

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Determinants of physicians' online medical services uptake: A cross-sectional study applying social ecosystem theory
AUTHORS	Peng, Xueqing; Li, Zhiguang; Zhang, Chi; Liu, Rui; Jiang, Yongzhi; Chen, Jiayu; Qi, Zixin; Ge, Jinjin; Zhao, Shiqi; Zhou, Meng; You, Hua

VERSION 1 – REVIEW

REVIEWER	Palanica, Adam Klick Health
REVIEW RETURNED	25-Feb-2021

GENERAL COMMENTS	<p>This manuscript is a well-written and interesting article on a valid topic of physicians' use of online medical services. Overall, my comments are minor, and relate to clarification of the methodology. All of my comments are listed below in chronological order (not necessarily in order of importance).</p> <ol style="list-style-type: none"> 1. Abstract: the results are a bit confusing without any context. For example, "willingness to offer OMS was 17.33±4.39" is difficult to interpret without the scale of "5 to 25". Also the term "cognition" is unclear as to what that means? 2. The term "OMS" is used throughout the manuscript but to North American audiences, it would help to clarify that this means "telemedicine" services, which is the more common term. 3. In general, how is OMS implemented in China? Is it simply having access to videoconferencing software (e.g., Zoom, Skype) or is there more training involved? Additionally, does OMS involve videoconferencing or just telephone (i.e., audio only)? This should be clarified in the Introduction. 4. Participants: It would help to clarify the education needed to obtain a medical degree in China. For example, in North America, a medical degree (doctor of medicine, MD) is a postgraduate education. It seems that in China, only an Undergraduate or Master's degree is needed to become a physician? There should be a note to help North American audiences understand this better. 5. Participants: It also states that "Most of them reported having a Master's degree, accounting for 45.7%." However, 45.7% is not considered "most". This needs to be clarified.
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	<p>6. Methods: More clear definitions are needed on macro, micro, meso questions, and perhaps some examples of each to help the audience understand what they mean?</p> <p>7. Related to my first note above, what does “cognition” mean? Does this mean the general mental ability or intelligence of the physicians? Or does this mean their general knowledge on OMS? If that’s the case, the term “knowledge” should be used instead? Also, how was cognition assessed? Was is self-report?</p> <p>8. What does the term “skills” mean? How was this assessed?</p> <p>9. Page 12: For the univariate analysis, instead of saying “irrelevant”, it would be better to say “not statistically significant”, which is more appropriate.</p>
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REVIEWER	Storkey, Prince The University of Newcastle
REVIEW RETURNED	24-Apr-2021

GENERAL COMMENTS	<p>Title: Determinants of physicians’ offerings of online medical services: A cross-sectional study applying social ecosystem theory</p> <p>The aim of this paper is to examine factors associated with physicians’ willingness and actual offerings of online medical services based on social ecosystem theory. A little above half of the participants reported they had conducted OMS.</p> <p>This is an interesting study and authors were able to recruit a large number of participants. However, some revisions need to be made to</p> <p>Abstract Indicate the time duration of the data collection under the setting. E.g. Data was gathered from May 2020 to July 2020.</p> <p>Under the result section (i.e. line 29), authors’ indicate “the score of the physicians’ willingness to offer OMS was 17.33□4.39”. My guess is that the 17.33 is the mean score and 4.39 is the standard deviation. If that is so, can they clarify that instead of saying “the score” which is ambiguous.</p> <p>Instead of just indicating the OR, I think the confidence interval and p-value can be stated in the determinants of the actual offerings.</p> <p>Introduction On line 54, the Authors wrote “delaying the spread of epidemics such as COVID-19”. COVID-19 is considered a pandemic, so I suggest they change the epidemic to pandemic.</p> <p>The authors indicated “Developing OMS has crucial practical value for building health services” (line 57). Please list some of these practical value or benefits.</p> <p>The authors’ mentioned “Moreover, preceding research tends to focus on individual factors”. Please cite these previous studies that have focused on only individual factors</p>
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	<p>Also on line 15, the authors' indicated "there has been little research on SET's application..." but they failed to cite these researches. Please cite these studies.</p> <p>Please expand the Social ecosystem theory.</p> <p>Methodology The sentence "Finally, random sampling surveys were administered in the sample hospitals" is not clear. Was random sampling used to select the 707 participants? If that is what was done, then I suggest that sentenced is restated to suggest that instead of "random sampling surveys"</p> <p>I don't think the authors have provide adequate details for future replication. Not much information has been provided on the procedure for date collection. Did they have to seek permission from the participating hospitals? Was information letter sent to participants prior to data collection? Enough details should be provided to help future researchers who would like to replicate the study.</p> <p>The authors indicated the number of items OMS-related cognition and skills had but failed to indicate the number of items used to measure meso system and macrosystem</p> <p>Is the 0.94 Cronbach's alpha only for the willingness to offer OMS and actual offerings or the entire sale used? If it is only for the willingness to offer and actual offerings, then the Cronbach alpha for the others should be stated.</p> <p>Please explain what the platform construction means and much information on how the scales were scored will be helpful.</p> <p>Results Was there any reason why the unstandardized coefficients were presented and not standardized coefficients?</p> <p>Please indicate the Hosmer-Lemeshow value</p> <p>Discussion The sentence "as shown that more years of work experience physicians actually employing OMS" is not clear.</p>
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REVIEWER	Moy, Amanda Columbia University, Department of Biomedical Informatics
REVIEW RETURNED	25-Apr-2021

