

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Healthcare professionals' intention to adopt mobile phone-based SMS and its predictors for adherence support and care of TB patients in a resource-limited setting: A structural equation modeling analysis
AUTHORS	Walle, Agmasie; Hunde, Mekonnen; Workie, Addisalem

VERSION 1 – REVIEW

REVIEWER	Kalayou, Mulugeta Wollo University, Health Informatics
REVIEW RETURNED	31-Dec-2022

GENERAL COMMENTS	<p>1, Title: the title would be good, if you write entitled as "Healthcare professionals' intention to use mobile based short message services and its predictors for adherence support and care of tuberculosis patients in a resource-limited setting: Applying modified UTAUT model"</p> <p>Introduction</p> <p>2. Why you are motivated to study the topics among health care professionals?</p> <p>3. Introduction section you should have to address the gaps of your study</p> <p>Method</p> <p>4. Please rewrite the sampling procedure</p> <p>5. Add outcome variable measurement (operational definition)</p> <p>Result</p> <p>6. The result section is good but please include the proportion of outcome of interest with discussion clearly.</p> <p>7. The establishment of measurement items was fully described but the Cronbach's alpha is not the proper method to confirm the reliability of the measurement tool in this kind of study.</p> <p>8. Measurement model to describe the indicator or the items of unobserved variable, covariance of exogenous variables with respect to their values are needed the confirmatory factor analysis result via figure. As a result, please include it in your manuscript.</p> <p>9. Socio demographic section, in addition, about 228(36.5%) of the respondents were medical doctor professionals, please use other word for "about".</p> <p>Discussion</p> <p>10. At the end of discussion section, please elaborate the theoretical, practical and upcoming research of the implication on your study clearly</p> <p>Conclusion</p> <p>11. Please add the recommendations based on your findings</p>
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	12. Could the authors avoid the composition grammar and language errors throughout the manuscript
REVIEWER	Hoddinott, Graeme Stellenbosch University Faculty of Medicine and Health Sciences, Desmond Tutu TB Centre
REVIEW RETURNED	23-Jan-2023
GENERAL COMMENTS	<p>The co-authors address an important knowledge gap. The sample size and operationalization of the conceptual model to the outcome assessment tool is impressive. I have one general concern and several specific points (noted below).</p> <p>I worry that overall, the evidence presented is that: health workers who say that they expect using mobile phones for adherence support to take a lot of effort, worry about their ability to do so well, who believe that others have similar concerns, and are not well trained / situationally motivated will be less likely to also say that they intend to use mobile phones to adherence support. When packaged in this way (without the complexities of the statistics), I do worry that what you found is pretty expected, and possibly even tautological. I suggest that the authors edit throughout to present more clearly (without acronyms or recourse to the conceptual model's jargon) exactly what it is they found (and did not find) for the readers.</p> <p>Specific edits:</p> <p>Line 60 - We have a mandate from community groups to avoid 'non-compliance' and rather "patients who experience treatment interruptions".</p> <p>Line 93 - The first sentence is unnecessary. It should be true of any published findings. Suggest removing.</p> <p>Line 94 - What is an RHB?</p> <p>Lines 97-101 - Please spell out what the UTAUT acronym means first, then use UTUAT only thereafter. Suggest also that the basic content / message carried in lines 97-101 be moved to the end of the introduction section (i.e., after theoretical background and hypothesis development and before 'method' sub-section).</p> <p>Lines 112-114 - You cannot know now that if adopted your approach will be implemented. Nor is this useful in a background / introduction sub-section. Suggest deleting the relevant sentence.</p> <p>Lines 127 -188 - I suggest that this is unnecessary detail for an empirical manuscript. Instead, refer to the UTAUT as an established conceptual model, justify why you selected it (which you have done), and then briefly summarize its key tenets - all of which could be done in a single paragraph.</p> <p>Lines 191-201 - Some repetition of information on who was offered participation the study here. Could be more succinctly stated.</p> <p>Lines 203-218 - Again, perhaps too much information on processes for determining sample size and not enough focus on the power / effect size the sample size gives.</p>

