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Developing an Instrument to Measure the Adoption of Mobile Devices in the Telehealth Environment

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Full Paper

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Abstract

The aim of this paper is to develop and describe the design process of an integrative tool to measure perceptions and experiences of health professionals for the use of mobile devices in healthcare. Prior researchers used three phases (from 2-4 mentioned in next line) of instrument development, however, this research used four phases to develop an integrative instrument to measure perceptions and experiences of health professionals for the use of mobile devices in telehealth. These four phases are: 1. Themes and factors selection, 2. Item creation, 3. Item refinement and 4. Item testing. The process followed to develop the instrument can be used to develop instruments in other domains. Also, service providers, service designers, management and researchers for understanding perceptions and experiences of health professionals for the use of mobile devices can use the instrument developed in this research.

Keywords Survey, Development, Mobile devices, Adoption, Telehealth,

1 INTRODUCTION

In the health information literature, various tools are used to understand the factors influencing adoption of technology. Some tools are based on human motivation aspects (Yangil and Chen 2007) while others are based on organizational aspects (Wu et al. 2011). Further, some authors used these tools by including and excluding some items in the previously validated instrument (Karahanna et al. 1999). These Tools are mainly used to understand the adoption of various types of Health Information Communication Technology (HIT). One of the most apparent shortcomings of previously developed tools to understand the adoption of HIT is that they are based on understanding the adoption of various other technologies such as mobile devices and m-health but not specifically mobile devices adoption in the Telehealth environment. The adoption of mobile devices in Telehealth has great potential in many Telehealth activities but its adoption is slow in this area (Rani et al.2019). To understand the adoption of mobile devices in telehealth, the measures used in the HIT literature cannot be applied because of technical and contextual differences (Rani et al.2019). Therefore, there is a need to modify the previously developed tools for understanding adoption of mobile devices in the Telehealth context. Further, previous tools developed on HIT adoption mainly focused on individual aspects such as attitude and intention (Karahanna et al. 1999; Mun et al. 2006) but rarely covered technological aspects such as technological features. It is important to understand these technological features because if they are not supportive to users then technology adoption may be dangerous for end users in this domain. Further, health domain is a complex domain where right technological features are really important. For example, if a technology used to calculate the doses of medication depending on patient daily health fails to do so then the patient may die due to intake of overdose or under dose. Therefore, the instrument development process for understanding the adoption of mobile devices in telehealth should be comprehensive; it should reflect all the dimensions of the individual user's behavior in relation with their socio-technological environment; should build explicitly on a testable theory; be multidimensional in content and methodology.

2 LITERATURE REVIEW

Although adoption of mobile devices has drawn increasing attention in the health domain, we have not found any studies which are completely focused on understanding adoption of mobile devices in telehealth except one study (Rani et. al 2019). This may be due to introduction of a relatively new technology concept in Telehealth. When introducing new technology it is difficult to study the factors which influence user intention because of the scarcity of literature. Also, limited literature is available which provide development phases of an instrument development to measure the adoption of any type of technology in healthcare domain, including telehealth. This gap in the literature motivated the researchers to develop the instrument for understanding adoption of mobile devices in Telehealth. Therefore, the aim of this article is to describe the design process and develop an integrative tool to understand the adoption of mobile devices in Telehealth.

Previous literature has rarely mentioned adoption of mobile device adoption in Telehealth. Therefore, before developing an instrument the researchers have tried to build an understanding of technology adoption in the healthcare. An extensive review of previous literature has suggested various factors for understanding adoption of technology in healthcare. Some of these factors are: Intention, Self-efficacy, Social influences, Relative advantages, Compatibility, Complexity, Design and technical concerns, Privacy and security (Bettiga et al. 2019; Byambasuren et al. 2019; Daim et al. 2013; Deng et al. 2013; Hossain et al. 2019; Liew et al. 2019; Mun et al. 2006; Sanders et al. 2012; Shareef et al. 2014; Wu et al. 2007). These factors may be used in this research study in the first phase of survey development because these are validated by previous technology adoption literature. However, they may not provide full understanding of mobile device adoption for survey instrument development as these were either based in understanding adoption of technology from patient's perspective or adoption of technology in general and not particularly in telehealth (McGrath et al. 2019). The researchers have also tried to understand technology adoption in healthcare using various technology acceptance models and theories which have been suggested in the literature to understand users' adoption of technology. Several researchers who worked on consumer adoption behavior, indicated that in the health domain, individuals' fundamental behavior factors could be revealed using Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Unified theory of acceptance and use of technology (UTAUT) and or Diffusion of Innovation Theory (DOI). TAM is widely used to understand individual's adoption of technology behavior but it has limitations when investigating user adoption of mobile services (Moon and Kim 2001). Only two constructs (Perceived usefulness and Perceived ease of use) of TAM may be unable to cover the full range of individual's behavior for the adoption of mobile devices in