GENERAL COMMENTS	<p>In this article, authors investigated the physicians willingness to offer online medical services (OMS) in addition to whether it was actually offered using a survey. Guided by social ecosystem theory, the goal of this study was to identify strategies that would facilitate OMS expansion at all three levels. Considering the rapid expansion of telehealth services during the COVID-19 pandemic, this is an interesting contribution to the literature as there still exists many barriers OMS uptake and expansion; however, this manuscripts does have a few gaps.</p> <p>Major</p>
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	<p>- Methodological details are still unclear. Particularly, authors do not provide adequate description of the survey. For example, why were specific concepts used to represent overarching SET constructs and why were survey items deemed adequate in representing a concept. Moreover, there are some gaps in the analysis.</p> <p>Minor</p> <p>- Re-read for grammar (e.g., page 18 line 46, page 19 line 7, Part ii sentence 1 is a fragmentary sentence, etc).</p> <p>Background</p> <p>- Authors provided comprehensive foundation to the purpose of using SET. The paper would benefit by briefly mentioning the existing applications of SET/social ecological model in the context of telemedicine itself (e.g., see Birama Apho Ly et al. 2017).</p> <p>- It would be worthwhile to mention the impact of the COVID-19 pandemic on OMS since this reemerges in the limitations</p> <p>- Would it be possible to rephrase "offerings"? The term is ambiguous and implies a discussion of many types of telehealth offered.</p> <p>Methods</p> <p>- Reiterate the study population of this survey and briefly mention who was sampled (e.g., attendings? trainees?)</p> <p>- Define what is meant by "valid" surveys. For example, was this based on threshold proportion of survey completion per participant?</p> <p>- Some details are missing; for example, why did authors opt for face-to-face interviews versus a self-administered survey? (see comments on limitations)</p> <p>- Perhaps, an accompanying figure would clearly display for readers how survey concepts specifically mapped to constructs in the framework</p> <p>- The study describes a self-designed survey. More details on how the survey was designed and who was involved should be included. How were the questions selected (e.g., Part i "Question based one SET") and how were they measured? Did researchers evaluate the survey for face or content validity prior to distribution? For example, what does "OMS-related cognition and skills" entail and what are the 5 associated items? How did you select the macro system level survey items? Did you adapt these from another source? Was there a consensus?</p> <p>- Describe how these survey items are defined since these are simply Likert-type ratings and Y/N questions it does not offer much context; a table mapping each item to its definition would be helpful for readers. Perhaps, add the survey as a supplement if possible.</p> <p>- Basic "demographic" characteristics would be clearer</p> <p>- Briefly describe how Cronbach's alpha was computed and what it intended to measure in this study or cite a source.</p> <p>- For the analysis portion, it may make more sense to introduce and describe your independent and dependent variables prior to outlining the statistical analysis plan. Also, clarification on what each statistic is measuring would be helpful to readers; for example, the chi-squared test is grouped will all other statistical analyses which are univariate in nature; however, a chi-square test is a test of independence and therefore, represent bivariable analysis.</p>
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	<p>- How did researcher justify 3 or more correct questions as a “yes”? Explain how “actual” offerings were captured in the survey in the methods section.</p> <p>Results</p> <ul style="list-style-type: none"> - Do you think having a large proportion of physicians working in surgery influenced your results? Was the proportion of participants from community hospitals imbalanced? If so, it may be worthwhile to stratify tables 1 and 2 by hospital type and briefly mention their differences. - It would be nice to see a table of the final models since you opted for stepwise inclusion of covariates. <p>Discussion</p> <ul style="list-style-type: none"> - Interesting that the authors allude to role of media in whether OMS was offered whereas there was no mention in the background and should be addressed earlier. - Since this study took place in China, it would be interesting to hear more about the existing laws and policies (a specific example barrier would suffice). The study they cited took place in Europe and North America. - This study was conducted in the middle of the pandemic, yet there is mention of the potential impact of COVID-19 on these study’s findings. The impact of COVID-19 policy changes and relaxations on telehealth in the U.S. has been huge. Was this survey developed prior to the pandemic? <p>Limitations</p> <ul style="list-style-type: none"> - No mentions of the limitations of surveys and also the possibility of observer bias given the face-to-face nature of survey administration. Also, were the results anonymous? What are your thoughts regarding the external and internal validity of the survey? Due to gaps in the methods regarding description of survey development, I cannot help but infer that some of the survey items may be biased. <p>This paper provides a summary of potential factors that may impact telehealth uptake among physicians. While there are gaps that still need to be addressed and clarified in the methods, there are valuable insights offered.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Dr. Adam Palanica, Klick Health

Comments to the Author:

This manuscript is a well-written and interesting article on a valid topic of physicians’ use of online medical services. Overall, my comments are minor, and relate to clarification of the methodology. All of my comments are listed below in chronological order (not necessarily in order of importance).

