ORIGINAL ARTICLE

Prevalence and Pattern of Usage of Smartphone Applications Enhancing Occupational Health and Safety among Workers at 10th of Ramadan City

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ABSTRACT:

Background: Over the past several years, numerous mobile health Applications have been developed globally to provide better medical access and care to users or patients. Mobile Health Applications aim to make healthcare professionals' work simpler by offering direct contact with medical specialists. This study aimed to assess the prevalence and pattern of smartphones applications usage designed to improve health, safety, and wellbeing of workers among randomly selected industrial facilities at 10th of Ramadan City.

METHODS: A cross-sectional study was conducted on a randomly selected group of workers and safety employees at two randomly selected industrial facilities (Cosmetic Products Company & Cable Industry Company) at 10th of Ramadan City, Sharkia Governorate, Egypt. A multistage (two stages) random sample was adopted, and the estimated sample size was calculated to be 311 workers. All participants in this study were interviewed and asked to complete a semi-structured questionnaire that included socio-demographic characteristics, lifestyle and special habits, occupational and medical history, workers' knowledge about smartphone applications enhance occupational health and safety at the workplace, source, fields, and constraints of the smartphone applications at workplace.

RESULTS: The studied participants had a mean age of 39.3 ± 10.9 years, about two-thirds of them were males (67.5%), and about half of them were married (47.9%). Only one-third of them (32.8%) received high education. About two-thirds of the participants (63.3%) used smartphones for both work and personal use; while (40.2%) of them used smartphone applications to improve occupational health; out of them only (11.6%) used private Apps. The most frequently reported fields of smartphone applications usage among the studied participants were occupational health legislations and rights and noise reduction (40.2% for both). The most frequently reported challenge was network problems.

CONCLUSIONS: The studied sample of workers uses smartphone applications, particularly at work, to improve health and safety. The most frequently reported fields of smartphone application usage were occupational health legislation and rights and noise reduction. However, a high percentage of the participants reported many constraints, particularly network challenges.

KEYWORDS: Smartphone Applications; Occupational Health, Safety;Prevalence, Pattern.

INTRODUCTION

Smartphone usage has increased over the last decade, engaging users from a young age until the old [1]. Smartphones are mobile phones that include advanced functionality beyond making phone calls and sending text messages. Most smartphones can display photos, play videos, check and send e-mail, and surf the Web [2].

Over the past several years, numerous Mobile Health Applications have been developed globally to provide better medical access and care to users or patients. Mobile Health Apps also aim to make healthcare professionals' work simpler by offering direct contact with medical specialists [3]. Remote monitoring health Apps have become essential tools for managing health and wellness, especially in managing chronic conditions, tracking fitness, and facilitating telemedicine [4].

E-health solutions offer various benefits that also apply to apps designed to enhance occupational health and wellbeing. These applications can reach a wide audience, are accessible 24 hours a day, and their content can be updated at any time. Additionally, training can be accessed and repeated as often as needed [5].

Occupational health and safety apps encompass a broad variety of applications. These apps can be categorized into two distinct types: information apps, which primarily provide users with information, and intervention apps, which aim to implement changes in the workplace [6].

Occupational health and safety apps focus on different aspects of the work environment. Each app is categorized based on its primary focus to give an overview of the distribution of apps across various areas. For instance, while an app primarily designed to address musculoskeletal disorders may include references to regulations regarding lifting heavy objects, it is still classified as a musculoskeletal disorder app because that is its main purpose. The apps have been divided into eight distinct work environment categories [7].

On the other hand, one of the main reasons why people choose not to use mHealth Apps for their own health care is concerns about health data security and privacy [8].

Inconsistent or weak network coverage can hinder app functionality, especially Apps that require significant data usage may struggle in low-bandwidth environments, impacting performance and user experience [9]. This study aims to improve the health, safety, and well-being of workers at workplaces. The objectives are to assess the prevalence and pattern of smartphone applications usage designed to improve the health, safety, and well-being of workers among randomly selected industrial facilities at 10th of Ramadan City.