Telehealth. TPB is an extension of TRA and seems to be more suitable than compared with TRA to develop an instrument, as including Attitude and the Perceived behavior control TPB also covers Social norms constructs, which is considered important for understanding adoption of technology in literature. However, only one theory (TPB) is partially suitable to develop an integrative tool to understand adoption of mobile devices in telehealth because it does not support usage context constructs. Therefore, there is a need to combine another theory with TPB to develop an integrative tool. DOI contains five constructs (1. Relative advantage, 2. Compatibility, 3. Complexity, 4. Trialability and 5. Observability) and can explain an individual's behavior in context with interaction of technology in a particular usage context and therefore seems suitable. UTAUT unifies more factors and consolidates the functions of the technology acceptance model with the constructs of eight prominent models in Information System (IS) adoption research, but it increases the complexity of its structure, which makes it slightly complicated to develop an instrument in this research. Therefore, TPB and DOI are the theories used for as guiding theories to start the first step of survey instrument development. A detailed explanation of the methodology used to develop survey instrument in this research is provided in the next section.

3 METHODS

The technology adoption literature provides three main steps of survey questionnaire development: item creation, item refinement and item testing (Gao et al. 2011; Kenbubpha et al. 2019). In this research, represented in Figure 1, a themes and factors selection step is added to the development of the survey questionnaire. The themes and factors selection step is important because the survey design process should begin with what is needed in the research and selecting themes and factors is the best way to understand these needs.

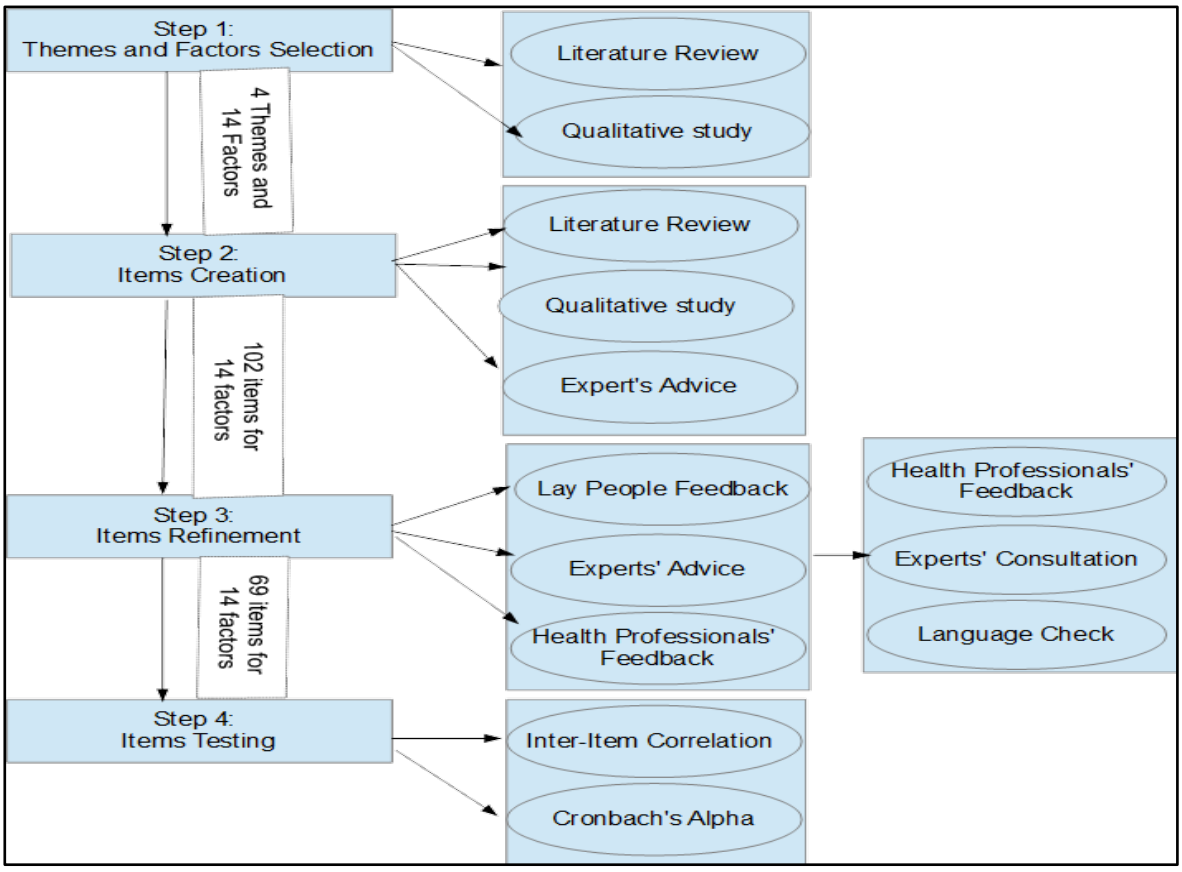

Figure 1: Phases used for developing the instrument

3.1 Step 1: Themes and factors selection

To develop an integrative tool for explaining Healthcare professionals' experiences and perceptions of the use of mobile devices in the Telehealth context, the comprehensive process started with the identification of overarching themes and factors from HIT adoption literature. Three themes initially