1. Abstract: the results are a bit confusing without any context. For example, “willingness to offer OMS was 17.33±4.39” is difficult to interpret without the scale of “5 to 25”. Also, the term “cognition” is unclear as to what that means?

RE :

Thank you for this comment. We have added the range of the OMS uptake willingness (Page 2 line

44). The term “cognition” refers to physicians’ awareness of information about OMS. We’ve replaced it with “awareness of OMS-related information”.

2. The term “OMS” is used throughout the manuscript but to North American audiences, it would help to clarify that this means “telemedicine” services, which is the more common term.

RE :

Thank you for this comment. OMS is not exactly the same as telemedicine. In general, it includes disease consultation, telemedicine, online re-examination, chronic disease management, rehabilitation guidance, etc.[1,2] Out of caution, we decided to still use the term “OMS”, and demonstrated the content contained in OMS. (Page 3 line 83-84)

[1] Shaw T, McGregor D, Brunner M, et al. What is eHealth (6)? Development of a Conceptual Model for eHealth: Qualitative Study with Key Informants. *J Med Internet Res* 2017;19: e324.

[2] CNNIC. The 44th statistical report on Internet development in China. Available: http://www.cac.gov.cn/2019-08/30/c_1124939590.htm (in Chinese)

3. In general, how is OMS implemented in China? Is it simply having access to videoconferencing software (e.g., Zoom, Skype) or is there more training involved? Additionally, does OMS involve videoconferencing or just telephone (i.e., audio only)? This should be clarified in the Introduction.

RE :

Thank you for this comment. Generally speaking, there are many ways to conduct online medical services, such as videoconferencing, telephone audio, text messaging, etc. [1] In China, conducting online medical services usually relies on specific internet medical platforms. For example, the third-party platforms (Doctor Chunyu, WeDoctor, haodf.com, Dingxiangyuan, etc.) and internet hospitals platforms built by physical medical and health institutions. These platforms can provide a variety of ways to conduct online medical services. We have clarified this in the Introduction. (Page3 line 85-89)

[1] Tuot DS, Boulware LE. Telehealth Applications to Enhance CKD Knowledge and Awareness Among Patients and Providers. *Adv Chronic Kidney Dis* 2017;24(1):39-45.

4. Participants: It would help to clarify the education needed to obtain a medical degree in China. For example, in North America, a medical degree (doctor of medicine, MD) is a postgraduate education. It seems that in China, only an Undergraduate or Master’s degree is needed to become a physician? There should be a note to help North American audiences understand this better.

RE :

Thank you for this comment. Indeed, as you mentioned, unlike in North America, becoming a physician in China requires only an Undergraduate or Master’s degree. We have added it as a footnote to table 1.

5. Participants: It also states that “Most of them reported having a Master’s degree, accounting for 45.7%.” However, 45.7% is not considered “most”. This needs to be clarified.

RE :

Thank you for this comment. We have revised this sentence with “Nearly half (45.7%) of them reported having a Master’s degree.” (Page 11 line 250)

6. Methods: More clear definitions are needed on macro, micro, meso questions, and perhaps some examples of each to help the audience understand what they mean?

RE :

Thank you for this comment. We have added the definitions of micro, meso, macro questions and listed some examples in the “Methods” section (Page 7 line 172 to page 8 line 202), and we also submitted our questionnaire (Please see supplementary file 1).

7. Related to my first note above, what does “cognition” mean? Does this mean the general mental ability or intelligence of the physicians? Or does this mean their general knowledge on OMS? If that’s

the case, the term “knowledge” should be used instead? Also, how was cognition assessed? Was it self-report?

RE :

Thank you for this comment. The term “cognition” refers to physicians’ awareness of OMS-related information. We’ve replaced the term in each section involved. It was assessed by five items, and all the questions were information about online medical services that we designed according to the published references.[1] (Page 7 line 177) The participants needed to self-report whether the items (information) correct or not.

[1] National Health Commission of the People’s Republic of China and National Administration of Traditional Chinese Medicine. Notice on printing and distributing three documents including the measures for the administration of Internet diagnosis and treatment (Interim). Available: http://www.gov.cn/gongbao/content/2019/content_5358684.htm (in Chinese)

8. What does the term “skills” mean? How was this assessed?

RE :

Thank you for this comment. The term “skills” refers to the skills necessary to conduct OMS. It was also assessed by five items which we designed according to the published references. [1,2] (Page 7 line 179). The participants needed to self-report whether they possess these skills or not.

[1] Dünnebeil S, Sunyaev A, Blohm I, et al. Determinants of physicians' technology acceptance for e-health in ambulatory care. *Int J Med Inform* 2012;81(11):746-760.

[2] de Souza CHA, Morbeck RA, Steinman M, et al. Barriers and Benefits in Telemedicine Arising Between a High-Technology Hospital Service Provider and Remote Public Healthcare Units: A Qualitative Study in Brazil. *Telemed J E Health* 2017;23(6):527-532.

