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Factors Influencing Professional Nurses' Acceptance and Use of Mobile Medical Apps in Ghana

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Abstract

The use of mobile medical apps in clinical settings has recently received considerable attention. While some practitioners are using this technology to optimize decision making, others, on the other hand, are indifferent about its usage. Therefore, this study has utilized a modified UTAUT2 model to determine factors that influence the acceptance and use of mobile medical apps among professional nurses in the Ghanaian setting. A web-based data collection tool (Google Forms) was used to solicit data from 216 health professionals. Of the 216 respondents, 126 (58.33%) of them were Public Health Nurses, with 85 (39.35%) being General Nurses, and the remaining 5 (2.32%) were midwives, resulting in an average age of 31.57±4.14 years. The study used a previously validated self-administered questionnaire (UTAUT 2) to find out factors that informed respondents to adopt and use mobile medical apps. The findings established that professional qualification, gender, and the number of years that the individual had used smartphones were key determinants in accepting and using mobile medical apps. That is why this study makes the case that using technology in clinical practice has enormous advantages. It is, however, important to

understand the factors that will influence the intention to adopt such technologies and their possible use.

Keywords: Nurses; Technology Acceptance; Mobile Medical Apps; UTAUT2; Ghana.

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1. Introduction

The increasing growth of Information and Communication Technologies (ICT), especially in the learning-mediated applications, has significantly influenced the culture of people, how they communicate, transact businesses, and socialize (Ami-Narh & Williams, 2012; González, Quesada, Urrutia, & Gavidia, 2006; Taiwo & Downe, 2013). One of these applications, which has revolutionized the way public and private sector businesses or governance are organized, by facilitating their methods of rendering services to their clients, particularly among medical practitioners in this 21st Century, is the use of smartphones. These applications are typically seemed as powerful devices that merge the traditional roles of a mobile phone with innovative computing capabilities (Boulos, Wheeler, Tavares, & Jones, 2011; Phillippi & Wyatt, 2011) and these applications are universally seen as essential parts of medical education (Ibrahim, Salisu, Popoola, & Ibrahim, 2014). Earlier studies on the practicality of these applications in the health sector have confirmed that medical practitioners, especially, nurses, do use smartphones for pharmacological information, as well as aiding nurses in making clinical decisions (McNally, Frey, & Crossan, 2017; Raman, 2015). Other uses of these applications as identified by Doyle, Garrett, and Currie (2014) and Grabowsky (2015) include "Point of Care resources, medical information and clinical logs, peer support, and communication".

In other words, these applications are seen as tools for facilitating businesses, helping with delivery of vital services to clients in the most efficient manner. That is, they are often seen as conduits for offering smart solutions at the world of work, and in the health sector, they may actually help in saving lives and adding value to medical activities. Indeed, an important development in medical practice that has sprung out of smartphone technology is the advent of mobile medical apps. These apps can help nurses do a number of things, namely learning about drug interactions, undertaking medical calculations, studying patients' radiological images and also reducing potential risks associated with the practice (Baumgart, 2011; Burdette, Herchline, & Oehler, 2008; Flannigan & McAloon, 2011; Fried, 2012). Increasingly, developers of these apps are coming up with new and more specific apps, including "medical calculators and medical reference tools", that seek to help practitioners in dealing with specific medical conditions (Dasari, White, & Pateman, 2011; Franko & Tirrell, 2012).

Despite the global acclaim for the efficiency and effectiveness of these apps, their acceptance and usage in performing medical activities has been rejected by some nurses (George,

DeCristofaro, Murphy, & Sims, 2017). For instance, McNally *et al.* (2017) and George *et al.* (2017) reported that "nurse managers view smartphones use as being potentially unprofessional and unethical". Again, the fear of appearing disinterested in patient care while using mobile apps was identified in studies among medical students in the United Kingdom (Payne, Wharrad, & Watts, 2012; Robinson *et al.*, 2013). Also, Mayer, Rodríguez Blanco, and Torrejon (2019) in their study on "use of health apps by nurses for professional purposes" among other things mentioned lack of knowledge or interest as reasons why nurses do not accept to use mobile medical apps. Equally, Farrell (2016) identified the small screen size of the mobile devices as reasons why most health care workers do not use the mobile medical apps. To help increase the acceptability and subsequent usage of these apps, and to further reduce the negative perceptions about such apps, it is imperative to understand the reasons that determine nurses' acceptance and use of these mobile medical apps.