	<p>Line 219-223 - Again repeats information that participants were sampled from five hospitals in southwest Ethiopia. We already know this from lines 191-201. Instead, what we need to know now is the recruitment processes - how were potential participants identified, approached, consented, what was the refusal rate etc.?</p> <p>Line 228 - What does the sentence "Various professions." mean?</p> <p>Lines 238-239 - The first sentence here seems like a heading / statement, rather than part of the narrative. Perhaps reword as "We calculated the internal consistency ..."</p> <p>Line 389-391 - I'm unclear what data informs this sentence. It seems an author opinion and should be removed?</p> <p>Line 396-398 - This seems completely the wrong conclusion to headlining the sub-section. You did not evaluate the relative suitability of different models. You made a choice to use the UTAUT based on (sound) conceptual / pre-study justifications. The conclusion from your empirical data must be about how you interpret the findings, not the feasibility / suitability of the conceptual model.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1 comments

- Title: the title would be good if you write entitled "Healthcare professionals' intention to use mobile-based short message services and its predictors for adherence support and care of tuberculosis patients in a resource-limited setting: Applying modified UTAUT model"

Authors reply: Thank you very much for giving us specific comments on the changes that need to be made to the title. Based on the comment we revised the title as specific, precise, and give meaning to the reader. Thank you!
- Why you are motivated to study the topics among healthcare professionals?

Authors reply: Thank you very much for your concern. Currently, as an opportunity, mobile cellular penetration in Africa and other regions of the world has been estimated to grow more than ever. Moreover, Evidence showed that mobile technologies had been found useful for resource-limited countries to overcome barriers against access to healthcare and the quality of care delivery. As a result, studies were conducted about the intention level of patients to use mobile health technology but the intention level of healthcare providers to use mobile health with SMS to support patients in the resource-limited setting is uncertain. Thank you!
- Introduction section you should have to address the gaps in your study

Authors reply: Thank you very much for giving us specific comments and based on this we add the gaps of the study from global to our study setting clearly. please have a look at the introduction section. Thank you!
- Please rewrite the sampling procedure

Authors reply: Thank you very much for giving us an important comment. Thus, we modified the sampling procedure in the method section please have a look again. Thank you!
- Add outcome variable measurement (operational definition)

Authors reply: Thank you very much for your necessary comment. Thus, we add details about how to measure the dependent variables in the method section please have a look operational definition section. Thank you!
- The result section is good but please include the proportion of outcome of interest with discussion.

Authors reply: Thank you very much for your fruitful comment. Thus, we add the proportion of dependent variables in the result section and discuss it. please have a look. Thank you!

7. The establishment of measurement items was fully described but the Cronbach's alpha is not the proper method to confirm the reliability of the measurement tool in this kind of study.

Authors reply: Thank you very much for your suggestion. Thus, we remove the Cronbach alpha result in the measurement model section and instead we used a composite variable to measure the reliability of the model. the proportion of dependent variables in the result section and discuss clearly. please have a look. Thank you!

8. Measurement model to describe the indicator or the items of unobserved variable, the covariance of exogenous variables concerning their values are needed the confirmatory factor analysis result via figure. As a result, please include it in your manuscript

Authors reply: Thank you very much for your suggestion. But we already include the figures and results by tables briefly in the measurement model section. please have a look. Thank you!

9. In Socio-demographic section, in addition, about 228(36.5%) of the respondents were medical doctor professionals, please use another word for "about".

Authors reply: Thank you very much for your suggestion. Thus, we used appropriate terms to describe it. Thank you!

10. At the end of the discussion section, please elaborate on the theoretical, practical, and upcoming research of the implication of your study clearly

Authors reply: Thank you very much for your specific comment. Thus, we add the implication of the study in the manuscript. Please have a look at the end of the discussion section. Thank you!