9. Page 12: For the univariate analysis, instead of saying “irrelevant”, it would be better to say “not statistically significant”, which is more appropriate.

RE :

Thank you for your suggestion. We have revised the corresponding content. (Page 14 line 285-289)

Reviewer: 2

Dr. Prince Storkey, The University of Newcastle

Comments to the Author:

Title: Determinants of physicians’ offerings of online medical services: A cross-sectional study applying social ecosystem theory

The aim of this paper is to examine factors associated with physicians’ willingness and actual offerings of online medical services based on social ecosystem theory. A little above half of the participants reported they had conducted OMS.

This is an interesting study and authors were able to recruit a large number of participants. However, some revisions need to be made to

Abstract

- Indicate the time duration of the data collection under the setting. E.g., Data was gathered from May 2020 to July 2020.

RE :

Thank you for this comment. We have added the duration of data collection in the abstract. (Page 2 line34)

- Under the result section (i.e., line 29), authors indicate “the score of the physicians’ willingness to offer OMS was 17.33±4.39”. My guess is that the 17.33 is the mean score and 4.39 is the standard deviation. If that is so, can they clarify that instead of saying “the score” which is ambiguous.

RE :

Thank you for this comment. In fact, as you said, the 17.33 is the mean score and 4.39 is the standard deviation. We have revised this sentence with “The mean score of the physicians’ OMS uptake willingness was 17.33 (range 5 to 25), with a standard deviation of 4.39”. (Page 2 line 44-45)

- Instead of just indicating the OR, I think the confidence interval and p-value can be stated in the determinants of the actual offerings.

RE :

Thank you for this comment. We’ve stated the 95% confidence interval and p-value in the determinants of the actual offerings. (Page 2 line 49-57)

Introduction

- On line 54, the Authors wrote “delaying the spread of epidemics such as COVID-19”. COVID-19 is considered a pandemic, so I suggest they change the epidemic to pandemic.

RE :

Thank you for your suggestion. We’ve changed the term “epidemic” to “pandemic”. (Page 4 line 98; page 24 line 443)

- The authors indicated “Developing OMS has crucial practical value for building health services” (line 57). Please list some of these practical value or benefits.

RE :

Thank you for this comment. To the best of our knowledge, developing OMS can improve the medical services’ efficiency, narrow the uneven distribution gap of medical resources, reduce health care costs, improve access to services, increase care delivery, and so on. We’ve listed some of these practical value or benefits in the manuscript. (Page 4 line 102-103)

- The authors’ mentioned “Moreover, preceding research tends to focus on individual factors”. Please cite these previous studies that have focused on only individual factors

RE :

Thank you for this comment. We’ve cited the following two studies that have focused on only individual factors (Page 5 line 118):

[1] Mayer G, Gronewold N, Alvarez S, et al. Acceptance and Expectations of Medical Experts, Students, and Patients Toward Electronic Mental Health Apps: Cross-Sectional Quantitative and Qualitative Survey Study. *JMIR Ment Health* 2019; 6: e14018.

[2] Kissi J, Dai B, Dogbe CS, et al. Predictive factors of physicians' satisfaction with telemedicine services acceptance. *Health Informatics J* 2020;26(3):1866-1880.

- Also on line 15, the authors’ indicated “there has been little research on SET’s application...” but they failed to cite these researches. Please cite these studies.

RE :

Thank you for this comment. By literature review, we only retrieved one document that applied the SET/social ecological model in the context of telemedicine itself. We’ve cited this study and briefly described it. (Page 5 line 133-136).

[1]. Ly BA, Labonté R, Bourgeault IL, Niang MN. The individual and contextual determinants of the use of telemedicine: A descriptive study of the perceptions of Senegal's physicians and telemedicine projects managers. *PLoS One*. 2017;12(7): e0181070. Published 2017 Jul 21. doi:10.1371/journal.pone.0181070

- Please expand the social ecosystem theory

RE :

Thank you for this comment. Social ecosystem theory (SET) involves humans and their living environments and states that individual behaviour is affected by many internal and environmental

factors, forming micro, meso, and macro ecosystems, respectively. In the micro system, it pertain to individual demographics, health conditions, awareness of information, skills and others; the meso system mainly entails those directly related to individuals, such as families, communities, organizations, institutions, etc; and the macro system usually includes policies, culture, social norms, and so on. [1]

We've expanded these contents in the introduction. (Page 5 line 122-126).

[1] Davison KK, Birch LL. Childhood overweight: a contextual model and recommendations for future research. *Obes Rev* 2001;2(3):159-171.

Methodology

- The sentence "Finally, random sampling surveys were administered in the sample hospitals" is not clear. Was random sampling used to select the 707 participants? If that is what was done, then I suggest that sentenced is restated to suggest that instead of "random sampling surveys"

RE :

Thank you for this comment. We've modified it according to your suggestion in the "Study design and participants" section. (Page 6 line 150-157).