Hence, in Ghana for example, there has been wide-ranging studies on the adoption of ICT in health management (Achampong, 2012; Andreatta, Debpuur, Danquah, & Perosky, 2011; Bedeley & Palvia, 2014; Brodie-Mends, 2012; Darkwa, 2000; Senya, Ibrahim, Lindong, & Addo-Lartey, 2017). Interestingly, these works did not focus on what contributes to professional nurses' acceptance and use of mobile medical apps. At the same time, none of these studies used the Unified Theory of Acceptance and Use of Technology II (UTAUT2) model in their studies. Additionally, in an era where information literacy has become part of the medical education (which is mostly taught by librarians), it is, therefore, imperative to identify the existing determinants of technology acceptance so that teachers of these programs can appropriately inculcate the concept of mobile medical apps in their teachings. Thus, the main objective of study has been to fill the gap in literature by using the UTAUT2 model to find the factors that influence the acceptance and use of mobile medical apps among professional nurses in the Ghanaian health setting.

2. Materials and Methods

This study used a web-based data collection tool, which is, Google Forms, to design and solicit data from the respondents. The data collection instrument for this study included two major parts. The first section sought to collect information on respondents' demographic characteristics and part two contained a previously validated self-administered questionnaire which sought to acquire information on nurses' intention to adopt and use mobile medical apps (UTAUT 2) (Venkatesh, Thong, & Xu, 2012). The scale was made up of eight (8) parts, with 28 delineated items. These parts include performance expectancy; effort expectancy; social influence; and facilitating conditions. The rest are hedonic motivation; prize value; habit; and behavioral intention. In terms of their delineated items, performance expectancy had four items, effort expectancy contained four items, social influence had three items, facilitating conditions included four items, hedonic motivation contained three items, prize value had 3 items, habit

included four items, and behavioral intention had three items, making it in 28 items overall. Respondents were asked to indicate on a six-point Likert scale, the extent to which they agree or disagree with statements that related to their intention to adopt and use mobile medical apps. The scores were from 1 (Strongly Disagree); 2 (Somewhat Disagree); 3 (Disagree); 4 (Agree) 5 (Somewhat Agree) and 6 (Strongly Agree).

As for the sampling method, a convenient sampling technique was used to employ 216 out of the 250 professional nurses as respondents. These respondents included professional nurses who were enrolled on a sandwich program at the University of Health and Allied Sciences, Ho, Ghana. The investigator then made a request to the university management for the student roll that contained the requisite coordinates needed for the study including active email addresses. Thereafter, the selected respondents were asked to voluntarily participate in the survey. The address (URL) to the survey was sent to all students who had active email addresses. In all, 250 of them were having active email addresses, but only 216 responded to the survey leading to a response rate of 86.40 percent. This category of nurses was targeted because their program required them to use mobile devices to access their notes and slides. In essence, the respondents who were selected for this study were well suited for this research.

2.1. The Unified Theory of Acceptance and Use of Technology II (UTAUT2) model

Two main research paradigms exist to explain technology adoption and acceptance (Melas, Zampetakis, Dimopoulou, & Moustakis, 2014; Pinigas, Cleopas, & Phiri, 2017). Whereas the first concept is system specific, focusing on how a technology's attributes affect an individual's perception of a technology, the second, on the other hand, aims at latent personality dimensions to explain the use and acceptance of new technologies (Hew, Lee, Ooi, & Wei, 2015; Melas *et al.*, 2014). Some of these models include the Theory of Reasoned Action (TRA) (Fishbein & Ajen, 1975); the Technology Acceptance Model TAM (Davis, 1989); and Theory of Planned Behavior (Ajzen & Madden, 1986). Identifiable weaknesses in these theories to perfectly predict acceptability and usage in these models instigated further research to improve their predictive powers (Melas *et al.*, 2014). Accordingly, Venkatesh *et al.* (2012) reviewed several tested models from different fields with unique explanatory powers on technology adoptions (Melas *et al.*, 2014). This led to the amalgamation of eight major models: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivation Model (MM), Theory of Planned Behavior (TPB), a combination of TAM and TBP, Innovation Diffusion Theory (IDT), Model of PC Utilization (MPCU), and Social Cognitive Theory (SCT) into what has become known as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Hew *et al.*, 2015; Melas *et al.*, 2014; Pinigas *et al.*, 2017).