11. Please add the recommendations based on your findings

Authors reply: Thank you very much for your fruitful comment. Based on this suggestion we add a recommendation for future researchers as well as policymakers and health system implementers in the manuscript. Please have a look. Thank you!

12. Could the authors avoid the composition grammar and language errors throughout the manuscript?

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we revised the grammar and punctuation errors throughout the manuscript well. Thank you!

Reviewer 2 comments

1. I worry that overall, the evidence presented is that: health workers who say that they expect using mobile phones for adherence support to take a lot of effort, worry about their ability to do so well, who believe that others have similar concerns, and are not well trained / situationally motivated will be less likely to also say that they intend to use mobile phones to adherence support. When packaged in this way (without the complexities of the statistics), I do worry that what you found is pretty expected, and possibly even tautological. I suggest that the authors edit throughout to present more clearly (without acronyms or recourse to the conceptual model's jargon) exactly what it is they found (and did not find) for the readers.

Authors reply: Thank you very much for giving us a specific and fruitful comment to improve the quality of the manuscript. As a result, we revised it well and modified it. Moreover, specifically, the study showed that healthcare professional effort expectancy had a positive direct effect on attitude and both direct and indirect effects on the intention to use mobile phone SMS. This suggested that when healthcare professionals perceived the system's simplicity or lack of effort in use, their perceptions of its usefulness, attitude, and intention to use mobile phone SMS were significantly improved. Based on this result we recommend to intended healthcare management when implementing the use of mobile phone SMS technologies, the system should be simple for healthcare providers to understand and use to ensure long-term mobile health technology adoption in Ethiopia.

In addition, we present more clearly (without acronyms or recourse to the conceptual model's jargon) exactly what it is they found (and did not find) for the readers in the manuscript. So, identifying necessary variables using recent types of models is critical. Currently, as an opportunity, mobile

cellular penetration in Africa and other regions of the world has been estimated to grow more than ever. Moreover, Evidence showed that mobile technologies had been found useful for resource-limited countries to overcome barriers against access to healthcare and the quality of care delivery. As a result, studies were conducted about the intention level of patients to use mobile health technology but the intention level of healthcare providers to use mobile health with SMS to support patients in the resource-limited setting is uncertain. Healthcare professionals' intention to use mobile SMS was 54.4% and it is high in the Ethiopian context. Finally, Effort expectancy, attitude, and facilitating conditions were the most important factors to improve the level of healthcare professionals' intention to use mobile phone SMS to support TB patients easily in Ethiopia. Thank you!

Specific edits:

2. Line 60 - We have a mandate from community groups to avoid 'non-compliance' and rather "patients who experience treatment interruptions".

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we modified the manuscript please have a look. Thank you!

3. Line 93 - The first sentence is unnecessary. It should be true of any published findings. Suggest removing.

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we removed the unnecessary sentences that you suggest in the manuscript, and please have a look. Thank you!

4. Line 94 - What is an RHB?

Authors reply: Thank you very much for your concern. RHB means regional health bureau, based on this comment we rewrite the full words well and please have a look. Thank you!

5. Lines 97-101 - Please spell out what the UTAUT acronym means first, then use UTUAT only thereafter. Suggest also that the basic content/message carried in lines 97-101 be moved to the end of the introduction section (i.e., after theoretical background and hypothesis development and before the 'method' sub-section).

Authors reply: Thank you very much for your important suggestion. Accordingly, we write the acronym of UTAUT as the unified theory and acceptance of to use of technology. Moreover, we moved the paragraphs to the end of the introduction section, and please have a look. Thank you!

6. Lines 112-114 - You cannot know now that if adopted your approach will be implemented. Nor is this useful in a background/introduction sub-section. Suggest deleting the relevant sentence.

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we removed the unnecessary sentences that you suggest in the manuscript, and please have a look. Thank you!

7. Lines 127 -188 - I suggest that this is unnecessary detail for an empirical manuscript. Instead, refer to the UTAUT as an established conceptual model, justify why you selected it (which you have done), and then briefly summarize its key tenets - all of which could be done in a single paragraph.