METHODS

A cross-sectional study was conducted on workers and safety employees at two randomly selected industrial facilities (Cosmetic Products Company & Cable Industry Company) at 10th of Ramadan city, Sharkia Governorate, Egypt. The study included workers and safety employees, both males and females working for at least one year in their current job. Workers who have no smartphone or have no access to the internet were excluded from the study. The study was conducted throughout the period from the beginning of October 2023 and was completed by the end of February 2024.

The sample size was calculated through Open Epi-Info (Epidemiological information package) [10]. Using 80% power and effect size equal 1, according to the following collected data; The total number of working populations at 10th of Ramadan city equals 159343 workers, and the estimated prevalence of safety apps use in a previous study was 28% [11]. So, the estimated sample size was calculated to be 311 workers.

A Multistage (two stages) random sample was adopted. In the first stage; listing all industrial facilities at the 10th of Ramadan City was done then two industrial facilities were selected using a simple random technique. In the second stage; obtaining a Workers' list from the administration of the two randomly selected industrial facilities was done then a simple random sample method was adopted to select the required sample.

Questionnaire: all participants in this study were interviewed by the investigator through a previously scheduled face-to-face interview and were asked to complete a semi-structured questionnaire that was obtained from similar studies [5,10] and translated into Arabic language. Workers were interviewed personally

and asked about socio-demographic characteristics, Occupational and medical history, workers' usage of smartphone applications to enhance occupational health and safety at the workplace, usage any smartphone applications to improve physical, mental fitness and healthy nutrition, fields of usage of smartphone applications in the workplace, receiving training at your workplace to use smartphone applications, and challenges while using smartphone apps.

The research was conducted under the World Medical Association's Code of Ethics (Helsinki Declaration) for human research. This study was carried out after the approval of the Institutional Review Board (IRB) (IRB#10546-12-3-2023). An informed consent was obtained from all participants of this study after explaining the aim of the study and ensuring data confidentiality.

It was carried out on 10% of the sample size to test the feasibility of the study, the clarity of the tools and to estimate the time needed to fill the questionnaire. The participants included in the pilot study were excluded from the main sample.

The collected data were coded, entered, and analyzed by computer using a database software program, IBM SPSS 23.0 for Windows [12]. Data was summarized and presented as mean, median, standard deviation (SD), and percentages (%).

RESULTS

Table (1) shows that the mean age of the studied participants was 39.3 ± 10.9 years, about two-thirds of them (67.5%) were males, most of them (71.1%) lived in rural areas, while only (32.8%) received high education, (55.9%) had not enough income, and almost half of them (47.9%) were married.

Table (2) shows that almost two-thirds of the participants (63.3%) used smartphones for both work and personal use; while (40.2%) of them used smartphone apps to improve occupational health, and only (28.6%) of the users used free apps and (11.6%) used private apps. Participants used smartphone apps to improve mental fitness, physical fitness, and healthy nutrition (34.7%, 37%, and 35.7%, respectively).

Figure (1) shows that the most frequently reported fields of usage of smartphone apps among the studied participants were occupational health legislations and rights and noise reduction which were detected among (40.2%), followed by psychosocial work environment (38.3%), then workplace safety and chemistry and toxicology (34.4%), then musculoskeletal disorders (30.5%); while the least frequently reported field of usage was management which was reported by (13.5%) of the participants.

Figure (2) shows that the most frequently reported challenge while using smartphone apps among the studied participants was network problems (61.4%), followed by the inability to install and update apps (40.5%), then high cost (34.4%); while the least frequently reported challenge was security and data privacy (15.4%).

Figure (3) shows that (27%) of the participants received training at the workplace to use smartphone apps, while (73%) of the participants didn't receive training at the workplace.