According to Hew *et al.* (2015), UTAUT which is made up of four key constructs (Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions) influences behavioral intention to use technology (Melas *et al.*, 2014). Performance expectancy

has been defined as the degree to which using technology will provide benefits to consumers in performing certain activities. Again, effort expectancy refers to the degree of ease associated with consumers' use of technology. Social influence is the extent to which consumers perceive that important others (e.g., family and friends) believe they should use a particular technology. Also facilitating conditions refer to consumers' perceptions of the resources and support available to perform a behavior (Venkatesh *et al.*, 2003). In line with the UTAUT model, performance expectancy, effort expectancy, and social influence are theorized to influence behavioral intention to use technology, while behavioral intention and facilitating conditions determine technology use (Venkatesh *et al.*, 2012).

To make UTAUT applicable to a consumer setting, Venkatesh *et al.* (2012) further sought to extend the original four constructs to include hedonic motivation, price value, and habit (Venkatesh *et al.,* 2012). Brown and Venkatesh (2005) define hedonic motivation as the fun or pleasure derived from using technology (Venkatesh *et al.*, 2012). Also, prize value has been defined as consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them (Dodds, Monroe, & Grewal, 1991). Finally, habit refers to the extent to which people tend to perform behaviors automatically because of learning (Limayem, Hirt, & Cheung, 2007). The user-focused nature of UTAUT 2 compelled the authors to adopt it for this study because, unlike other information systems where workers/individuals are mandatorily made to use in the clinical settings, mobile medical apps are voluntarily adopted and used by health professionals.

2.2. Statistical Analysis

The cumulative percentages of the various scores were calculated for the various constructs on the questionnaire. Items or groups that scored 80 percent or more were ranked as "High," those within $60 \geq x < 80$ were ranked as "Acceptable" and scores that were less than 60 percent were ranked as "Low" (Al Abdullah, 2010). Continuous variables were expressed as their mean ± standard deviation, whereas categorical variables were expressed as figure and proportion. Comparisons of the general characteristics among the various stratified groups were performed using unpaired t-tests, chi-square tests, or Fisher exact tests where appropriate. A level of $P<0.05$ was considered statistically significant for all the conducted analysis. Microsoft Excel and GraphPad Prism version 6.00 were used for statistical analysis where appropriate.

2.3. Ethical considerations

The researchers ensured that none of the responses was linked to any specific respondent. Also, the researchers ensured that the confidentiality of responses was assured. All participants after reading and understanding the objectives of this research consented to participate in the study.

3. Results

Among the 216 participants in the study, 126 (58.33%) were Public Health Nurses, 85 (39.35%) were General Nurses, and 5 (2.32%) were midwives. The average age of the respondents in this study was 31.57±4.14 years. There was a significant difference between the male and the female population (p=0.0192). At the time of the study, there was a significant difference in the highest level of education a respondent had attained (p<0.0001), with the majority of the Public Health Nurses and General Nurses having Diploma 75 (59.52%) and Certificate 67 (78.82%) respectively. Also, this survey revealed that most of the respondents had been using mobile devices that support mobile apps for the past five years (5.63±3.86) (see Table 1).

Table 1. General socio-demographic characteristics of respondents stratified by professional qualifications

Parameters	Total N=216	PH N=126	GN N=85	Midwifery N=5	P-value
Age	31.57±4.14	31.83±4.14	30.75±4.08	37.40±3.98	0.0012
Gender					
Male	120 (55.56)	76 (60.32)	44 (51.76)	0(0.00)	0.0192
Female	96 (44.44)	50 (39.68)	41 (48.24)	5(100.00)	
Highest level of education					
Certificate	117 (54.17)	47 (37.30)	67 (78.82)	3(60.00)	
Diploma	89 (41.20)	75 (59.52)	12 (14.12)	2(40.00)	<0.0001
Degree	10 (4.63)	4 (3.18)	6 (7.06)	0(0.00)	
M. Apps supported device usage	210 (97.22)	124 (98.41)	82 (96.47)	4(80.00)	0.0422
M. Apps usage duration (years)	5.63±3.86	5.41±3.86	5.98±3.86	5.40±3.84	0.9179
Users of mobile medical apps	123 (56.94)	75 (59.52)	47 (55.29)	1(20.00)	0.1999

