

Peer Review File

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Reviewer A

Comment 1:

Line 50/51 It would be useful to also mention healthcare organisations and national health approaches to mHealth dissemination, including the DiGA in Germany, NHS X, and the ORCHA app libraries procured by NHS sites.

Our response to comment 1:

We have added the information to Introduction as suggested.

Changes in the text:

We have added the suggested content (see Page 3, lines 36-40): “Many nations have promoted this technology through national health approaches. For instance, Germany's DiGA allows physicians to recommend digital healthcare apps to their patients. In the UK, NHSX and the NHS ORCHA app library have been launched with the aim to offer the public safe and quality-assured health apps.”

Comment 2:

Line 65 and 67 WTU health-apps, not WTU "for" health-apps

Our response to comment 2:

The phrase "WTU" is no longer in the paper because we significantly changed the content.

Comment 3:

Line 85 this is confusing, are you saying that a survey was conducted during a face-to-face interview?

Our response to comment 3:

We apologize for the unclear presentation. In fact, the data were collected using a self-administered questionnaire. No interviews were conducted during this process. We have revised the writing.

Changes in the text:

We have modified the relevant language (see Page 5, lines 87-88): “A paper-based questionnaire was used to collect the study participants’ sociodemographic information and to administer the DCE.”

Comment 4:

Line 90, you say based on a review of the literature but provide no references. I would expect to see a corresponding reference (preferably more than one) for each attribute to justify its

inclusion in the DCE design. Typically, as per ISPOR best practice guidelines, the choice of attributes would be determined in an iterative process of literature review--> validation in interviews or focus/groups --> DCE. If you are circumventing possibly the most meaningful part of this process, there will need to be good justification for the inclusion of these attributes, to be certain that consumers actually care most about these.

Our response to comment 4:

Thanks for the comment. In the Methods section, we have added a new section with references to provide justifications and citations for the selection of health app attributes.

Changes in the text:

We have added new content accordingly (see Page 7-9, section 2.2, Lines 112-169):

2.2 Health app attributes and corresponding study hypotheses

We identified seven health app attributes that may influence consumers' willingness to purchase health apps. This section introduces the seven attributes and the study hypothesis for each of them.

Usefulness

According to the technology acceptance model (Davis 1985, Davis 1989), perceived usefulness is a key determinant of individuals' intention to use information technology, including health apps (Or and Karsh 2009, Or, Karsh et al. 2011, Yan and Or 2018, Yan and Or 2019). Higher levels of usefulness were hypothesized to improve consumers' perceptions of health apps, making them more willing to accept and use them and increasing their willingness to purchase them. Accordingly, we tested the following hypothesis.

H1: Improvement in the usefulness of health apps is associated with an increase in consumers' willingness to purchase them.

Ease of use

According to the technology acceptance model (Davis 1985, Davis 1989), perceived ease of use directly influences an individual's intention to use information technology and also indirectly influences it by influencing perceived usefulness. Higher levels of ease of use were hypothesized to improve consumers' perceptions of the usefulness of health apps, making them more willing to accept and use them and increasing their willingness to purchase them. Accordingly, we tested the following hypothesis.

H2: Improvement in the ease of use of health apps is associated with an increase in consumers' willingness to purchase them.

Security and privacy

Concerns about security and privacy have been identified as a major barrier to the adoption of health apps (Kutlu and Ozturan 2012, Krebs and Duncan 2015, Peeters, Krijgsman et al. 2016). Consumers may be less likely to purchase health apps when they believe that using them would pose a risk to their information security. Accordingly, we tested the following hypothesis.

H3: Improvement in the security and privacy of health apps is associated with an increase in consumers' willingness to purchase them.

Healthcare professionals' attitude

Healthcare professionals' attitude has been reported to have an impact on the adoption of health apps, as healthcare professionals can explain the benefits of health apps to consumers,

thus encouraging them to purchase and use the apps (Peng, Yuan et al. 2016, Reger, Browne et al. 2017, Collado-Borrell, Escudero-Vilaplana et al. 2018). Accordingly, we tested the following hypothesis.

H4: Improvement in healthcare professionals' attitude toward the consumers' use of health apps is associated with an increase in consumers' willingness to purchase the apps.

Smartphone storage consumption

Smartphone storage consumption has been reported as a factor influencing the adoption of health apps (Velu, van Beukering et al. 2017). Consumers may not purchase a health app if they believe that it will take up too much of their smartphone storage space. Accordingly, we tested the following hypothesis.

H5: A decrease in health apps' smartphone storage consumption is associated with an increase in consumers' willingness to purchase them.

Mobile Internet data consumption

Mobile Internet data consumption has also been reported as a factor influencing the adoption of health apps (Nijland, van Gemert-Pijnen et al. 2011, Simblett, Greer et al. 2018). Consumers may not purchase a health app if they believe that using it will intensely consume mobile Internet data, which will incur additional costs. Accordingly, we tested the following hypothesis.