- I don't think the authors have provide adequate details for future replication. Not much information has been provided on the procedure for data collection. Did they have to seek permission from the participating hospitals? Was information letter sent to participants prior to data collection? Enough details should be provided to help future researchers who would like to replicate the study.

RE :

Thank you. It's a very interesting and constructive comment. We've made a major revision in the "Study design and participants" section We don't need to seek the permission from the participating hospitals. Before data collection, we invited the head of the department sent a notice to invite physicians (with the job title of resident physician and above) to participate in our survey, and to determine the time and place of the investigation. There was an information letter at the beginning of the questionnaire to inform the purpose, significance, main content, information security, etc. of the survey. More details about the data collection had been elaborated (Page 6 line 145-158).

- The authors indicated the number of items OMS-related cognition and skills had but failed to indicate the number of items used to measure meso system and macrosystem

RE :

Thank you for this comment. There were 7 and 5 items used to measure meso system and macro-system, respectively. We've indicated it in measurement tools under the methods. (Page 8 line 188; page 8 line 195).

- Is the 0.94 Cronbach's alpha only for the willingness to offer OMS and actual offerings or the entire sale used? If it is only for the willingness to offer and actual offerings, then the Cronbach's alpha for the others should be stated.

RE :

Thank you for this comment. The 0.94 Cronbach's alpha was only for the OMS uptake willingness, we've clarified this in the manuscript. (Page 9 line 209-211). The measurement of the OMS uptake willingness was a five Likert's scale, with 5 items. However, the other questions of our questionnaire were not scale items, so we couldn't calculate the other Cronbach's alpha.

- Please explain what the platform construction means and much information on how the scales were scored will be helpful.

RE :

Thank you for this comment. The platform construction refers to the features of the platforms used to conduct OMS, including three aspects: legitimacy, humanistic care for physicians, and the proportion of withdrawing diagnostic fees. Each aspect was measured by one question, with an answer of Yes

(scored 1)/ No (scored 0). (Page 8 line 198-202).

Results

- Was there any reason why the unstandardized coefficients were presented and not standardized coefficients?

RE :

Thank you for this comment. According to Wang et al. [1], the standardized coefficients are the effect of each variable on the dependent variable without affecting other independent variables, which can also be used to assess importance of the influence of these variables. The unstandardized coefficients reflect the degree of correlation between the independent variable and the dependent variable after excluding the influence of other variables. Relatively speaking, the comparison of the unstandardized coefficients to determine the internal relationship between the variables will be more real and reliable. In this study, our purpose was to explore the predictive factors that influence OMS uptake without focusing on the importance of these factors. Therefore, we only presented the unstandardized coefficients when interpreting the results. But we've showed both the standardized regression coefficients and unstandardized coefficients of all statistically significant influencing factors in Table 4.

[1] Wang, H.Y., Yang, F.T., Liu, L. Comparison and Application of Standardized Regressive Coefficient & Partial Correlation Coefficient. THE JOURNAL OF QUANTITATIVE & TECHNICAL ECONOMICS, 2006, 23(9): 150-155.

- Please indicate the Hosmer-Lemeshow value

RE :

Thank you for this comment. The Hosmer-Lemeshow test showed that the χ^2 value was 4.517, and the p value was 0.808. We've indicated the values in the manuscript. (Page 18 line 330)

Discussion

- The sentence "as shown that more years of work experience physicians actually employing OMS" is not clear.

RE :

Thank you for this comment. We've revised this sentence with "which physicians with more years of work experience were more likely to actually employ OMS". (Page 20 Line 366)

Reviewer: 3

Ms. Amanda Moy, Columbia University

Comments to the Author:

In this article, authors investigated the physicians' willingness to offer online medical services (OMS) in addition to whether it was actually offered using a survey. Guided by social ecosystem theory, the goal of this study was to identify strategies that would facilitate OMS expansion at all three levels. Considering the rapid expansion of telehealth services during the COVID-19 pandemic, this is an interesting contribution to the literature as there still exists many barriers OMS uptake and expansion; however, this manuscript does have a few gaps.

Major

- Methodological details are still unclear. Particularly, authors do not provide adequate description of the survey. For example, why were specific concepts used to represent overarching SET constructs and why were survey items deemed adequate in representing a concept. Moreover, there are some gaps in the analysis.

RE :

Thank you very much! We have taken your opinions seriously and made a lot of modifications accordingly, especially in the methods section. Please see the following responses to specific comments for detail.

Minor

- Re-read for grammar (e.g., page 18 line 46, page 19 line 7, Part ii sentence 1 is a fragmentary sentence, etc).

RE :

Thank you for this comment. We've carefully checked these sentences and revised. (Page 20 line 359; Page 20 line 366; Page 9 line 204)

Background

- Authors provided comprehensive foundation to the purpose of using SET. The paper would benefit by briefly mentioning the existing applications of SET/social ecological model in the context of telemedicine itself (e.g., see Birama Apho Ly et al. 2017).

RE :

Thank you for this comment. By literature review, we only retrieved one relevant document. In Ly et al's study,[1] they also applied the social-ecological framework to explore the individual and contextual determinants of telemedicine utilization among Senegal's physicians. But they merely explored the meso and macro level contextual determinants by qualitative interview. We've adopted your suggestion to briefly mention the existing applications of SET/social ecological model in OMS. (Page 5 line 133-136).

