations in health campaigns at Heritage Polytechnic, Eket. In this work, the interplay between technology adoption, campaign effectiveness, and behavioural outcomes is explored in order to draw implications for educators and health practitioners on how to optimally leverage mobile health technologies for public health applications.

Objectives of the Study

Specifically, this study seeks to:

(1) Assess students' awareness of mobile health apps and their roles in digital health communication campaigns;
(2) Examine students' knowledge of health issues promoted through mobile health apps;
(3) Investigate how students use mobile health apps to adopt healthier practices and behaviours;
(4) Find out the challenges students face in engaging with mobile health apps for digital health campaigns.

2 LITERATURE REVIEW

2.1 Mobile Health (mHealth) Apps: An Overview

Mobile health (mHealth) apps have become vital tools in modern healthcare, utilising modern technology to improve accessibility, efficiency and personalisation in medical care. Mobile health apps are applications on smartphones or other mobile devices that support health related services [8]. These apps cater to diverse needs such as disease management, fitness tracking, mental health support, telemedicine, among others. With features such as real-time tracking, data storage, personalised recommendations, and communication with healthcare professionals seamlessly, these apps are fast becoming indispensable in today's healthcare ecosystem. Apps like MySugr help patients with diabetes manage blood sugar levels, while Teladoc facilitates virtual consultations with board-certified doctors, ensuring continuous healthcare access [9] (Figure 1).

Figure 1 Mobile Health Apps
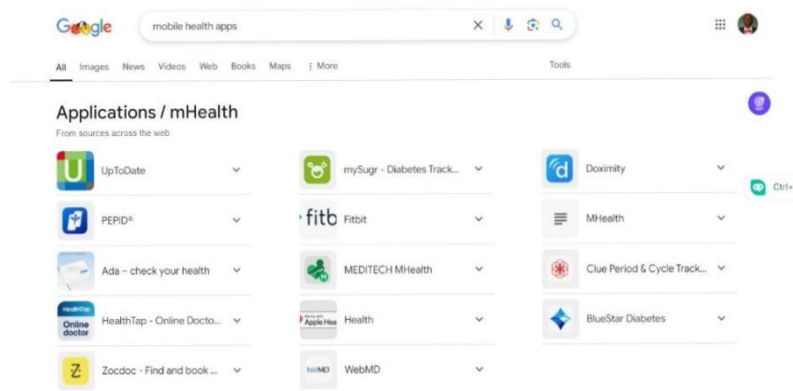
Source: google.com/mobile-health-apps

The evolution of mHealth apps correlate with the advancement in technology, resulting in the shifting healthcare priorities. Early apps were focused narrowly on basic health education and fitness, but they have since expanded. Disease management apps such as MDacne and MySugr provide tailored treatment plans as well as monitoring. Virtual consultations are offered by Telemedicine platforms such as Teladoc, and EyeCare Live; while mental health apps like BetterHelp offer online therapy. Other notable types include Fitness trackers like Fitbit, symptom checkers like Ada Health, and overall decision-support tools like PEPID for clinicians [9]. The multifacetedness of mHealth apps allows them to cater to specific needs, such as menstrual health tracking through Clue or DNA-based nutrition guidance via Generis (Table 1).

Table 1 Some Examples of Mhealth Apps and Their Usefulness

Classification	Mhealth Apps	Rating	Downloads	Usefulness
Health & Fitness Apps	My Health	4.0	100M+	Tracks calories, carbs, and other health metrics.
	MyChart	4.6	10M+	Allows users to schedule appointment s, access test results, and communicate with healthcare providers.
	mHealth	Not specified	1K+	Provides health-related data and secure storage.
	Lefun Health	4.3	10M+	Tracks fitness and health metrics, with Features like heart rate monitoring and Sleep tracking.
	Google Fit	4.4	100M+	Tracks fitness activities, including Walking, running, and cycling.
Mental health & Wellness Apps	Headspace	4.5	10M	Provides guided meditation session for Stress, anxiety, and sleep.
	Calm	4.5	10M+	Offers guided meditation, sleep stories, and relaxing music.
	Moodfit	4.0	5K+	Tracks mood and emotion, providing Personalized recommendations for Improvement.
Nutrition & Diet Apps	MyFitnessPal	4.5	10M	Tracks daily food intake and calorie consumption.
	Lose It	Not specified	1K+	Helps users set and achieve weight loss Goals, with a large database of foods and Exercises.
Telemedicine And Online Consultation App	Teladoc	4.0	1M+	Provides virtual consultations with healthcare professionals.
	Amwell	Not specified	1M	Offers online consultations with doctors And other healthcare professionals.
Women's Health Apps	Clue	Not specified	1M+	Tracks menstrual cycles and provides personalized insights into reproductive health.
	Glow	3.5	4K+	Offers a range of tools for women's health, including fertility tracking and pregnancy support.