considered were: 1. Individual context 2. Usage context and 3. Technological context (Rani 2018: Sood et al. 2016). The detailed explanation about selection of these four themes is provided in Rani (2018)

In the first theme, Individual context, it is important to identify what customers really expect from technology because the chance of adopting a particular technology is reduced if customers consider that their expectations cannot be met (Parasuraman 2000; Tan 2013). In this theme, five factors, three from the TPB (Intention, Social norms and Self-efficacy/Perceived behavior control) and two from the literature (Technology readiness and Demographic factors) were considered. These factors were:

1. Intention
2. Technology readiness
3. Self-efficacy
4. Social influences
5. Demographic factors (Age, Gender and Experience).

Intention was an important factor as user intention is a good indicator of how a system is likely to be accepted in the future (Perkins et al. 2007; Tiong et al. 2006). Individual Self-efficacy and Technology readiness were important because mobile device use in Telehealth demands a certain level of knowledge and skills from the HCPs, with some likely to be confident and ready and others less likely to be so. The Social influences factor was important because the adoption of technology is a socio-technical phenomenon and HCPs (working in the Telehealth environment) may be influenced by their colleagues. Demographic factors were important to study as different HCPs could perceive mobile device use in Telehealth in different ways and their intention to use mobile devices might differ depending upon their Age, Gender and Experience.

The second theme, Usage context, was important because users' concerns and needs vary within the context in which they are using the technology. The Usage context provides an understanding of the ways and circumstances in which a technology is used and adopted. In the Usage context, three factors from the DOI Theory were considered. These factors were:

1. Relative advantage
2. Compatibility
3. Complexity.

These factors were important because technology such as mobile devices are often developed to provide an alternative channel for accessing health services and not to replace the existing health services completely. When a health service is required to be accessed or delivered immediately regardless of time and place barriers, the usefulness, compatibility and ease-of-use of the technology could implicitly influence the users' intention to use it. Hence, initially, these three factors from the Diffusion of Innovation Theory were considered in this theme.

The third theme, Technological context, was important because the healthcare domain deals with the health and life of people. Every second counts in this domain, even the delay of a fraction of a second could cost a life. Under such circumstances, the technology used should have good supporting features for clinical tasks. As a result, one factor, Functional features, was considered vital in this theme.

The themes and factors obtained from the literature and technology adoption theories were further verified as explained further.

3.1.1 verification of the themes and factors

The three themes and nine factors obtained after reviewing the literature were further verified in the Qualitative study using six focus group discussions and two interviews. In these discussions, a Discussion Questions guide containing open-ended questions for the factors considered from the literature review were used for obtaining information from the respondents. Respondents were also asked to give their free and fair opinions of mobile device use in the Telehealth environment. In this process, the Qualitative study showed that most of the factors identified from the literature were significant. One new theme and six new factors also emerged during the Qualitative study. All the themes and factors considered after the Qualitative study for the development of the questionnaire are provided in Table 1.

Themes	Factors	References
Individual context	Intention	(Mun et al. 2006; Wu et al. 2011; Yangil and Chen 2007) and confirmed in qualitative analysis
	Social influences	(Karahanna et al. 1999; Mun et al. 2006; Wu et al. 2011) and confirmed in qualitative analysis

Themes	Factors	References
	Self-efficacy	(Gagnon et al. 2016; Mun et al. 2006; Parasuraman 2000; Wu et al. 2011; Yangil and Chen 2007) and confirmed in qualitative analysis
Usage context	Relative advantage	(Karahanna et al. 1999; Mun et al. 2006; Yangil and Chen 2007) and confirmed in qualitative analysis
	Complexity	(Mun et al. 2006; Wu et al. 2011; Yangil and Chen 2007) and confirmed in qualitative analysis
	Compatibility	(Karahanna et al. 1999; Yangil and Chen 2007) and confirmed in qualitative analysis
	Trialability	(Yangil and Chen 2007) and confirmed in qualitative analysis
Technological context	Functional features	(Gagnon et al. 2016; Kim and Shyam 2014) and confirmed in qualitative analysis
	Security and privacy	(Gagnon et al. 2016; Premarathne et al. 2015) and confirmed in qualitative analysis
	Network coverage	Discovered in qualitative analysis
Organizational context	Training	Discovered in qualitative analysis
	Management support	Discovered in qualitative analysis
	Resource issues	Discovered in qualitative analysis