Table (1): Sociodemographic characteristics of the studied particpants.

Sociodemographic characteristics		Participants (n=311)	
Age *(years)*	*Mean ± SD*	39.3 ± 10.9	
	Range	(21 – 56)	
		N	*%*
Sex	Male	210	67.5%
	Female	101	32.5%
Residence	Urban	90	28.9%
	Rural	221	71.1%

Level of education	Read and write only	66	21.2%
	School or technical institute	143	46%
	High education	102	32.8%
Marital status	Married	149	47.9%
	Single	162	52.1%
The educational level of the wife (N=149)	Read and write only	24	7.7%
	School or technical institute	95	30.5%
	High education	30	9.6%
Number of children	< 3 children	60	40.3%
	≥ 3children	89	59.7%
Age of the oldest child	< 15 years	54	36.2%
	≥15 years	95	63.8%
Income	Not enough	174	55.9%
	Enough	137	44.1%

Table (2): Frequency distribution of the studied participants regarding usage of smartphone apps to enhance occupational health and safety

| Usage		Participants (n=311)	
		N	*%*
Usage of the device	Work	42	13.5%
	Personal use	72	23.2%
	Both	197	63.3%
Using smartphone apps to improve occupational health	No	186	59.8%
	Yes	125	40.2%
Sources of apps used in the workplace (n = 125)	Private apps	36	11.6%
	Free apps	89	28.6%
Usage of smartphone apps to improve mental fitness	No	203	65.3%
	Yes	108	34.7%
Usage of smartphone apps to improve physical fitness	No	196	63%
	Yes	115	37%
Usage of smartphone apps to improve healthy nutrition	No	200	64.3%
	Yes	111	35.7%
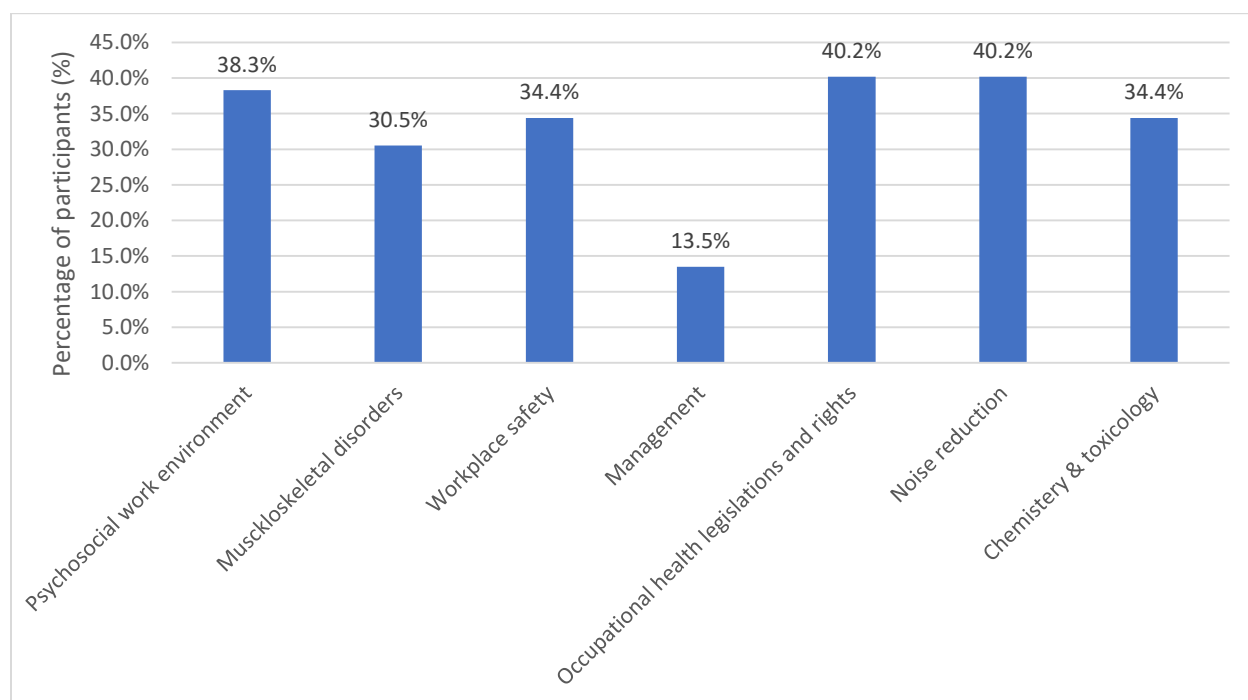
Figure (1): Frequency distribution of the studied participants regarding using different fields of smartphone apps**.**
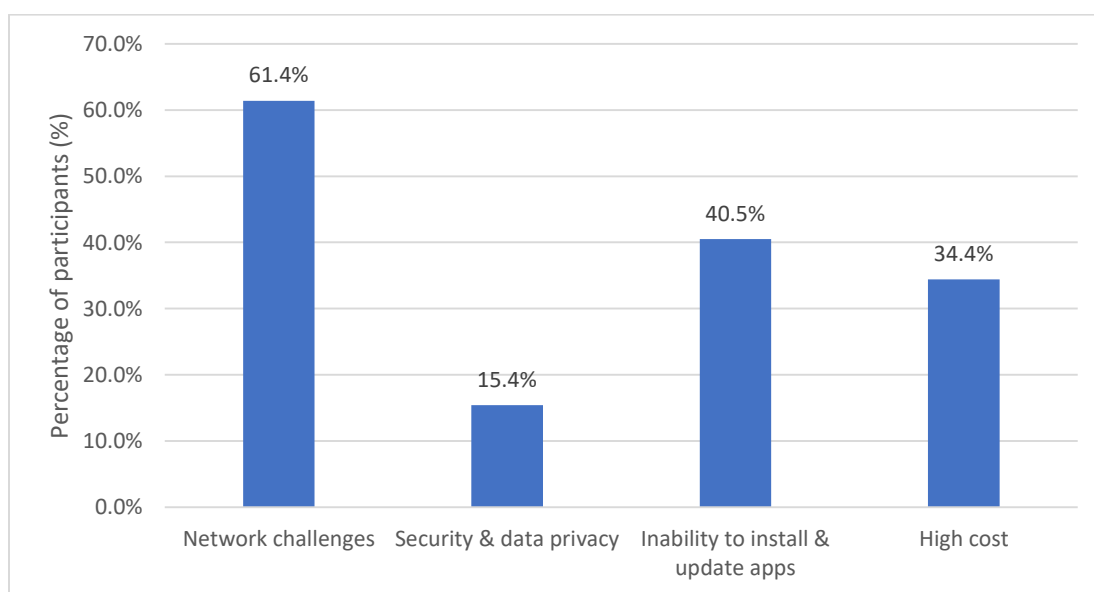