[1] Ly BA, Labonté R, Bourgeault IL, Niang MN. The individual and contextual determinants of the use of telemedicine: A descriptive study of the perceptions of Senegal's physicians and telemedicine projects managers. PLoS One. 2017;12(7): e0181070. Published 2017 Jul 21. doi:10.1371/journal.pone.0181070

- It would be worthwhile to mention the impact of the COVID-19 pandemic on OMS since this reemerges in the limitations

RE :

Thank you for this comment. Under the influence of the COVID-19 pandemic, the utilization of OMS in many countries has risen rapidly,[1] as well as in China. We've mentioned it in the background. (Page 4 line 99-100)

[1] Sun S, Yu K, Xie Z, et al. China empowers Internet hospital to fight against COVID-19. J Infect 2020;81(1): e67-e68.

- Would it be possible to rephrase "offerings"? The term is ambiguous and implies a discussion of many types of telehealth offered.

RE :

Thank you for your suggestion. We've rephrased the term "offerings" with "uptake".

Methods

- Reiterate the study population of this survey and briefly mention who was sampled (e.g., attendings? trainees?)

RE :

Thank you for this comment. In this study, the participants were the physicians with the job title of resident physician and above, excluding interns. The job title was one of the basic demographic characteristics in the questionnaire, and its specific distribution was shown in table 1. We've reiterated our study population of this survey. (Page 6 line 150)

- Define what is meant by "valid" surveys. For example, was this based on threshold proportion of survey completion per participant?

RE :

Thank you for this comment. The term "valid surveys" in this manuscript is easily misleading. In fact, the "valid" surveys were these who completed the questionnaire. We've reiterated it. (Page 6 line 155-

157)

- Some details are missing; for example, why did authors opt for face-to-face interviews versus a self-administered survey? (See comments on limitations)

RE :

Thank you for this comment. It's our negligence that we didn't describe the detail process. We've modified it accordingly. (Page 6 line 145-158) Specifically, during the investigation, we summoned the participants to department conference rooms together, and invited them to complete a structured questionnaire within 30 minutes. And the investigators introduce this study and the participants gave the informed consent face-to-face. All participants answered the questionnaire anonymously by themselves. Therefore, although the survey was conducted face-to-face with the investigator and the participant, in a strict sense, the questionnaire was still a self-administered survey.

- Perhaps, an accompanying figure would clearly display for readers how survey concepts specifically mapped to constructs in the framework

RE :

Thank you. It's a very interesting and constructive comment. We've depicted a figure and showed it the manuscript.

Figure1 The constructs of the OMS uptake questionnaire based on SET

- The study describes a self-designed survey. More details on how the survey was designed and who was involved should be included. How were the questions selected (e.g., Part i "Question based one SET") and how were they measured? Did researchers evaluate the survey for face or content validity prior to distribution? For example, what does "OMS-related cognition and skills" entail and what are the 5 associated items? How did you select the macro system level survey items? Did you adapt these from another source? Was there a consensus?

RE :

Thank you for these interesting and constructive comments. We've made a lot of modifications on the "Measurement tools" section. (Page 7 line 160- Page 9 line 215).

The design processes of the study are as follows: Firstly, our research team formulated the initial questions pool by learning the SET framework and referencing the OMS utilization-related published studies. Secondly, through multiple discussions between study team members, we drafted the first version of questionnaire. To ensure the content validity of the questionnaire, we invited experts to review the first draft of the questionnaire and modified it according to their comments. Thirdly, we piloted the questionnaire among 20 physicians from different hospitals to test if the questions were understandable and clear. Finally, after re-review by experts, we formed the latest version of questionnaire.

All the Part I questions were adapted from the existing published source and the SET's definitions and contents. Except for the OMS uptake willingness in Part II measured by Likert-type rating scale items, almost all of them were measured by Yes/No questions. (See the supplementary file 1 for the questionnaire)

Throughout the questionnaire designation, we consulted experts several times and adopted their comments to modify the contents and items of the questionnaire. And we piloted our questionnaire prior to the formal survey. Therefore, we think that the questionnaire has certain content validity. "OMS-related cognition" (Rephased to "OMS-related knowledge") entails information about OMS, and "OMS-related skills" entails some of the skills necessary to uptake OMS. The items were derived from the official documents or published studies. Similarly, the items of the meso and macro system level were derived from the published sources. We've cited the sources that we referenced in the manuscript accordingly.

- Describe how these survey items are defined since these are simply Likert-type ratings and Y/N

questions it does not offer much context; a table mapping each item to its definition would be helpful for readers. Perhaps, add the survey as a supplement if possible.

RE :

Thank you for this comment. We have added our questionnaire as a supplement (See the supplementary file 1). There are four question types in the questionnaire: general single choice (such as gender, job title, etc.), fill in blank (E.g., birthdate), Yes/No question, and Likert-type ratings items. For the Yes/No question, we assigned a value of 1 for “Yes” and 0 for “No”. For the Likert-type ratings items, each item ranged from absolutely disagree (1 point) to absolutely agree (5 points). We’ve clarified it in the manuscript. (Page 9 line 207-208).