Source: Google Play Store, 2024

Mobile health apps integration into educational settings have improved student health engagement and learning. MEDITECH MHealth Apps allow students and healthcare trainees to access patient portals and experience hands on learning. In the same way, PEPID and UpToDate provide evidence based clinical resources that support medical students and professionals when making decisions [10]. Also, fitness and mental health apps like Fitbit and BetterHelp train students in self-care, and contribute to their well-being, thereby encouraging them to stay healthy, and in turn do better in class. mHealth, which provides educational webinars, personalised health plan, and on demand consultation, is a very versatile tool in learning environments [11].

Mobile health apps are transforming the healthcare industry with innovative solutions that solve wide variety of medical and wellness problems. In professional healthcare and educational setting, they have been critical to their ability to personalise care, enhance accessibility, and incorporate technology. These apps are programmed to manage chronic diseases like diabetes with MySugr, allow for improved mental health with BetterHelp, and increase an inclusive Health system. The role of mHealth in education and fitness will only grow as mHealth continues to develop, and with a more informed and health conscious society [12].

2.2 Digital Health Communication Campaign

Digital health communication campaigns have become an invaluable resource for spreading health and wellness among younger groups of people. Defined as structured efforts that rely on digital platforms to provide health messages and encourage healthy behaviours. Digital health campaigns aim to inform, persuade and mobilise audiences towards making healthy choices [13]. To respond to the developing technology and internet penetration, health communication evolved from face to face counselling, mass media to digital platforms [14]. Social media integration, mobile app integration, and mobile SMS based interventions have transformed the traditional health campaigns into something more interactive and accessible [15]. There is an evolution going on which mirrors the growing dependency on digital devices, especially by young people.
The concept of digital health communication campaigns revolves around the strategic use of digital tools to carry out health promotion objectives. Among these objectives are to raise awareness about specific health issues, encourage preventive behaviours and take up health services [16]. For students and young adults, such campaigns use digital platforms to talk about issues like mental health, sexual health, as well as substance abuse. Online health campaigns such as "Headspace" in mental health and "Get Yourself Tested" in sexual health have effectively tailored messages for younger audiences by focusing on their preferred communication channels [14]. To ensure the success of health communication campaigns, the key depends on designing campaigns that are culturally relevant, visually engaging and based in evidence in order to resonate with the target audience and drive behaviour change [8].
In digital health campaigns, strategies that have been utilised include the use of social media platforms, mHealth apps and SMS based interventions. Social media campaigns, such as those on Instagram or TikTok, use influencers, hashtags, and viral content to engage the target audience [14]. Mobile health apps such as 'MyFitnessPal' or 'Calm' allow users to track and educate themselves on a personalised health level, making it easier for users to adopt healthy habits. However, SMS based interventions continue to be effective, particularly for the delivery of reminder and educational content to individuals in low resource settings [11]. Interactive campaigns targeting students or young adults are highly effective, especially when they make use of peer influence [15]. For instance, studies have shown that campaigns using social media lead to significantly increased awareness and participation rates among younger audiences due to their habitual use of these platforms [13].