Figure (2): Frequency distribution of the studied participants regarding challenges of using smartphone apps.
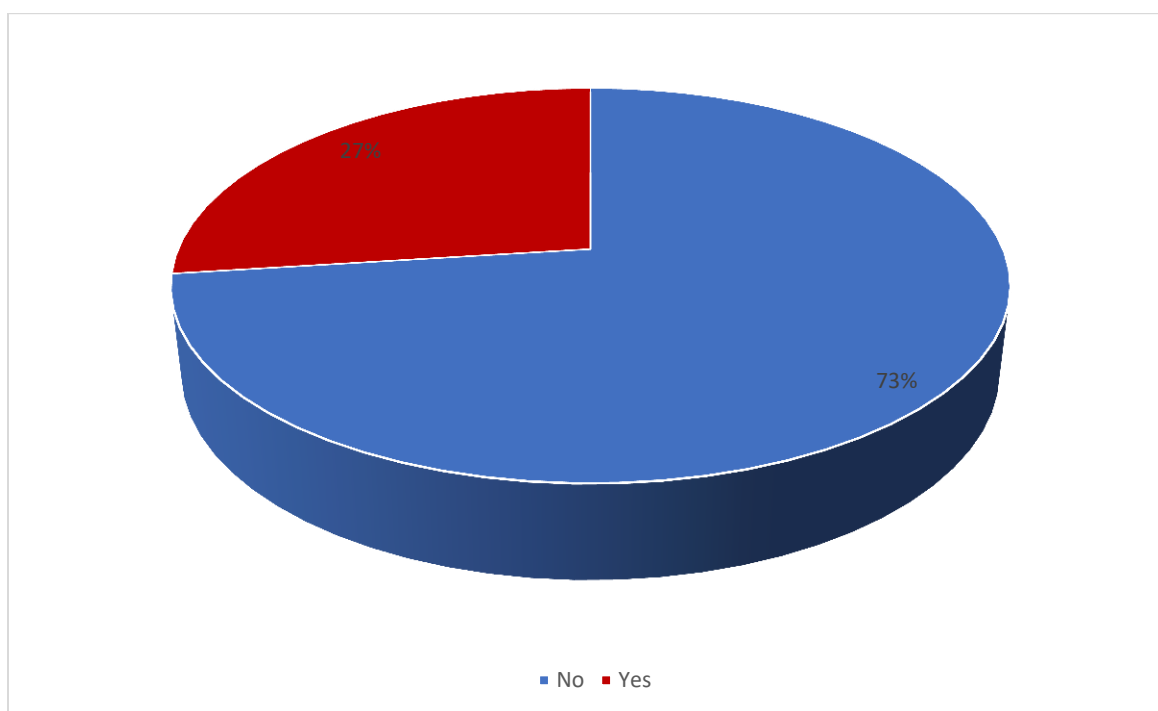
Figure (3): Frequency distribution of the studied participants regarding receiving training at the workplace to use smartphone apps

DISCUSSION

This cross-sectional study was conducted at two randomly selected industrial facilities at 10th of Ramadan City, Sharqia Governorate, Egypt. The estimated sample size was 311 workers. Conducting the study in 10th of Ramadan City, a prominent industrial hub in Egypt, provides a representative snapshot of the country's industrial workforce. The random selection of facilities and a substantial sample size of 311 workers enhance the study's validity and generalizability. This methodological approach ensures that the findings are reflective of broader trends in OHS practices and technology usage within similar industrial settings in Egypt.

The studied participants had a mean age of 39.3 ± 10.9 years, about two-thirds of them were males (67.5%), about half of them were married (47.9%), and (71.1%) lived in rural areas. Only one-third (32.8%) received a high education, and more than half (55.9%) reported insufficient income.

The demographic profile of the participants indicates a predominantly middle-aged, male workforce, with a significant portion residing in rural areas and lacking higher education.

The prevalence of insufficient income among more than half of the participants may influence their access to and engagement with smartphone technologies. These socio-economic factors are critical when considering the implementation of OHS interventions, as they may affect workers' ability to adopt and effectively use smartphone applications designed to enhance workplace safety [14].

In this study, only (13.5%) of participants reported using smartphones for work, while (23.2%) used them for personal purposes. The majority, 63.3%, used smartphones for both work and personal activities. In contrast, another study by Zaky et al. [13] found that 47% of participants relied on mobile phones for their work tasks, leaving 53% who used their phones primarily for other purposes. Additionally, it is noteworthy that only (27%) of participants in our study received workplace training on how to use smartphone applications, while nearly two-thirds of participants in the other study received such training.