Continuous data are presented as means ± standard deviation of the mean, with categorical data presented as figure with percentage in parenthesis. Continuous data were compared using unpaired t-test. Categorical data were compared with chi-square tests or Fisher exact tests where appropriate. P is significant at <0.05. PH = Public Health Nurses, GN = General Nurses, M. Apps means mobile applications.

There was a significant difference (p=0.0070) as far as respondents' willingness to use mobile medical apps and their doubts on whether the use of such apps would provide benefits in performing clinical activities or not was concerned. Majority of the public health nurses 55 (43.65%) indicated a high level of willingness to use the apps whiles majority of the midwives 4 (80.00%) showed a low level of readiness to adopt the apps mainly because of the trade-offs involved in using such technologies (performance expectancy). Even though there was a significant difference (p=0.0076) among the respondents regarding their willingness to adopt and use the mobile medical apps because those technologies are easy to use (effort expectancy), it was observed that majority of the respondents 94 (43.52%) showed negative inclination to adopt and use mobile medical apps in their clinical practices. This was highly revealed among the midwifery group 4 (80.00%). With regards to social influence, there was a high record of lack of

readiness 85 (39.36%) among the respondents to use the technology with the public health nurses, general nurses and the midwives recording 65 (51.59%), 47 (55.29%) and 4 (80.00%) respectively.

The perception of respondents regarding mobile medical apps and available support to use such technologies also influenced the respondents' willingness to adopt and use these technologies. It was revealed that a significant number of the respondents viewed the perceived availability of support (facilitating conditions) as a high 66 (30.55%) or acceptable 65 (30.09%) determinant that can influence them to adopt and use mobile medical apps for clinical practices. The study also reported a significant difference among the study population with regards to using hedonic motivation as a predictive tool in order to adopt and use mobile medical apps within the clinical settings (p=0.0145). Equally, this survey study recorded significant differences among the respondents regarding their perceived benefits derived from the apps as against the cost and efforts required to use such technology (0.0161). However, with regards to habit and behavioral intentions, this study did not report any significant difference among the study population (see Table 2).

Table 2. Respondents' intention to adopt and use mobile medical apps stratified by professional qualifications

Parameters	Total N=216	PH N=126	GN N=85	Midwifery N=5	*P-value*
Performance Expectancy					
High	77 (35.65)	55 (43.65)	21 (24.71)	1 (20.00)	
Acceptable	64 (29.63)	37 (29.37)	27 (31.76)	0(0.00)	0.0070
Low	75 (34.72)	34 (26.98)	37 (43.53)	4 (80.00)	
Effort Expectancy					
High	52 (24.07)	33 (26.19)	19 (22.35)	0 (0.00)	
Acceptable	70 (32.41)	49 (38.89)	21 (24.71)	0 (0.00)	0.0076
Low	94 (43.52)	44 (34.92)	45 (52.94)	5 (100.00)	
Social Influence					
High	47 (21.76)	33 (26.19)	13 (15.29)	1 (20.00)	
Acceptable	53 (24.54)	28 (22.22)	25 (29.42)	0 (0.00)	0.2074
Low	116 (53.70)	65 (51.59)	47 (55.29)	4 (80.00)	
Facilitating Conditions					
High	66 (30.55)	49 (38.89)	17 (20.00)	0 (0.00)	
Acceptable	65 (30.09)	34 (26.98)	30 (35.29)	1 (20.00)	0.0145
Low	85 (39.36)	43 (34.13)	38 (44.71)	4 (80.00)	
Hedonic Motivation					
High	55 (25.46)	40 (31.75)	15 (17.65)	0 (0.00)	
Acceptable	63 (29.17)	38 (30.16)	24 (28.24)	1 (20.00)	0.0457
Low	98 (45.37)	48 (38.10)	46 (54.11)	4 (80.00)	