2.3 Student Engagement with mHealth Apps

The increase in the use of mobile health (mHealth) apps among students has spurred research into the theories that explain their engagement. The most commonly used framework, which has influenced the research and practise in the area of acceptance of technology, is the Technology Acceptance Model (TAM) that considers how perceived ease of use and perceived usefulness determine the users' intention to engage with the technology [17]. Another interesting framework is the Uses and Gratifications Theory (UGT), which examines how people proactively use digital instruments to fulfil particular needs like health tracking or mental wellness [12]. These theories propose that engagement is active with how well the mHealth apps match expectations and goals of students balancing academic work, social life and health issues.
Factors contributing to students' adoption of mHealth apps cover from favourable utilisation and accessibility to perceived and actual benefits. Usability as well as intuitive design and easy navigation needs to be considered because students prefer apps that are time saving and have a smooth user interface [17]. For students in low resource settings, accessibility factor, such as affordability and compatibility is also crucial. Perceived benefits such as better fitness, mental health support, and chronic disease management, for example, significantly dictate how likely people are to keep using mhealth apps [8]. Additionally, apps with personalisation and real time feedback features in them, tend to have a higher level of engagement to students [18].
Engagement with mHealth apps leads to considerable behavioural outcomes, such as increased health awareness, enhanced knowledge, and positive behaviour change. For example, fitness app, such as "Nike Training Club" have been shown to improve physical activity levels in students by providing customised workout plans [17]. Likewise, mental health apps like "Calm" enhance awareness of stress management techniques, contributing to improved well-being. Using such tools is not only helpful for immediate health goals but also support long term behaviours like healthier eating or more consistent exercise routines [19]. Hence, understanding the dynamics of student engagement with mHealth apps informs the development of more effective intervention that promotes holistic health.

2.4 Impact of mHealth Apps on Health Behaviour and Outcomes
Mobile health (mHealth) apps have proven highly effective in transforming the way people get health information, raising health awareness and literacy. These apps give users the power to make their own decisions by providing ready available resources like educational articles, video tutorials, and symptom checkers [20]. For example, applications like "Ada" or "MyFitnessPal" simplify complex health topics into simple and actionable steps so that users can better understand their health conditions, and adopt a healthier lifestyle in the process. Scholz S, et al. have shown that through mHealth apps [21], the health literacy is increased and that it translates better into health seeking behaviour especially among younger, tech savvy individuals.

Gamification, push notifications as well as data tracking are some key features which encourage a user to create and maintain healthy habits. Gamification elements, such as earning rewards or achieving milestones, make health management fun and engaging [22]. Push notifications act as reminders, reminding users to stay consistent with activities like taking prescription drugs or to completing a workout. While users can monitor their progress as real time data is being tracked, they feel more accountable and motivated [23]. For instance, fitness trackers that track steps and caloric intake give users actual proof that they are working toward their health goals, which motivates users to remain dedicated to programmes designed to achieve such goals. These features combined together provide an ecosystem to support sustained behaviour change.

Despite their potential, mobile health apps still face limitations in achieving measurable health benefits. The biggest challenge for mhealth apps is ensuring long term user engagement — often, many users stop using these apps once the initial burst of enthusiasm wears off [12]. Plus, not all users are equally able to access a smartphone and reliable internet resulting in a digital divide that leaves some people behind [24]. Some people are also reluctant to use these apps at all, for privacy reasons related to sensitive health data. Moreover, although the mHealth apps can contribute toward awareness, they lack the capability to alter chronic health conditions or complex behaviours directly and the need for integration with wider healthcare services makes it difficult for mHealth apps to effectively modify a chronic health condition or a complex behaviour [25]. To fully realise the impact of mHealth technology, these limitations need to be addressed.

3 METHODOLOGY

A cross sectional survey research design was used for this study. The rationale of using cross sectional survey in research design was so that the researcher can collect data from a representative sample of the target population at a specific point in time. This allowed for the examination of relationships in variables without the need for long term follow up or repeated measurements.

The target population of this study comprised ND and HND students of Heritage Polytechnic, Eket, during the time of this study in the 2024/ 2025 academic session. This population of subjects was composed of students from diverse academic disciplines and study levels. This selection rationale was because the young adult population is commonly represented by undergraduate students, ranging from late adolescence to early adulthood. This point in life is frequently viewed as a critical 'tipping' point for health promotion and change behaviour projects as it is a transitional time when new behaviours and beliefs can be formed, or institutionalised. The population of this study therefore is, 4, 300 male and female students of Heritage Polytechnic, Eket.