Table 1: List of themes and factors considered for the development of the survey questionnaire after the Qualitative study

Organizational context emerged as a new theme in the Qualitative study. Earlier, while selecting themes from the literature review, Organizational context was considered unimportant as the development of the questionnaire was focused on the individual level of adoption, and the organizational context appeared to be insignificant and inappropriate. However, this context appeared to be important in the Qualitative study. In the Organizational context theme, six factors emerged in the Qualitative study:

1. Trialability
2. Network Coverage
3. Privacy and security
4. Training
5. Management Support
6. Resource Issues.

These six factors were further confirmed with the literature on technology adoption in healthcare and were included in various themes. They were either considered in the previous three themes or placed into the new theme, Organizational context. The Trialability factor was included in the Usage context as the other three factors in the Usage context were identified from the DOI theory and Trialability was also one of the constructs of the DOI theory. Three factors, Training, Management support, and Resource issues were placed in the Organizational context, as these are the functions of an organization. Two factors, Network coverage and Privacy and security were considered in the Technological context.

Further, during this verification, the Individual's Technology readiness and Self-efficacy factors were merged and represented as Self-efficacy because the respondents' opinions for Technology readiness and Self-efficacy were similar in the Qualitative study. Furthermore, Gender as one of the factors considered in the Individual context, was removed from the study because respondents confirmed that both male and female health professionals were equal in handling and using technology. Hence, the four themes and fourteen factors as given in Table 1 were considered important to the questionnaire design. After that, the second step of item creation for fourteen factors commenced.

3.2 Step 2: Item creation

The survey questionnaire's items were developed from three sources: the literature review, Qualitative study and expert advice. Initially, the items were considered from the literature review and confirmed with the help of the Qualitative study. Then, the items were revised with the help of experts' advice (discussions with two PhD supervisors who are experts in the adoption and implementation of technology research and discussions with other statistical experts). In line with the expert statistical advice, some items from one factor were intentionally retained in another factor enabling the observation of trends in participants' responses. Finally, the items obtained from the Qualitative Phase were tracked back to the literature to avoid any duplication and to write the questionnaire questions in

a standard language style. As a result, 102 items represented in the form of survey questions were developed. Next, the 102 items were reduced to 99 items in Pretesting. These were then reduced to 69 items in pilot testing. A detailed explanation of pretesting and pilot testing including the justification for reducing the number of items used is given in the next step.

3.3 Step 3: Item refinement

In this step, pretesting was conducted to increase the face validity and to identify any particularly ambiguous or redundant items. Pilot testing was conducted to increase item validity.

3.3.1 pretesting

Pretesting is usually conducted with participants who are similar to potential respondents. This Pretesting was conducted with two participants who were similar to the potential respondents, four experts and four lay people. The four experts were comprised of two PhD supervisors expert in the adoption and diffusion of technology literature, and two professors' both expert in statistical analysis. The lay people respondents had no experience working in the health domain, and were not expert in adoption and diffusion of technology literature or statistical analysis of data.

The pre-test began with a brief introduction of the goal of the survey questionnaire. Participants were then asked to read the items and give their feedback on the questions (Gao et al. 2011). The respondents were also requested to interpret the meaning of randomly selected questions to ensure that the questions were correct and understandable to the respondents. A brief description of the feedback obtained in the pretesting is given below:

1. Lay people Feedback

The four lay participants indicated that they found the questions to be understandable. One suggested breaking the questions into two parts: tag line and key idea. That respondent had the perception that breaking the content into two components might reduce the reading content for respondents and so help to obtain good response rates for the survey. One example of breaking questions into two components is:

- I intend to use mobile devices in the Telehealth environment:
- To finish my work timely
- If I have a mobile device
- Whenever I need them.
- The feedback obtained from lay people was further discussed with experts.

2. Experts' Feedback

The two statistical experts approved of breaking the questions into two parts, as suggested by one of the lay people participants (an English professor). The literature also used this method of writing survey questions(Yangil and Chen 2007). However, the two supervisors did not agree with the suggestion. They considered that respondents may have to read the tag line again and again to make sense of each of the survey questions, thus confusing the respondents and resulting in the consumption of even more time to complete the survey. As supervisors were experienced in collecting data in the healthcare context, it was decided to go with the supervisors' advice and each question was written as a full sentence rather than in two parts.

3. Health Professionals' Feedback

After feedback from the experts, the survey was further revised and tested with the two health professionals. These two respondents indicated that the survey questions were clear and made sense but that some questions were repeated and the layout was unattractive, making it difficult to move from one question to another. After careful examination, the repeated questions were eliminated. To make the survey questions more readable and attractive, a new color scheme was implemented to represent question and response options. Pretesting resulted in a reduction of items from 102 to 99, ensured face validity and identified ambiguous and redundant items. Next, the survey containing 99 items was pilot tested with the nine participants.