The finding that a majority of participants use smartphones for both work and personal

activities suggests a high potential for integrating OHS applications into daily routines. However, the relatively low percentage of participants using smartphones exclusively for work-related tasks indicates possible barriers, such as lack of awareness or training. The comparison with another study highlights a significant gap in workplace training on smartphone application usage in our cohort. This disparity underscores the importance of implementing comprehensive training programs to enhance the effective use of technology in promoting occupational health and safety.

In the present study (34.7%) of the participants used smartphone Apps to improve mental fitness and (37%) used smartphone Apps to improve physical fitness. This finding is almost close to that of another study by Amr et al. [14] in which (30%) of the participants used smartphone Apps to improve mental fitness. Also, the finding of the current study partially agrees with that of another study by Neștian et al. [15] as they revealed that (40%) of workers used smartphone Apps to improve physical fitness and weight loss.

The comparable usage rates of smartphone applications for mental and physical fitness between our study and others suggest a growing recognition among workers of the importance of holistic well-being. This trend indicates an opportunity to introduce or promote OHS applications that address both mental and physical health aspects, potentially leading to a more comprehensive approach to worker safety and well-being. Aligning OHS initiatives with workers' existing interests in health-related applications may enhance engagement and effectiveness.

In the present study the most frequently reported fields of usage of smartphone Apps among studied participants were occupational health legislations and rights and noise reduction which were detected among (40.2%) of the participants, followed by psychosocial work environment (38.3%), then workplace safety and chemistry and toxicology (34.4%),

then musculoskeletal disorders (30.5%); while the least frequently reported field of usage was management which was detected among (13.5%) of the participants.

These findings may be linked to the fact the most frequently detected hazards among studied participants were physical hazards (40.5%). Among these, noise was the most prevalent physical hazard, affecting (32.8%) of the participants. Additionally, the usage of smartphone apps for information on occupational health legislation and workers' rights suggests that employees are increasingly seeking knowledge about their rights and regulations related to occupational health. This can empower employees to advocate for safer work environments and understand their entitlements.

However, in contrast to our findings, another study demonstrated that the most frequently detected fields of usage of smartphone Apps among participants were workplace safety and accident prevention (45%), followed by psychosocial work environment (31.5%), then musculoskeletal disorders Apps (8.7%); while the least frequently detected field of usage were occupational health legislations and rights and management (2%) [13].

The results of this study indicated that the most reported challenge of using smartphone apps among the participants was network problems, which affected (61.4%) of them. In contrast, the least frequently reported challenge was related to security and data privacy, noted by only (15.4%) of participants. In Egypt, internet disruptions can be attributed to several key factors, including technical malfunctions, power outages, infrastructure issues, and regulatory challenges [16]. This finding is partially inconsistent with that of another study in which (50%) of participants had technical challenges (network challenges) [9]. However, in contrast to our finding another study found that the most frequently detected challenge while using smartphone Apps was privacy concerns among 89% of participants [5].

CONCLUSIONS

About two-thirds of the participants used smartphones for both work and personal purposes. The most frequently reported fields of smartphone Apps were occupational health legislation and rights and noise reduction. In comparison, the least frequently reported field of usage was management. The most frequently reported challenge of using smartphone Apps was network problems. Less than one-third of the participants received training at the workplace about using smartphone apps

RECOMMENDATIONS

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Enhanced Training Programs: develop comprehensive training sessions that focus on educating workers about the specific smartphone applications available for OHS.

Address Privacy Concerns**:** Provide clear communication regarding data privacy and security measures associated with smartphone applications. Ensuring transparency about how data is used and protected can alleviate concerns that may hinder adoption.

CONFLICT OF INTEREST AND FINANCIAL DISCLOSURE

No potential conflict and financial disclosure of interest was reported by the authors.

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Figure Legend

Figure (1): Frequency distribution of the studied participants regarding fields of smartphone apps usage.

Figure (2): Frequency distribution of the studied participants regarding challenges of using smartphone apps.

Figure (3): Frequency distribution of the studied participants regarding receiving training at the workplace to use smartphone apps.

Citation