Price Value					
High	46 (21.30)	33 (26.19)	12 (14.12)	1 (20.00)	
Acceptable	66 (30.55)	44 (34.92)	22 (25.88)	0 (0.00)	0.0161
Low	104 (48.15)	49 (38.89)	51 (60.00)	4 (80.00)	
Habit					
High	38 (17.59)	24 (19.05)	13 (15.29)	1 (20.00)	
Acceptable	60 (27.78)	36 (28.57)	24 (28.24)	0 (0.00)	0.6258
Low	118 (54.63)	66 (52.38)	48 (56.47)	4 (80.00)	
Behavioral Intention					
High	83 (38.42)	53 (42.06)	29 (34.12)	1 (20.00)	
Acceptable	49 (22.69)	29 (23.02)	20 (23.53)	0 (0.00)	0.2488
Low	84 (38.89)	44 (34.92)	36 (42.35)	4 (80.00)	

Data presented as figure with percentage in parenthesis. Data were compared using chi-square tests, or Fisher exact tests where appropriate. P is significant at <0.05. PH = Public Health Nurses, GN = General Nurses.

As for what motivates male and female nurses to adopt and use mobile medical apps in their clinical practices, it was recognized that, apart from effort expectancy (p=0.0479) and behavioral intention (p=0.0082), there was no significant difference in their responses concerning the other constructs. Also, it was realized that for the female practitioners, more than half of them did not see effort expectancy 50 (52.08%), social influence 56 (58.33%), hedonic motivation 50 (52.08%), price value 51 (53.12%) and habit 54 (56.25%) as factors that will influence their adoption and use of the technology. However, male practitioners, apart from social influence 60 (50.00%) and habit 64 (53.33%) which they least accepted as factors that can influence their adoption and use of the technology, they "highly" or "acceptably" revealed that all other factors can influence their use of mobile medical apps in their clinical activities (see Table 3).

Table 3. Respondents' intention to adopt and use mobile medical apps stratified by gender

Parameters	**Male N=120**	**Female N=96**	***P value***
Performance Expectancy			
High	48 (40.00)	29 (30.21)	
Acceptable	38 (31.66)	26 (27.08)	0.1785
Low	34 (28.34)	41 (42.71)	
Effort Expectancy			
High	35 (29.17)	17 (17.71)	
Acceptable	41 (34.17)	29 (30.21)	0.0479
Low	44 (36.66)	50 (52.08)	

Social Influence			
High	28 (23.33)	19 (19.79)	
Acceptable	32 (26.67)	21 (21.88)	0.4733
Low	60 (50.00)	56 (58.33)	
Facilitating Conditions			
High	41 (34.17)	25 (26.04)	
Acceptable	38 (31.66)	27 (28.13)	0.2000
Low	41 (34.17)	44 (45.83)	
Hedonic Motivation			
High	31 (25.83)	24 (25.00)	
Acceptable	41 (34.17)	22 (22.92)	0.1323
Low	48 (40.00)	50 (52.08)	
Price Value			
High	25 (20.83)	21 (21.88)	
Acceptable	42 (35.00)	24 (25.00)	0.2643
Low	53 (44.17)	51 (53.12)	
Habit			
High	20 (16.67)	18 (18.75)	
Acceptable	36 (30.00)	24 (25.00)	0.7066
Low	64 (53.33)	54 (56.25)	
Behavioral Intention			
High	55 (45.83)	28 (29.17)	
Acceptable	29 (24.17)	20 (20.83)	0.0082
Low	36 (30.00)	48 (50.00)	

Data were compared using chi-square tests, or Fisher exact tests where appropriate. P is significant at <0.05.

This survey sought to find the relationship between the number of years that a practicing nurse has been using a mobile device that supports mobile apps and the various components of UTAUT2. Consequently, the study revealed that apart from social influence (p=0.1542) and habit (p=0.0586), there were significant differences among respondents who have been using mobile devices that support mobile apps. It was observed that respondents who have been using such devices for less than four years were less likely to adopt and use the technology based on the components of UTAUT2 (see Table 4).