3.3.2 pilot testing

The pilot testing was conducted to validate the items and remove any redundant items from the survey questionnaire (Zikmund 2010). Nine people (five HCPs, two statistics professors and two supervisors expert in the literature) participated in the pilot test. This number of participants was considered sufficient to achieve the aim of pilot testing (Morgan and Griego 1997). A review of the literature revealed that pilot testing is generally

conducted with respondents who are similar to the sampling frame, however, this pilot study was conducted with a variety of respondents to ensure that the survey questionnaire was simple, understandable, valid and useful for further data collection and statistical analysis (Gillham 2007). The process of pilot testing started with the health professionals' feedback.

1. Health Professionals' Feedback

The pilot testing was conducted with three HCPs. Each went through the questions given in the survey questionnaire and provided their feedback for: a) redundant questions, b) merging of questions, c) rewording of questions, and d) verified convergent and discriminant validity by reshuffling and removing some of the items in the survey. Below is an example of one of the reworded questions:

- Initial question: I intend to use mobile devices in Telehealth context to improve my work.
- Refined question: I intend to use mobile devices in the Telehealth context to improve my work processes and outcome.

After receiving detailed feedback from the health professionals, the researcher revised the survey questions by changing sequence numbers, rewording and deleting/modifying some of the survey questions as per the feedback.

2. Experts' Consultation

After the three health professionals had reviewed the survey questionnaire, a meeting was held with the two experts (supervisors) in the technology adoption and diffusion literature. They guided the researcher to: a) Track back the literature and Qualitative study output to finalize the items, b) Change the layout of the survey, c) Remove the definitions of factors from the survey, d) Include demographic questions at the end of the survey, e) Number the questions in a continuous sequence and f) Include a five point scale (strongly disagree, disagree, neutral, agree, strongly agree) and add an extra scale, 'I do not know'.

During the discussion the two expert supervisors also indicated that most of the proposed items were placed in the right factor category and matched the intended scale. Gao et al. (2011, p. 53) stated that if the placement of the measurement items into the construct categories supplied by the subject was consistent with the initial placement of the items, then it was considered to demonstrate convergent validity of the construct and discriminant validity with the other constructs. Thus, the feedback obtained from the expert supervisors helped to refine the survey questionnaire and also demonstrated the convergent and discriminant validity of the survey questionnaire.

The survey was then tested with two expert statistics professors and received the following feedback: a) Keep the definition and name of the factor to avoid the misinterpretation of the questions, b) Keep the five point scale, and remove 'I do not know' option from the scale as the five point Likert scale is a standard scale mentioned in the literature, c) Do not repeat an item if it shows a relationship with more than one construct, d) However, in rare cases, repeat the item if it shows a relationship with more than one construct to check the respondents' trend for obtaining the responses for repeated item/(s).

The feedback obtained from the two expert statistics professors was discussed with the two expert supervisors. The supervisors suggested removing the definition of the factors. To obtain the feedback for the overall survey and the second opinion concerning keeping or deleting the definitions of factors, the questionnaire was further tested with one of the health professionals and received the following feedback: a) Questions are understandable, b) Keeping the factors' name and their definition in the survey may distract the respondents, c) Too many questions and written content in the survey, d) Text size is appropriate and e) Items are making sense with the factors (convergent validity ensured). At the conclusion of the consultation, the name and definitions of the factors were removed from the survey.

3. Language Check

Finally, the questionnaire was tested for simple English language and spelling mistakes by a university English language professor. After the language check, the final version of the survey (given in Appendix 1) was obtained which contained 14 constructs with 69 items. After revising the survey questionnaire in step three, 69 items were finalized which were represented as 69 questions in the final version.

3.4 Step 4: Item testing

Further, the survey questionnaire containing 69 questions was tested with the 41 HCPs to assess the internal consistency of each construct, which is measured using Cronbach's alpha and Pearson's inter-item correlation. Cronbach's alpha and Pearson's inter-item correlation have been used in other studies and are fairly standard tests in most reliability discussions (Gao et al. 2011; Yangil and Chen 2007). The

literature indicates that ≥ 0.7 values is acceptable for Cronbach's alpha (Barnes and Vidgen 2006; Gao et al. 2011; Lance et al. 2006). However, the sample size suggested in the literature for a sufficiently precise estimate of the Cronbach's alpha is a minimum sample of 300 participants (Yurdugul 2008). In this phase of pilot testing ≥ 0.6 value of Cronbach's alpha was considered acceptable because the questionnaire was tested with a small sample size. The Pearson's inter-item correlation indicates the correlation between two variables. Too high a value (r ≥ 0.8) indicates that two variables are separate identities and too low a value (r < 0.3) indicates that two variables are the same identity and hence both the values are unacceptable.

