Massive Open Online Course (MOOC) Opportunities in Health Education (HE) in a mandatory social isolation context [version 2; peer review: 1 approved with reservations, 1 not approved]

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Abstract

Background: Routine care for prevention and health promotion has reduced significantly due to the Covid-19 pandemic and mandatory social isolation measures. In this context, it is necessary to identify and describe Massive Open Online Courses (MOOCs) that provide opportunities for health education, promotion, and prevention aimed at the general population. The study is a systematic review of MOOCs on health education, health promotion, and prevention for the general population in a pandemic context.

Methods: We developed a search for MOOC courses aimed at the general population on health education, health promotion, and prevention in different available MOOC platforms. We executed a descriptive analysis of the main characteristics of the selected MOOCs. Terms such as healthy living, physical activity, healthy eating, mental health, and variants aimed at the general population were explored. We did not include advanced or specialized studies aimed only at professionals that required prior knowledge. A descriptive analysis of the main characteristics of the selected MOOCs was performed.

Results: There were 117 MOOCs chosen on health education, promotion, and prevention for the general population. Coursera (40.3%) was the platform that offered the highest quantity of MOOCs; more than half of the MOOCs were in English (52.9%). The median (interquartile range) duration of the selected MOOCs was 11 (6–15)
hours. The predominant themes were "Health promotion" (43%) and "Food and nutrition" (31%), and the origin was mainly from Europe (37.8%).

**Conclusions:** Potentially MOOCs could improve access to massive open online public health courses. Adaptation to different languages and topics needed for each context could increase access to important health promotion messages, even outside of "times of pandemic and enforced social isolation".

**Keywords**
health education, MOOC, eHealth, digital health literacy, eLearning, Social isolation
Introduction

In December 2019, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) triggered the COVID-19 pandemic. As of February 1, 2021, the cases amounted to 134,228,450, with 2,229,565 deaths worldwide. The countries with the highest fatality due to COVID-19 are mostly low-middle-income countries (LMICs) with precarious health systems or those that have already collapsed. The efforts of primary care services have been focused on containing the COVID-19 pandemic, so there is great concern about the neglect of routine care and preventive health visits, reduction in access to medical doctors, drugs and growth monitoring during the lockdown period. Also, disruptions in drug supply chains are likely associated with defaulters on immunization schedules, which may lead to future outbreaks of preventable diseases such as diphtheria. Researchers suggest that maternal and child health neglect in LMICs could be devastating in a context where maternal deaths could increase up to 60% and infant mortality up to 41%. The control of endemic infectious diseases, such as malaria, as well as chronic non-communicable diseases (NCDs), such as hypertension and diabetes, have been neglected or suspended, and there has been an increase in mental illnesses such as anxiety, depression, and suicide. Furthermore, there is a concern of the population to visit health systems for their routine care for fear of contagion. Against this, some countries implemented remote healthcare systems (teleconsultation) and health communication campaigns. However, these strategies have been insufficient to cover the demand for healthcare affected by the pandemic and mandatory social isolation measures.

The pandemic context calls for innovation of strategies to help counteract the neglect of non-COVID-19 diseases in health systems. Class Central, a website that offers online courses, described in its December 2019 report that MOOCs had 110 million students worldwide, excluding China. In addition, according to Shravan Goli, chief product officer at MOOCs provider Coursera, between March 17 and April 16, 2020, international enrollments in the United States were up 607% over the same period in 2019, with the largest increases in enrollments in public health; social sciences, arts, and humanities; and personal development courses.

MOOCs, in the past, have been an opportunity for health education for developing countries. Among their advantages are global accessibility, flexible hours, multiple teaching tools, and that they are generally free. MOOCs have been an educational response to emerging and re-emerging disease epidemics. However, to access these resources, inequities exist for developing countries, such as language barriers and technological access. Therefore, the study aimed to identify and describe MOOCs that provide health education, promotion, and prevention opportunities for the general population during a COVID-19 pandemic.

Methods

For this study, we conducted a digital search on MOOC platforms like Coursera, edX, FutureLearn, XuetangX, Udacity, Miriadax, Alison, Canvas Network, and OpenWHO, among others to identify MOOCs with content related to health education (education, promotion, and prevention of health) aimed at the general public. Also, the search involved explored topics related to health, well-being, and medicine. We included terms as nutrition, healthy life, physical activity, medical care, healthy nutrition, mental health, and variants.