Table 4. Respondents' intention to adopt and use mobile medical apps stratified by number of years that respondents have been using mobile devices that support mobile apps.

Parameters	greater than 8 N=37	8<x>=4 N=85	less than 4 N=94	*P value*
Performance Expectancy				
High	14 (37.84)	34 (40.00)	29 (30.86)	
Acceptable	10 (27.02)	32 (37.65)	22 (23.40)	0.0234
Low	13 (35.14)	19 (22.35)	43 (45.74)	
Effort Expectancy				
High	14 (37.84)	19 (22.35)	19 (20.21)	
Acceptable	8 (21.62)	39 (45.89)	23 (24.47)	0.0017
Low	15 (40.54)	27 (31.76)	52 (55.32)	
Social Influence				
High	11 (29.73)	21 (24.71)	15 (15.95)	
Acceptable	11 (29.73)	22 (25.88)	20 (21.28)	0.1542
Low	15 (40.54)	42 (49.41)	59 (62.77)	
Facilitating Conditions				
High	11 (29.73)	34 (40.00)	21 (22.34)	
Acceptable	11 (29.73)	27 (31.76)	27 (28.72)	0.0481
Low	15 (40.54)	24 (28.24)	46 (48.94)	
Hedonic Motivation				
High	12 (32.44)	28 (32.94)	15 (15.95)	
Acceptable	9 (24.32)	29 (34.12)	25 (26.60)	0.0109
Low	16 (43.24)	28 (32.94)	54 (57.45)	
Price Value				
High	7 (18.92)	24 (28.24)	15 (15.95)	
Acceptable	14 (37.84)	30 (35.29)	22 (23.40)	0.0193
Low	16 (43.24)	31 (36.47)	57 (60.65)	
Habit				
High	9 (24.32)	16 (18.82)	13 (13.83)	
Acceptable	9 (24.32)	31 (36.47)	20 (21.28)	0.0586
Low	19 (51.36)	38 (44.71)	61 (64.89)	
Behavioral Intention				
High	18 (48.64)	38 (44.71)	27 (28.72)	
Acceptable	6 (16.22)	24 (28.24)	19 (20.21)	0.0110
Low	13 (35.14)	23 (27.05)	48 (51.07)	

Data were compared using chi-square tests, or Fisher exact tests where appropriate. P is significant at <0.05.

Additionally, this study revealed that the clinicians' does not affect their decision to adopt and use mobile medical apps as there was no significant difference between any of the attributes used. However, it was ascertained that the majority of the respondents who were more than 40 years old had a low tendency to adopt and use mobile medical apps in their clinical practices (refer to Table 5).

Table 5. Respondents' intention to adopt and use mobile medical apps stratified by age

Parameters (Age)	A N=12	B N=129	C N=75	*P value*
Performance Expectancy				
High	4 (33.33)	43 (33.33)	30 (40.00)	
Acceptable	3 (25.00)	36 (27.91)	25 (33.33)	0.5014
Low	5 (41.67)	50 (38.76)	20 (26.67)	
Effort Expectancy				
High	2 (16.67)	29 (22.48)	21 (28.00)	
Acceptable	4 (33.33)	40 (31.01)	26 (34.67)	0.7119
Low	6 (50.00)	60 (46.51)	28 (37.33)	
Social Influence				
High	2 (16.67)	23 (17.83)	22 (29.33)	
Acceptable	2 (16.67)	32 (24.81)	19 (25.33)	0.2834
Low	8 (66.66)	74 (57.36)	34 (45.34)	
Facilitating Conditions				
High	5 (41.67)	46 (35.66)	32 (42.66)	
Acceptable	2 (16.67)	27 (20.93)	20 (26.67)	0.4722
Low	5 (41.67)	56 (43.41)	23 (30.67)	
Hedonic Motivation				
High	4 (33.33)	29 (22.48)	22 (29.33)	
Acceptable	1 (8.33)	35 (27.13)	27 (36.00)	0.1159
Low	7 (58.34)	65 (50.39)	26 (34.67)	
Price Value				
High	4 (33.33)	24 (18.61)	18 (24.00)	
Acceptable	2 (16.67)	35 (27.13)	29 (38.67)	0.1251
Low	6 (50.00)	70 (54.26)	28 (37.33)	
Habit				
High	3 (25.00)	22 (17.06)	13 (17.33)	
Acceptable	1 (8.33)	33 (25.58)	26 (34.67)	0.3268
Low	8 (66.67)	74 (57.36)	36 (48.00)	
Behavioral Intention				
High	5 (41.67)	46 (35.66)	32 (42.66)	
Acceptable	2 (16.67)	27 (20.93)	20 (26.67)	0.4722
Low	5 (41.67)	56 (43.41)	23 (30.67)	