In this research, the Cronbach's alpha value for most of the constructs was > 0.6 excluding the Training construct as indicated in Table 2, whereas the values for Pearson's inter-item correlations were varied. Some of the correlations were > 0.8 and some had a Pearson's inter-item correlation of < 0.3. Therefore, it was difficult to present the inter-item correlation items. To overcome this problem, averaging all the values of the inter-item correlation matrix in each row and ranking them in ascending order calculated an inter-item correlation rank. After that, in each group of constructs, an item with the lowest correlation rank was identified and if Cronbach's alpha value improved by deleting that item, then it was chosen as the candidate for elimination.

4 RESULTS

Table 2 below indicates the Cronbach's alpha values for each group of constructs before and after deleting the lowest averaged values. From Table 2, it is clear that Cronbach's alpha value improves for most items excluding four: CP4, FF6, MS3 and RI1. This indicates that the remaining ten lowest correlation ranked items can be considered for deletion. More detailed information about deletion of each item can be found on Rani (2018, p 195-197).

Constructs	Number of items in original questionnaire	Cronbach's alpha	Item with the lowest correlation rank	Cronbach's alpha after deleting item with the lowest correlation rank
1. Intention	5	.905	IN5	.906
2. Social influences	5	.883	SI5	.900
3. Demographic factors	4	.660	DC2	.747
4. Relative advantage	4	.936	RA4	.937
5. Complexity	5	.879	CX4	.883
6. Compatibility	5	.920	CP4	.915
7. Trialability	5	.848	TRI5	.888
8. Functional features	6	.881	FF6	.877
9. Network coverage	5	.612	NS5	.821
10. Privacy and security	7	.674	PS1	.814
11. Training	5	.129	TR5	.605
12. Management support	4	.940	MS3	.939
13. Resource issues	5	.936	RS1	.932

Table 2: Cronbach's alpha values for each group of variables/items

Next, to ensure that the domain coverage of the scales did not suffer, the items with the lowest rank and improved alpha values were rechecked. If the domain coverage of the scale for a particular factor was suffering, then that item (for which the correlation rank was lowest and its deletion can improve Cronbach's alpha) was not considered for deletion. As a result of this analysis, ten items (as mentioned in Appendix 1 with an asterisk (*) could be considered for deletion. For example, in the Self-efficacy, item SE3 could be removed because it was the lowest ranked of the four items. Cronbach's alpha value improved from .707 to .805 when item SE3was considered for deletion. The detailed process of each item deletion can be found in the phD thesis entitled "Study to investigate factors influencing adoption of mobile devices in the healthcare environment" (Rani, 2018). However, when researchers looked at the domain coverage, SE3 was covering the domain. Further, the Self-efficacy construct already had four items and the Cronbach's alpha value for the four items was at the acceptable level of ≥ 0.6. Therefore, all Self-efficacy construct items were retained.

5 DISCUSSION AND CONCLUSION

The overall research objective of this study was to develop a measurement instrument for understanding the use of mobile devices in the Telehealth context using a systematic approach. Concerning the research methods for the instrument development, the entire instrument development process was carried out in mainly four steps. In addition to the three steps: item creation, refinement and testing provided in the literature for the instrument development, an additional themes and factors selection phase was also included. Using a four phases' process helped to improve and ensure the validity and reliability of the instrument and has some practical implication for service providers, service designers, management and researchers. The reliability analysis using inter-item correlation and Cronbach's alpha indicated that ten items could be further deleted (represented with * in Appendix 1) from the instrument. However, as the reliability tests were conducted with a small sample size (41) the researchers do not suggest deleting any items yet. Before deleting any items from the instrument, further examination using confirmatory factor analysis is required with a larger sample as indicated in the literature (Nathan 2009).The contribution of this research is to the HIT adoption and survey development literature. The process followed to develop the instrument can be used to develop instruments in health domain as well as other domains. Also, service providers, service designers, management and researchers for understanding perceptions and experiences of health professionals for the use of mobile devices can use the instrument developed in this research.