Authors reply: Thank you very much for your suggestion. We accept your comment and describe why we used UTAUT model for this study and tried to summarize the variables in a short paragraph and remove the details of the definition for each construct but still, this kind of study (structural equation modeling analysis) mainly focuses on testing the theory(UTAUT model) as the correlation ship, influences, and differences between/among constructs or specifically testing the mediating effect. Accordingly, it needs the procedure to develop or generate the hypothesis from different literature for testing the constructs that influence the outcome of the interest in our study, which is briefly described in the result section based on the hypothesis, whether it was supported or not by each construct or latent variable. Thank you!

8. Lines 191-201 - Some repetition of information on who was offered participation in the study here. Could be more succinctly stated.

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we removed the repeated sentences in the study participant and study area in the manuscript, and please have a look. Thank you!

9. Lines 203-218 - Again, perhaps too much information on processes for determining sample size and not enough focus on the power / effect size the sample size gives.

Authors reply: Thank you very much for your concern. Since the study was structural equation modeling and we applied the free parameter estimation technique, which is the best and representative sample size estimation for SEM analysis based on the following rules for determining model parameters that could be estimated by using our modified model

Rule 1: All the variances of the independent variables are parameters

Rule 2: All covariance between independent variables are parameters

Rule 3: All load factors between latent and its indicators are parameters

Rule 4: All regression coefficients between observed or latent variables are parameters

Rule 5: (i) The variances of dependent variables, (ii) the covariance between dependent variables, and (iii) the covariance between dependent and independent variables, are never parameters (as would be explained by other parameters)

Rule 6: For each latent variable must be set its metric:

Set its variance to a constant (typically 1) and fix a load factor between the latent and its indicator for independent latent. There is only one way to set the metric for the latent dependent: fix a coefficient between it and one of the observed variables to a constant (usually 1). Accordingly, A 1: 10 ratio of responders to free parameters to be estimated was suggested to estimate the sample size based on the number of free parameters in the hypothetical model (32-34). As a result, the minimum sample size necessary was 590, taking into account the 59 parameters that needed to be estimated and taking participants by a free parameter ratio of 10. Since the computed sample size considers the 10% non-response rate. Thus, the final sample size of 649 study participants was calculated. Therefore, the study covers a large sample size, which improved its generalizability. Thank you!

10. Line 219-223 - Again repeats information that participants were sampled from five hospitals in southwest Ethiopia. We already know this from lines 191-201. Instead, what we need to know now is the recruitment processes - how were potential participants identified, approached, consented, what was the refusal rate etc.?

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we modified the manuscript, and please have a look. Thank you!

11. Line 228 - What does the sentence "Various professions." mean?

Authors reply: Thank you very much for giving us specific comments we remove this unnecessary word in the manuscript, and please have a look. Thank you!

12. Lines 238-239 - The first sentence here seems like a heading / statement, rather than part of the narrative. Perhaps reword as "We calculated the internal consistency ..."

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we modified the manuscript, and please have a look. Thank you!

13. Line 389-391 - I'm unclear what data informs this sentence. It seems an author opinion and should be removed?

Authors reply: Thank you very much for giving us specific comments we remove the unnecessary word in the manuscript, and please have a look. Thank you!

14. Line 396-398 - This seems completely the wrong conclusion to headlining the sub-section. You did not evaluate the relative suitability of different models. You chose to use the UTAUT based on (sound) conceptual / pre-study justifications. The conclusion from your empirical data must be about how you interpret the findings, not the feasibility / suitability of the conceptual model.

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we modified the conclusion section of the manuscript, and please have a look. Thank you!

With regards!

Thank you!