Data were compared using chi-square tests, or Fisher exact tests where appropriate. P is significant at <0.05. A = respondents who are 40 years or more; B = respondents who are greater than 30 years but less than 40 years; C = respondents who are less than 30 years.

4. Discussion

Using UTAUT2 to find out what determines professional nurses' adoption and use of mobile medical apps was the principal objective of this study. Generally, the belief that mobile medical apps provide benefits in performing clinical activities influenced both the public health nurses and general nurses' acceptance and usage of the technology. Interestingly, the midwifery group's willingness to accept and use the app was not influenced by this. This is shown in the low score recorded among the midwifery group under all the categories. This record could be attributed to the low response rate among this group. However, in a study on "midwives' perceptions of the use of technology in assisting childbirth in Northern Ireland", Sinclair and Gardner (2001) reported that most midwives "trust the use of technology but have concerns about issues of safety regarding potential faults and their perceived lack of training in technology usage" (Gonen, 2016).

Regarding the influence of UTAUT2 components on a particular gender's willingness to accept and use mobile medical apps, this study found out that the male nurses were more inclined towards accepting and using the app in their clinical settings than their female colleagues. This finding is in tandem with the observations of Singh and Senthil (2015) and Gonen (2016) which reported that "male nurses are significantly different compared to female nurses as male nurses are more comfortable in using technology than female nurses". This low level of willingness to accept and use mobile medical apps among female nurses could be as a result of "cultural factors, which link masculinity and technologies" (Gonen, 2016). "Women are often seen as entities designed to focus on human relationships, while men are seen as those to be in contact with machinery" (Wajcman, 2010). According to Gonen, such situations are common in typical local communities where the social structure of the religious communities dictate that women are responsible for the household and raising the children, engaging in human relationships and that they are not supposed to have high technological capabilities (Gonen, 2016).

This study also revealed a relationship between the number of years a nurse owns a Smartphone and his/her willingness to accept and use mobile medical apps in their clinical settings. It established that the lengthier the period a nurse owns a Smartphone, the higher the propensity of that fellow accepting and subsequently using mobile medical apps in the clinical setting. This may be as a result of the fact that people tend to know the benefits of technology when they experience it over a period. This is also in line with the assertion of Weinberg that technological progress may be skill-biased, and because human capital increases over the lifecycle, technological change may favor experienced users (Gonen, 2016). More so, more experienced users tend to have more skills, and they may see new technology as time savings, so long as vintage effects do not lower their productivity (Weinberg, 2004). Unlike the findings of Andone *et al.* (2016), which established a positive relationship between younger age and intention to accept and use technology, this study did not show any significant difference among

the age categories (Gonen, 2016). This development may be as a result of the relatively younger age (31.57±4.14) of the study population.

5. Conclusion

This study has established that professional nurses have a positive inclination towards the acceptance and usage of mobile medical apps. It was realized that professional qualification, gender, and the number of years the individual has been using a Smartphone are key determinants in accepting and using mobile medical apps based on the UTAUT2 model. However, ages of nurses were not identified as fundamental factors in accepting and using mobile medical apps in the clinical settings. It is important to understand these issues so that teachers/librarians in health educational institutions and other institutes of higher learning can educate their students on information literacy skills for accessing medical or health online or electronic library resources. The appropriate discussion of such issues with students can lead to increased acceptance and usage. It is also imperative for developers of these apps to understand these factors to improve on their design. It is expected that further researches would employ factor analysis to ensure that the dimensional structure of the study constructs is similar to those found in the erstwhile literature.

6. Conflict of interest

The authors have no conflict of interest to declare.

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