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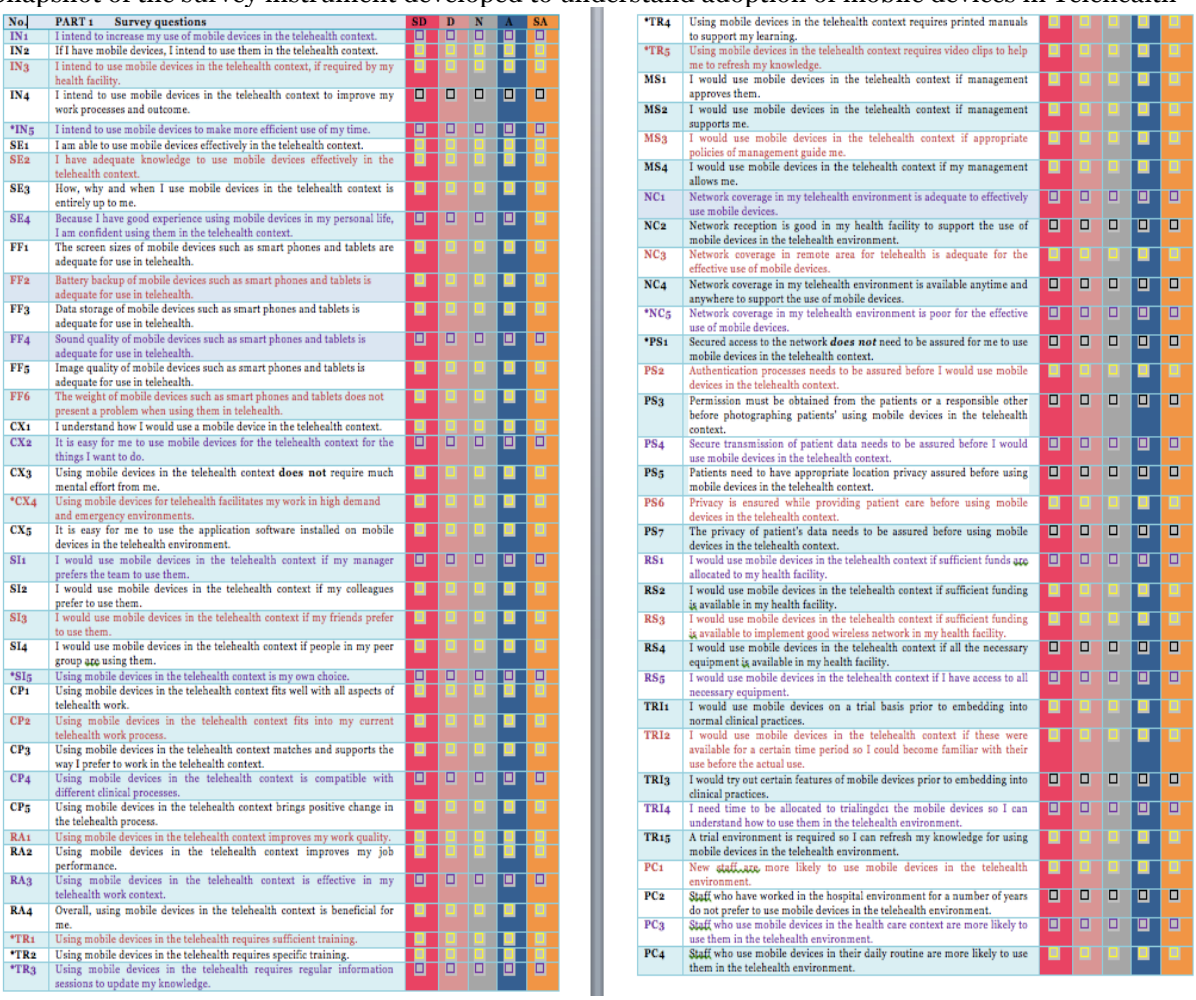
Appendix 1

Snapshot of the survey instrument developed to understand adoption of mobile devices in Telehealth