VERSION 2 – REVIEW

REVIEWER	Hoddinott, Graeme Stellenbosch University Faculty of Medicine and Health Sciences, Desmond Tutu TB Centre
REVIEW RETURNED	27-Feb-2023

GENERAL COMMENTS	<p>Thank you for the revisions. However, I believe that there are still two substantive problems with the manuscript:</p> <p>1. I still find no appropriate consideration of limitations in the discussion section. The primary one being that these are cross-sectional (correlation, not causality) data which are often different to what actually makes people do / not do something. And yet the authors take the implications as being self-evident points of intervention. E.g., 'people say that they like technology more also more likely to say that they will send sms, therefore try to make people like technology more' is fraught with logical flaws. There is just no discussion of confounders, alternative explanations or other limitations on drawing such conclusions.</p> <p>2. Lines 124-222 is far too much to be devoting to just describing a conceptual model of the potential factors that can be influencing behavioural intentions. This is neither novel (whole sub-disciplines devoted to these models), nor is it useful to reader. I suggest that it continues to obfuscate the core message which is that you the researchers asked some health workers whether or not they intended to use sms reminders and are reporting correlates of that intention.</p>
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VERSION 2 – AUTHOR RESPONSE

Reviewer comments

1. I still find no appropriate consideration of limitations in the discussion section.

The primary one being that these are cross-sectional (correlation, not causality) data which are often different to what actually makes people do / not do something.

And yet the authors take the implications as being self-evident points of intervention. E.g., 'people say that they like technology more also more likely to say that they will send sms,

Therefore try to make people like technology more' is fraught with logical flaws.

There is just no discussion of confounders, alternative explanations or other limitations on drawing such conclusions.

Authors reply: Thank you very much for giving us fruitful comment to improve the manuscript before publication. As a result, we made corrections in the manuscript and draw conclusion and discussed properly through considering the limitation of the study and described and incorporated the limitation of study in the manuscript properly after abstract section which is placed based on journal requirement guideline. e.g this study may be tilted different to what actually makes people do / not do something because it was a cross-sectional survey, it was not supported by qualitative findings and the study was not included private hospitals. Moreover, the implications of the point's intervention were based on the study findings and used the existing literatures via citing or acknowledge the authors properly. Furthermore, this study analysis was multivariate types of analysis, which is important to examine the relationship between multiple independent variables, making clear comparison, discard unwanted information, predict future outcome, correct errors , get new insights

address the confounders' issue and more accurate, realistic and closer to the real life situation than bivariate and univariate types of statistical technique.

Furthermore, we are in an era of exponentially rising disease burden and population health demands, which places a heavy load on managing health systems, particularly in developing nations. Due to the limited resources available, it is even more important to use cutting-edge technological technologies(1). Policymakers have paid very little attention to the use of electronic technologies in Ethiopian healthcare. However, in recent years there has been a resurgence of interest and confidence in its capability to improve healthcare quality and access. The idea for this research was conceived in this context in order to determine whether future users have an open mind to this technology, which may be extremely instructive for introducing healthcare professionals and policymakers to this patient management option. Thank you!

2. Lines 124-222 is far too much to be devoting to just describing a conceptual model of the potential factors that can be influencing behavioral intentions. This is neither novel (whole sub-disciplines devoted to these models), nor is it useful to reader. I suggest that it continues to obfuscate the core message which is that you the researchers asked some health workers whether or not they intended to use sms reminders and are reporting correlates of that intention.

Authors reply: Thank you very much for giving us your significant concern to improve the manuscript. However, the conceptual model we clearly mention in the method section of the manuscript for how to take the important factors which influences intention to use mhealth technology. For this types of study, the most notable model has been introduced as 'Unified Theory of Acceptance and Use of Technology (UTAUT)', which was developed by venkantsh.et.al and the novel to explain the relation of predictors regarding intention to use health information technology. In addition we used the existing studies (intention to use health information technology researches) for improving the conceptual model. This model was extracted from eight previous theoretical models that includes theory of reasoned action (TRA), Social Cognitive Theory (SCT), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Motivational model, Model of PC utilization (MPCU), Combined TAM and TPB (C-TAM-TPB) and Innovation Diffusion Theory (IDT). In 2012, unified theory of acceptance and use of technology developed to predict acceptance and use of technology has been introduced. The aim of this study was adapting Unified Theory of Acceptance and Use of Technology (UTAUT) model in resource limited setting. As a result, this study investigates, introduces, and empirically tests a modified theoretical model based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model to identify the main factors influencing healthcare professionals' intention to adopt and use a mobile phone SMS system.