- Basic “demographic” characteristics would be clearer

RE :

Thank you for your suggestion. We’ve changed the phrase “basic characteristics” to “basic demographic characteristics”. (Page 7 line 173).

- Briefly describe how Cronbach’s alpha was computed and what it intended to measure in this study or cite a source.

RE :

Thank you for this comment. The Cronbach’s alpha was calculated on the OMS uptake willingness scale to verify that this scale which designed by ourselves has good internal consistency and reliability. (Page 9 line 209-211).

- For the analysis portion, it may make more sense to introduce and describe your independent and dependent variables prior to outlining the statistical analysis plan. Also, clarification on what each statistic is measuring would be helpful to readers; for example, the chi-squared test is grouped will all other statistical analyses which are univariate in nature; however, a chi-square test is a test of independence and therefore, represent bivariable analysis.

RE :

Thank you for these constructive comments. We have made a lot of modifications in “Data analysis”. In this study, there were dependent variables, one was the OMS uptake willingness, and the other one was actual OMS uptake. The independent variables were micro, meso, and macro system-related factors based on SET. We have introduced and described them prior to the statistical analysis plan. (Page 9 line 217-224) Also, we have supplemented the content of the univariate analysis (Page 10 line 227-234).

- How did researcher justify 3 or more correct questions as a “yes”? Explain how “actual” offerings were captured in the survey in the methods section.

RE :

Thank you for this comment. After careful consideration, we think that the way we justify 3 or more correct questions as a “yes” in the OMS related information and skills was improper. Therefore, we justified 3 or more correct questions as “physicians possessed sufficient OMS related awareness and skills”; otherwise, the physicians didn’t possess sufficient OMS related awareness and skills. We’ve modified it. (Page 9 line 220)

The actual OMS uptake was measured by one question—“Have you used OMS to provide medical services to patients before?”. If the physicians answered “Yes”, it meant that they have actually provided OMS; otherwise, they hadn’t provided. We’ve explained it in the methods section. (Page 9 line 211-214).

Results

- Do you think having a large proportion of physicians working in surgery influenced your results? Was the proportion of participants from community hospitals imbalanced? If so, it may be worthwhile to stratify tables 1 and 2 by hospital type and briefly mention their differences.

RE :

Thank you for these comments.

In our study, we did not consider the difference between surgery and internal medicine, because surgeons, such as renal surgery, cardiothoracic surgery and other surgical outpatient experts, also have the opportunity to actively carry out OMS (e.g., interpreting imaging results), so we believe that there is not much difference between physicians and surgeons in conducting online medical services. Also, surgeons can carry out online medical services in China, so we think that having a large proportion of surgeons does not differ for the results.

There is indeed an imbalance between the proportion of participants from community hospitals and general hospitals. Limited by the small number of medical staff in community hospitals, participants from community hospitals accounted for only a small proportion. We've stratified Table 1 and Table 2 by hospital type, and found that physicians in the two hospital types did not differ too much in the constituent ratios of almost all variables. (Page 11 line 255-258; page 11 line 260-261; Page 13 line 277-281)

- It would be nice to see a table of the final models since you opted for stepwise inclusion of covariates.

RE :

Thank you for this comment. The contents shown in the table were all determinants of the final model, and constant variables have been added in Table 4 and Table 5.

Discussion

- Interesting that the authors allude to role of media in whether OMS was offered whereas there was no mention in the background and should be addressed earlier.

RE :

Thank you for this comment. The role of media orientation is, in a sense, a manifestation of social culture, which belongs to the scope of the macro system in SET. To the best of our knowledge, there has been no previous study taking media orientation as an independent factor to explore its impact on physicians' OMS uptake. In the study questionnaire of Ma et al.,[1] one item was that "The media's strong publicity will encourage me to try online medical services." However, this item was only one of five items used for measuring the social impact dimension of the Unified theory of acceptance and use of technology (UTAUT), not an independent variable. Some other studies in the health behaviour field have already confirmed the effect of media orientation. Provoked by these above, we designed one item to tested the media orientation impact on physicians' OMS uptake. Therefore, we only mentioned it in detail in the "Measurement tools" rather than in the "Background". (Page 8 line 194)

[1] Ma CY, Wang QZ. An empirical study on physicians' willingness to adopt online medical service platform and its influencing factors. *Chinese Journal of Health Policy* 2018;11(6):58-73. (in Chinese)

- Since this study took place in China, it would be interesting to hear more about the existing laws and policies (a specific example barrier would suffice). The study they cited took place in Europe and North America.