H6: A decrease in health apps' mobile Internet data consumption is associated with an increase in consumers' willingness to purchase them.

Price

The price of health apps has often been mentioned as a factor influencing their adoption in previous studies (Kutlu and Ozturan 2012, Krebs and Duncan 2015, Peng, Yuan et al. 2016, Simblett, Greer et al. 2018). When the perceived benefits of a health app remain unchanged, a higher price results in more reluctance by consumers to purchase it. Accordingly, we tested the following hypothesis.

H7: A decrease in health apps' price is associated with an increase in consumers' willingness to purchase them.

Comment 5:

A similar comment is applicable to the lack of pilot testing of the DCE and checking for interpretation. This should be mentioned as a limitation.

Our response to comment 5:

We would agree that pilot testing of the DCE is necessary. In fact, prior to data collection, we conducted a pilot test with 12 participants to confirm that participants could understand and complete the DCE. The Methods section has been updated with relevant information.

Changes in the text:

We have added new content accordingly (see Page 5, Lines 102-103): "Prior to data collection, a pilot test with 12 people was conducted to ensure the effectiveness of the experiment and the readability of the questionnaire."

Comment 6:

Line 111, this will need explaining as I am not sure this is correct. Using $N > 500c/(t \times a)$, $c=4$ (as there are four levels on the mobile internet data consumption question), $t = 18$ (as you provided 18 choice sets), and $a = 1$, as each choice is only compared to itself, it isn't like you are comparing two choice sets and asking people to choose their favourite.

Therefore, based on this we have $(500 \times 4) / (18 \times 1) = 111$. Which is almost three times your estimate of 42.

Our response to comment 6:

Thank you for pointing out the error. We have fixed the calculation.

Changes in the text:

We have modified the relevant text (see Page 9, Lines 177-181): “We used Orme’s equation (38) for sample size estimation, $n > \frac{500c}{t \times a}$, where n is the number of participants required, c is the largest number of levels for any one attribute, t represents the number of choice tasks in the DCE, and a represents the number of health apps in a choice task. Therefore, our DCE required no less than 84 participants ($c = 3$, $t = 18$, and $a = 1$).”

Comment 7:

Line 117, you need to mention inclusion criteria somewhere in the manuscript, I assume it was a minimum of 18 years old to answer the DCE. Were there any other inclusion criteria?

Our response to comment 7:

Thank you. The information about inclusion criteria has been revised to improve its clarity.

Changes in the text:

We have revised the content (see Section 2.3., Page 9, Line 174-176): “Individuals were enrolled if they (i) were 18 years or older, (ii) could understand written and spoken Chinese, and (iii) agreed to participate in the study.”

Comment 8:

Line 136, was there no participant information leaflet or consent form? This is a concern and the lack of a participant information leaflet needs to be mentioned as a limitation. The reason is that a lack of time to consider the study, results in people rushing their answers, and occasionally feeling under pressure to respond. This is particularly so if they DCEs were being completed in person.

Our response to comment 8:

We did not use a leaflet, but we collected signed consent forms from participants, and explanations about the experimental procedures were included in the consent form. We agree with the reviewer's concern about participants “rushing their answers” and have included this in the Limitations section.

Changes in the text:

We have now added a description of the collection of signed informed consent form from the participants in the methods section (see Page 10, Lines 186-187): “Eligible individuals were enrolled in the study and asked to provide written informed consent.”

And we also add a discussion of the issue that participants may “rush their answers” during the DCE in the Limitations section (see Page 20, Lines 402-405): “Next, the DCE was performed by the participants in person. This may have put time pressure on the participants, which may have led them to give inaccurate answers because they were rushing to complete the questionnaire.”

Comment 9:

Line 161, which type of logistic regression, mixed logit, MNML? Please specify more clearly.

Our response to comment 9:

We used the standard logit model. We have added a specification for this.

Changes in the text:

We have added a specification (see Section 2.5., Page 10, Lines 195): “A standard logit regression model was used to...”

Comment 10:

Line 181 It is odd to include baseline characteristics for those excluded from the study (n=31). These should be presented only for those whose data is considered in the analysis and for whom the results of the analysis are relevant. Please repeat this Table, instead limiting it to those who were included, i.e. n=561.

Our response to comment 10:

Thank you for the comment. We ran the descriptive statistics again and updated the necessary content.

Changes in the text:

We have adjusted the text and table accordingly (see Page 11, Lines 215-219, Table 3): “Six hundred people agreed to take part in the study, but only 561 provided valid data and were included in our sample and data analysis. Table 3 presents the participants’ sociodemographic characteristics.

Table 3. Sociodemographic characteristics of the sample (N = 561).