No.	PART 1 Survey questions	SD	D	N	A	SA
IN1	I intend to increase my use of mobile devices in the telehealth context.					
IN2	If I have mobile devices, I intend to use them in the telehealth context.					
IN3	I intend to use mobile devices in the telehealth context, if required by my health facility.					
IN4	I intend to use mobile devices in the telehealth context to improve my work processes and outcome.					
*IN5	I intend to use mobile devices to make more efficient use of my time.					
SE1	I am able to use mobile devices effectively in the telehealth context.					
SE2	I have adequate knowledge to use mobile devices effectively in the telehealth context.					
SE3	How, why and when I use mobile devices in the telehealth context is entirely up to me.					
SE4	Because I have good experience using mobile devices in my personal life, I am confident using them in the telehealth context.					
FF1	The screen sizes of mobile devices such as smart phones and tablets are adequate for use in telehealth.					
FF2	Battery backup of mobile devices such as smart phones and tablets is adequate for use in telehealth.					
FF3	Data storage of mobile devices such as smart phones and tablets is adequate for use in telehealth.					
FF4	Sound quality of mobile devices such as smart phones and tablets is adequate for use in telehealth.					
FF5	Image quality of mobile devices such as smart phones and tablets is adequate for use in telehealth.					
FF6	The weight of mobile devices such as smart phones and tablets does not present a problem when using them in telehealth.					
CX1	I understand how I would use a mobile device in the telehealth context.					
CX2	It is easy for me to use mobile devices for the telehealth context for the things I want to do.					
CX3	Using mobile devices in the telehealth context **does not** require much mental effort from me.					
*CX4	Using mobile devices for telehealth facilitates my work in high demand and emergency environments.					
CX5	It is easy for me to use the application software installed on mobile devices in the telehealth environment.					
SI1	I would use mobile devices in the telehealth context if my manager prefers the team to use them.					
SI2	I would use mobile devices in the telehealth context if my colleagues prefer to use them.					
SI3	I would use mobile devices in the telehealth context if my friends prefer to use them.					
SI4	I would use mobile devices in the telehealth context if people in my peer group are using them.					
*SI5	Using mobile devices in the telehealth context is my own choice.					
CP1	Using mobile devices in the telehealth context fits well with all aspects of telehealth work.					
CP2	Using mobile devices in the telehealth context fits into my current telehealth work process.					
CP3	Using mobile devices in the telehealth context matches and supports the way I prefer to work in the telehealth context.					
CP4	Using mobile devices in the telehealth context is compatible with different clinical processes.					
CP5	Using mobile devices in the telehealth context brings positive change in the telehealth process.					
RA1	Using mobile devices in the telehealth context improves my work quality.					
RA2	Using mobile devices in the telehealth context improves my job performance.					
RA3	Using mobile devices in the telehealth context is effective in my telehealth work context.					
RA4	Overall, using mobile devices in the telehealth context is beneficial for me.					
*TR1	Using mobile devices in the telehealth requires sufficient training.					
*TR2	Using mobile devices in the telehealth requires specific training.					
*TR3	Using mobile devices in the telehealth requires regular information sessions to update my knowledge.					
*TR4	Using mobile devices in the telehealth context requires printed manuals to support my learning.					
*TR5	Using mobile devices in the telehealth context requires video clips to help me to refresh my knowledge.					
MS1	I would use mobile devices in the telehealth context if management approves them.					
MS2	I would use mobile devices in the telehealth context if management supports me.					
MS3	I would use mobile devices in the telehealth context if appropriate policies of management guide me.					
MS4	I would use mobile devices in the telehealth context if my management allows me.					
NC1	Network coverage in my telehealth environment is adequate to effectively use mobile devices.					
NC2	Network reception is good in my health facility to support the use of mobile devices in the telehealth environment.					
NC3	Network coverage in remote area for telehealth is adequate for the effective use of mobile devices.					
NC4	Network coverage in my telehealth environment is available anytime and anywhere to support the use of mobile devices.					
*NC5	Network coverage in my telehealth environment is poor for the effective use of mobile devices.					
*PS1	Secured access to the network ***does not*** need to be assured for me to use mobile devices in the telehealth context.					
PS2	Authentication processes needs to be assured before I would use mobile devices in the telehealth context.					
PS3	Permission must be obtained from the patients or a responsible other before photographing patients' using mobile devices in the telehealth context.					
PS4	Secure transmission of patient data needs to be assured before I would use mobile devices in the telehealth context.					
PS5	Patients need to have appropriate location privacy assured before using mobile devices in the telehealth context.					
PS6	Privacy is ensured while providing patient care before using mobile devices in the telehealth context.					
PS7	The privacy of patient's data needs to be assured before using mobile devices in the telehealth context.					
RS1	I would use mobile devices in the telehealth context if sufficient funds are allocated to my health facility.					
RS2	I would use mobile devices in the telehealth context if sufficient funding is available in my health facility.					
RS3	I would use mobile devices in the telehealth context if sufficient funding is available to implement good wireless network in my health facility.					
RS4	I would use mobile devices in the telehealth context if all the necessary equipment is available in my health facility.					
RS5	I would use mobile devices in the telehealth context if I have access to all necessary equipment.					
TRI1	I would use mobile devices on a trial basis prior to embedding into normal clinical practices.					
TRI2	I would use mobile devices in the telehealth context if these were available for a certain time period so I could become familiar with their use before the actual use.					
TRI3	I would try out certain features of mobile devices prior to embedding into clinical practices.					
TRI4	I need time to be allocated to trialingdc1 the mobile devices so I can understand how to use them in the telehealth environment.					
TR15	A trial environment is required so I can refresh my knowledge for using mobile devices in the telehealth environment.					
PC1	New staff are more likely to use mobile devices in the telehealth environment.					
PC2	Staff who have worked in the hospital environment for a number of years do not prefer to use mobile devices in the telehealth environment.					
PC3	Staff who use mobile devices in the health care context are more likely to use them in the telehealth environment.					
PC4	Staff who use mobile devices in their daily routine are more likely to use them in the telehealth environment.					

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