RE :

Thank you for this comment. In China, although, a series of policies and laws have been issued to promote the development of OMS, they were still imperfections and not been implemented very well,[1] which exacerbated physicians' worries and hesitations about OMS. In Cai et al.'s study in Gansu Province of China, one of the reasons why physicians are reluctant to participate in telemedicine in the future was the imperfect laws and regulations. [2] We have added these contents in the "Macro system factors" section under the "Discussion". (Page 22 line 394-399)

[1] Ge PN, Zhao Y, Han CX. Problems and Countermeasures on the Implementation of Internet Medical Policy—An Analysis Based on Smith Model. *Health Economics Research* 2021; 38(1):17-21. (in Chinese)

[2] Cai H, Wang H, Guo T, et al. Application of Telemedicine in Gansu Province of China. *PLoS One*

2016;11(6): e0158026.

- This study was conducted in the middle of the pandemic, yet there is mention of the potential impact of COVID-19 on these study's findings. The impact of COVID-19 policy changes and relaxations on telehealth in the U.S. has been huge. Was this survey developed prior to the pandemic?

RE :

Thank you for this comment. This study was conducted in June 2020, that is, the study was conducted when the COVID-19 pandemic had been well controlled in China, rather than prior to the pandemic. We acknowledged that COVID-19 promotes OMS utilization, which was also mentioned in "Limitation". However, the impact of COVID-19 cannot be eliminated in the short term, even in the post-pandemic era when COVID-19 vaccines are popularized and COVID-19 is gradually being effectively controlled. Therefore, whether there are systematic obstacles to the use of OMS is an important issue that needs to be paid attention to in the long term and in the future.

Limitations

- No mentions of the limitations of surveys and also the possibility of observer bias given the face-to-face nature of survey administration. Also, were the results anonymous?

RE :

Thank you for this comment. In our study, although we conducted the survey face-to-face with the investigator and the participant, to be precise, the questionnaire was filled out by the participants themselves. Specifically, we summoned the participants to department conference rooms together, and invited them to complete a structured questionnaire within 30 minutes. After the introduction of this study purpose and informed consent, all participants answered the questionnaire anonymously by themselves. We've been clarified these in detail in the method section. Therefore, we inclined to believe that the possibility of observer bias is small.

- What are your thoughts regarding the external and internal validity of the survey? Due to gaps in the methods regarding description of survey development, I cannot help but infer that some of the survey items may be biased.

RE :

Thank you for this comment. For the internal validity of the survey, we develop all survey items by referencing published resources and the content and definition of the SET. We have made a detailed complementary in the method section. (Page 7 line 160 - page 9 line 214) Therefore, we think that, to an extent, the survey has internal validity. For the external validity of the survey, limited by the small number of medical staff in community hospitals, participants from community hospitals accounted for only a small proportion. Therefore, the research results need to be cautious when interpreting physicians' determinants in primary hospitals. We will expand the sample size of community hospital physicians in the future to carry out targeted research. We've added this limitation in the manuscript. (Page 24 line 440-443) Nevertheless, due to the extensive existence of factors based on SET, some of the study results may inspire research into other areas besides the study sites.

This paper provides a summary of potential factors that may impact telehealth uptake among physicians. While there are gaps that still need to be addressed and clarified in the methods, there are valuable insights offered.

VERSION 2 – REVIEW

REVIEWER	Palanica, Adam Klick Health
REVIEW RETURNED	10-Aug-2021

GENERAL COMMENTS	All of my comments have been adequately answered. Thanks to the authors for the responses!
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REVIEWER	Storkey, Prince The University of Newcastle
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REVIEW RETURNED	27-Aug-2021
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GENERAL COMMENTS	Thank you for responding to my comments and revising the paper. It is looking good and I do not have any further comments. Thanks
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REVIEWER	Moy, Amanda Columbia University, Department of Biomedical Informatics
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REVIEW RETURNED	01-Sep-2021
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GENERAL COMMENTS	Thank for you for the opportunity to review the manuscript. This is an interesting study and the use of the SET framework is a major strength of this paper. There are a few orthographic errors remaining throughout in addition to gaps in limitations (e.g., inherent limitations in the use of surveys) which need to be corrected prior to publication; however, authors have adequately addressed all major concerns.
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VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

Dr. Adam Palanica, Klick Health

Comments to the Author:

All of my comments have been adequately answered.

Thanks to the authors for the responses!

RE :

Thank you very much for your comments.

Reviewer: 2

Dr. Prince Storkey, The University of Newcastle

Comments to the Author:

Thank you for responding to my comments and revising the paper. It is looking good and I do not have any further comments. Thanks.

RE :

Thank you very much for your comments.

Reviewer: 3

Ms. Amanda Moy, Columbia University

Comments to the Author:

Thank for you for the opportunity to review the manuscript. This is an interesting study and the use of the SET framework is a major strength of this paper. There are a few orthographic errors remaining throughout in addition to gaps in limitations (e.g., inherent limitations in the use of surveys) which need to be corrected prior to publication; however, authors have adequately addressed all major concerns.

RE :

Thank you very much for your comments.

We've added the limitation posed by the self-administered questionnaire survey in the "Limitation" section. (Page 24, line 441-443)

We've carefully checked and corrected the orthographic errors in the manuscript. And we have previously asked a professional institution (Editage (www.editage.cn)) to polish the language and grammar of this article. (See the supplementary file for the editing certificate.)