Sociodemographic characteristics	N (%)
Gender	
Male	256 (45.6)
Female	305 (54.4)
Age group	
18-24	58 (10.3)
25-34	96 (17.1)

35-44	107 (19.1)
45-54	98 (17.5)
55-64	97 (17.3)
≥65	105 (18.7)
Household size	
1	48 (8.6)
2	119 (21.2)
3	183 (32.6)
4	154 (27.5)
≥5	57 (10.1)
Monthly household income (HK\$)	
<6,000	23 (4.1)
6,000-9,999	20 (3.6)
10,000-14,999	49 (8.7)
15,000-19,999	67 (11.9)
20,000-24,999	54 (9.6)
25,000-29,999	53 (9.5)
30,000-39,999	64 (11.4)
40,000-49,999	80 (14.3)
50,000-59,999	37 (6.6)
60,000-79,999	42 (7.5)
80,000-99,999	31 (5.5)
≥100,000	41 (7.3)
Education	
Some primary school	20 (3.6)
Completed primary school	43 (7.7)
Some secondary school	61 (10.9)
Completed secondary school	152 (27.1)
Diploma, advanced diploma, associate degree, or equivalent	88 (15.7)
Bachelor's degree	125 (22.3)
Master's degree	56 (10.0)
Doctoral degree	16 (2.9)
Had used health apps	
Yes	262 (46.7)
No	299 (53.3)
Had bought health apps	
Yes	56 (10.0)
No	505 (90.0)

”

[Comment 11:](#)

Line 182, the Table says <25, but in the methods it says 18-25, which is it?

Our response to comment 11:

We apologize for the mistake. It should be “18-24”, and we have adjusted the text and the table.

Changes in the text:

We have adjusted the text and the table accordingly (see Page 9, Line 173, and Page 11, Table 3): “18-24”.

Comment 12:

GENERAL COMMENTS

I think having an attribute of usefulness doesn't tell us much. It's like saying compare an app you like and an app you don't like, you will always choose the one you like. Usefulness for me at least, is too subjective of a concept to be included in a DCE, it tells us nothing about the underlying attitudes or beliefs of respondents other than saying people tend to prefer things which are useful to them. This needs noting as a limitation as it is unclear how to use this information going forward, other than saying we must strive to create health-apps which are useful to people. Lines 285-289 insufficient referencing and explanation of findings compared to other studies. It is therefore unclear what this study adds to our current knowledge on this subject, as the current knowledge is not provided. Line 348 The limitations section is far too short. This study has a significant number of methodological, process, and other limitations associated with interpretation which require explanation. Line 356 I feel like "the improvement of health app attitudes", it adds nothing to our current knowledge on this subject. This conclusion requires rewriting to spell out clearly what you found.

Our response to comment 12:

We have carefully considered your comments and believe that the original manuscript had some weak points in terms of expression and discussion. In order to enhance the persuasiveness and contribution of our manuscript, we have extensively revised the manuscript, especially the Introduction and Discussion sections. Additionally, as Davis (1985, 1989) discussed in the technology acceptance model, we believe that health app attributes are important factors in health app acceptance and therefore need to be analyzed as influencing factors. As mentioned earlier, we have added a separate section to the Methods section to explain the reasons for selecting each health app attribute with relevant references, and the hypotheses we have made about them. We have also provided new implications in the discussion section for each influencing factor to help stakeholders better develop, promote, and distribute health apps.

Reference

Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly 1989:319-40.

Davis FD. A technology acceptance model for empirically testing new end-user information systems: Theory and results. Cambridge, MA: Massachusetts Institute of Technology; 1985.

Changes in the text:

We have made significant revisions to the entire manuscript.

Reviewer B

Comment 13:

Thank you for conducting an interesting study. The methods and results are well described. Please just add a limitation with regards to the recruited participants-no information provided on the number of people approached/agreed to participate and no information on their representativeness.

Our response to comment 13:

Thanks for your comment. Unfortunately, we were not able to keep track of the number of people approached. However, a total of 600 people agreed to participate, and we have added a description of this in the Results section. In order to ensure the representativeness of the sample, we recruited the study participants from the general public and stratified the sample by age group (18-24, 25-34, 35-44, 45-54, 55-64, and ≥ 65 years old), gender, and district of residence. In addition, we have added a short discussion on the sample representativeness in the Limitations section.

Changes in the text:

We revised description the sample (see Page 9, line 172-174):“The study sample comprised individuals recruited from the general public in Hong Kong, stratified by age group (18-24, 25-34, 35-44, 45-54, 55-64, and ≥ 65 years old), gender, and district of residence”, and added the number of participants (see Page 11, Lines 215-216): “Six hundred people agreed to take part in the study, but only 561 provided valid data and were included in our sample and data analysis.” Also, we have expanded the Limitations section (see Page 20, Lines 405-408): “In addition, participants who had difficulty going out due to poor health conditions were less likely to be recruited from public places for the study, which may have affected the representativeness of the participants.”