The sample size for this study was determined using Krejcie and Morgan (1970) formular. The required sample size for a population of 4, 300 students is 351.Therefore the sample size for this study was 351 respondents. A multistage sampling technique was used, involving stratified sampling to represent different faculties and simple random sampling to select participants. A structured questionnaire was used to collect data on awareness, usage and engagement with mHealth apps and their engagement in digital health campaigns. Out of 351, 346 copies (98%), were retrieved and found valid from the numbers questionnaire distributed. Descriptive statistics (weighted mean scores) were used to analyse quantitative data from the questionnaire.

4 RESULTS AND DISCUSSION

Table 2 Responses on Students' Awareness of mhealth Apps and Their Roles in Health Campaigns

Statement	SA (4)	A (3)	D (2)	SD (1)	Total	Weighted Mean Score
Students Awareness of mHealth Apps	180	110	30	26	346	3.28
Role of mHealth Apps in Creating Awareness	200	100	25	21	346	3.38
Students' Familiarity with Health Campaigns Using Apps	150	120	50	26	346	3.14
Student Usage of Apps for Accessing Health Information.	120	120	52	54	346	2.89
Promotion of Apps in Digital Health Campaigns	210	90	30	16	346	3.43

Source: survey data, 2024; Keys: SA – Strongly Agree, A – Agree, D – Disagree, SD – Strongly Disagree

The weighted mean score of 3.28 (Statement 1) above indicates the fact that most respondents were aware of the existence of the mobile health apps for health campaigns (Table 2). On role of mobile health apps in creating awareness (Statement 2): shows that with the highest mean score of 3.38, most respondents strongly agreed that mobile health apps have a major role

in enlightening people about health issues. On familiarity with health campaigns using apps (Statement 3): a mean score of 3.14 indicates that most agreed that they had seen or heard about mobile health apps being used for specific health campaigns in at least their institution. About usage of apps for accessing health information (Statement 4): the score of 2.89 shows a mean between agreement and disagreement in terms of the perception about the wide spread use of mobile health apps by students. About promotion of apps in digital health campaigns (Statement 5): the strongest agreement, of 3.43, is for the claim that digital health campaigns loudly promote mobile health apps as means of engagement. In summary, these findings suggest awareness and perceived role of mobile health app usage in health communication is high, but actual app usage among students varies, suggesting opportunities for barriers to adoption or engagement.

Table 3 Responses on Students' Knowledge of Health Issues Promoted Through Mhealth Apps

Statement	SA (4)	A (3)	D (2)	SD (1)	Total	Weighted Mean Score
Adequacy of Information	50	90	140	66	346	2.36
Knowledge of Specific Health Topics	100	180	46	20	346	3.04
Guidance on Preventing Health Issues	90	160	70	26	346	2.91
Improvement in Understanding	110	180	40	16	346	3.11
Relevance and Practicality	95	160	70	21	346	2.95

Source: survey data, 2024; Keys: SA – Strongly Agree, A – Agree, D – Disagree, SD – Strongly Disagree

On statement 1 above (Table 3), the weighted mean score of 2.36 shows that most respondents did not believe that mobile health apps provide adequate information about commonly occurring health issues affecting students. On knowledge of specific health topics (Statement 2): a mean score of 3.04 indicates that most agreed that they know specific health topics such as mental health and sexual health on these apps. On guidance on preventing health issues (Statement 3): A large number of respondents agreed on a mean raw score of 2.91 that mobile health apps provide detailed guidance on how to prevent health issues like malaria or HIV/AIDS. About improvement in understanding (Statement 4): a mean score of 3.11 indicates that the majority of the respondents agreed that their understanding of health issues have improved through the use of mobile health apps. About relevance and practicality (Statement 5): a mean score of 2.95 reveals that many respondents agreed that mobile health apps provide useful, practical and relevant knowledge for students' health needs. In summary, findings indicate that while mhealth apps are recognised for improving knowledge and providing guidance on health topics, concerns remain about the adequacy and depth of information provided for addressing common student health issues (Table 4).