VERSION 3 – REVIEW

REVIEWER	Hoddinott, Graeme Stellenbosch University Faculty of Medicine and Health Sciences, Desmond Tutu TB Centre
REVIEW RETURNED	06-Jul-2023
GENERAL COMMENTS	<p>I reiterate points made in the previous round of review:</p> <p>1. The reader does not need 3 pages on the UTAUT model. A citation directing the reader to more detail on the UTAUT is sufficient. After reading "A unified theory of acceptance and use of technology (UTAUT) model is currently regarded as the most accurate and up-to-date technology acceptance model used to evaluate intention to use and actual use of technology" (lines 106-108), the reader should be happy to just hear that core concepts of</p>

	<p>UTAUT are BI, PE, EE, SI, FC, and ATT with very brief definitions of each, no need for bolded sub-headings or belaboring the point.</p> <p>2. The limitations on extrapolations from these findings should still be part of the discussion even if they are listed as bullets after the abstract. Currently, throughout the discussion there are postulations about possible explanations for the findings. E.g., line 401-402 "This could be because an individual's attitude...". These should be tempered by references to the limitations of the data at the point at which they are made as claims. If not, then these extrapolations come across as unsubstantiated.</p> <p>3. Some of the existing text and some of the newly added revisions have grammatical errors or the writing could be improved. E.g., line 423 "This study provides theoretical and practical implications based on the findings". Firstly, all implications in every study, not just this one, should be premised on the findings. Secondly, implications are based on author's interpretation of the findings, not done by 'the study'. Another e.g., line 376 "This study was used..." - typo?</p> <p>Overall, I don't know what more to comment. I stand by my original review. I do not believe the comments have been adequately addressed by the response to reviewers or revisions. At this point, I am happy to defer to another reviewer and the academic editor.</p>
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VERSION 3 – AUTHOR RESPONSE

Reviewer 1 comments

1. The reader does not need 3 pages on the UTAUT model. A citation directing the reader to more detail on the UTAUT is sufficient. After reading "A unified theory of acceptance and use of technology (UTAUT) model is currently regarded as the most accurate and up-to-date technology acceptance model used to evaluate intention to use and actual use of technology" (lines 106-108), the reader should be happy to just hear that core concepts of UTAUT are BI, PE, EE, SI, FC, and ATT with very brief definitions of each, no need for bolded sub-headings or belaboring the point.

Authors reply: Thank you very much for giving us specific comments on introduction section, accordingly we tried to minimize the pages and remove bolded sub-headings or belaboring the point. As a result based on the comment, we revised the introduction section properly. However, the extension of pages in introduction section was due to nature of study which is incorporating the hypothesis development for theory constructs. Thank you!

2. The limitations on extrapolations from these findings should still be part of the discussion even if they are listed as bullets after the abstract. Currently, throughout the discussion there are postulations about possible explanations for the findings. E.g., line 401-402 "This could be because an individual's attitude...". These should be tempered by references to the limitations of the data at the point at which they are made as claims. If not, then these extrapolations come across as unsubstantiated.

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we revised line 401-402 and revised discussion section well, moreover we provides/ tempered the references for that possible reasons of the finding. Thank you!

3. Some of the existing text and some of the newly added revisions have grammatical errors or the writing could be improved. E.g., line 423 "This study provides theoretical and practical implications based on the findings". Firstly, all implications in every study, not just this one, should be premised on the findings. Secondly, implications are based on author's interpretation of the findings, not done by 'the study'. Another e.g., line 376 "This study was used..." - typo?

Authors reply: Thank you very much for giving us specific comments to improve the quality of the manuscript. As a result, we revised the grammar throughout the document well and made significant change on implication section of the manuscript after the end of discussion section please have a look. Thank you!

With regards!

Thank you!