Table 4 Responses on How Students Use Mobile Health Apps to Adopt Healthier Practices

Statement	SA (4)	A (3)	D (2)	SD (1)	Total	Weighted Mean Score
Tracking Health Practices	100	150	70	26	346	2.94
Adoption of Healthier Habits	110	140	70	26	346	2.97
Following Recommendations	90	100	100	56	346	2.65
Encouragement for Preventive Measures	120	150	50	26	346	3.05
Guidance on Managing Conditions	80	100	100	66	346	2.56

Source: survey data, 2024. Keys: SA – Strongly Agree, A – Agree, D – Disagree, SD – Strongly Disagree

Weighted Mean Formula:

$$\text{Weighted Mean} = \frac{(SA \times 4) + (A \times 3) + (D \times 2) + (SD \times 1)}{\text{Total Responses}} \quad (1)$$

Tracking health practices (Statement 1): the weighted mean score of 2.94 showed the majority agreed with using mobile health apps to monitor or track behaviour related to their health, such as diet and exercise. On adoption of healthier habits (Statement 2): most respondents said they have adopted healthier habits such as better nutrition and regular exercise through use of mobile health apps, with a 2.97 score indicating that the majority agreed to this statement. Following

recommendations (Statement 3): the mean score of 2.65 reflects a balanced view, this means that responses were evenly split between agreeing and disagreeing with following app recommendations to improve health. About encouragement for preventive measures (Statement 4): the highest score of 3.05 indicates that mobile health apps are good for inducing participation in preventive health techniques, like vaccination. About guidance on managing conditions (Statement 5): a mean score of 2.56 showed mixed opinions, with participants divided on whether they rely on mhealth apps for managing specific health conditions, like stress or malaria. In summary, the results indicate that while mobile health apps are valued for tracking and encouraging healthy behaviours, there is variability in how much users believe and follow their guidance for managing specific conditions (Table 5).

Table 5 Responses on Challenges Students Face in Engaging with mhealth Apps for Health Campaigns

Statement	SA (4)	A (3)	D (2)	SD (1)	Total	Weighted Mean Score
Limited Access	173	173	0	0	346	3.50
Subscription Costs	100	180	40	26	346	3.03
Lack of Awareness	120	150	50	26	346	3.02
User-Friendliness	90	90	90	76	346	2.59
Privacy Concerns	80	90	90	86	346	2.50

Source: survey data, 2024; Keys: SA – Strongly Agree, A – Agree, D – Disagree, SD – Strongly Disagree

Limited Access (Statement 1): the highest weighted mean score of 3.50 indicates strong agreement among respondents that there is limited access to either smartphones or the internet. About Subscription Costs (Statement 2): the weighted mean score of 3.03 proves that many respondents agreed that subscription fees to mobile health apps are a financial barrier. On Lack of Awareness (Statement 3): a score of 3.02 indicates that most agreed that the absence of proper awareness towards utilising reliable mobile health apps is stopping their effective usage. User-Friendliness (Statement 4): with a mean score of 2.59, opinions were divided about the user-friendliness of mobile health apps, showing usability concerns. About Privacy Concerns (Statement 5): a score of 2.50 indicates mixed feelings, showing that privacy issues moderately discourage the use of the app. In summary, these findings suggest that while mhealth apps have potential, barriers such as accessibility, costs, and usability hinder widespread adoption.

5 CONCLUSION

This study examined how mobile health apps affect students' participation in digital health communications campaigns at Heritage Polytechnic, Eket. Students were aware of the value of using these apps to track health practises and promoting healthier habits, but they appeared to be hindered by several barriers to full engagement. Mobile health (mHealth) apps, as agreed by many students, help establish preventive health practises and enhance the understanding of health issues. Despite that, limited access to smartphones and Internet, high subscriptions costs and limited awareness of good apps prevented some of the students from enjoying the full extent of these tools.

Despite these barriers, the study found that mobile health apps had the potential to raise student awareness about health issues and help them to engage in healthier behaviours. However, concerns about privacy, user friendliness, and affordability still remained big obstacles. Addressing these challenges could help in improving the adoption and effectiveness of mobile health apps in future digital health campaigns. Developers should also strive to make these apps more accessible, affordable, and user-friendly, so that more students could actively engage with them to enhance their health and well-being.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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