Three authors conducted the MOOC search manually and independently on the mentioned virtual platforms. The search development was between the months of June and December 2020. Likewise, we had to consult websites on larger platforms available in the world like Class Central and MOOC List. We started the search of each virtual platform and examined MOOC contents with the terms described above. The eligibility criteria for selecting the MOOCs were that they had content related to health education, and were aimed at the general population; further, we considered availability of registration/access at the time of the search.
Subsequently, through a peer review, the researchers excluded MOOCs that showed highly specialized content or requested a prerequisite. MOOCs aimed at professionals or indicated that they were MOOCs for professional certification were also not considered, neither were those only available as paid content. If a conflict or inconsistency existed about our exclusion criteria, it was solved through deliberation peer review. We organized MOOCs by groups according to similar topics for a better description.

The data analysis was about the place of origin, principal language, and duration of the course. We used frequency measures to describe the categorical characteristics and dispersion measures to describe the hours. The analysis was using STATA version 16 (RRID:SCR_012763). Statistical analysis may also be performed using RStudio open source software for Windows, version 4.0.0.

**Results**

With the established search criteria, a total of 217 MOOC courses were found on the different platforms. After excluding MOOC courses because they were specialized, unavailable, aimed at other target audiences, or without relation to health education, we selected 117 of the total MOOCs to be analyzed (Figure 1).

The 117 MOOCs analyzed were classified into six groups according to their content, with themes such as “health promotion” and “food and nutrition”. These latter two accounted for more than 60% of the total MOOCs included. Regarding the duration of time, the MOOCs had a median (interquartile range) of 117–16 hours and the topics of health promotion and community health and social rights presented higher medians, as well as a minimum of 8.5 hours and a maximum of 16.5 hours (Table 1).

Of the total number of courses on the topics “Health promotion” and “Psychology and mental health”, 21 (50%) and 12 (52.17%) were offered on the Coursera platform. (Table 2). Likewise, all the courses around COVID19 (5 MOOCs) were classified (4 MOOCS) in “Psychology and mental health” and 1 (4 MOOC) in “Health promotion”.

![Figure 1. Flow diagram.](image)

**Table 1.** Frequency, median and interquartile range of MOOC duration time.

<table>
<thead>
<tr>
<th>N</th>
<th>Topics</th>
<th>N (%)</th>
<th>Median (IR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Health promotion</td>
<td>42 (35.9)</td>
<td>12 (8.5-16.5)</td>
</tr>
<tr>
<td>2</td>
<td>Food and nutrition</td>
<td>31 (26.5)</td>
<td>9 (6-12)</td>
</tr>
<tr>
<td>3</td>
<td>Psychology and mental health</td>
<td>23 (19.7)</td>
<td>11 (5-16)</td>
</tr>
<tr>
<td>4</td>
<td>Health care</td>
<td>13 (11.1)</td>
<td>10 (6-12)</td>
</tr>
<tr>
<td>5</td>
<td>Climate change and health</td>
<td>4 (3.4)</td>
<td>2 (2-5)</td>
</tr>
<tr>
<td>6</td>
<td>Community health/social rights</td>
<td>4 (3.4)</td>
<td>15 (13.5-16)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>117 (100)</td>
<td>11 (6-15)</td>
</tr>
</tbody>
</table>

IR: Interquartile range.
Regarding the principal language, English was identified in 62 (53%) of the MOOCs the language of preference, followed by Spanish in 18 (15.4%) MOOC courses (data not shown). Likewise, the principal language for all topics was English, with the exception of the climate change and health topics (See Table 3).

Regarding the origin of the MOOC courses, we found that 44 (37.6%) of the MOOCs were from institutions in Europe, followed by America 27 (23.1%) and Asia 26 (22.2%) (Data not shown). In the case of America, 25 (21.4%) were from North America and 2 (1.7%) from South America (data not shown). The topics of health promotion, psychology, and mental health and health care came mainly from universities in Europe; and the food and nutrition topic mainly from Asia (See Table 3).

**Discussion**

We identified 117 MOOC courses on health promotion. The majority are offered in English and are carried out mainly by institutions in Europe. Most of the courses were on the topics of health promotion and food and nutrition.

From the preliminary search, it was evident that a large number of MOOCs were highly specialized, were aimed at professionals, or offered professional certification, and some are not available without payment. Although we have not included these MOOCs in the study, it is essential to notice that it can be an indicator of the limited supply of MOOCs with a profile aimed at the general public or users of primary level care centers, with the content of free health education and aimed at prevention and healthcare. We consider that this is an extremely important point regarding access to health education in a context of compulsory social isolation.

Regarding the predominant themes of health promotion and food and nutrition, certain similarity was found with another study whose main topics were food, nutrition, your health, and introduction to health nursing, courses were aimed at professionals. MOOCs on health and medicine allow patients to acquire health education on specialized topics. Patients can gain understanding in disease implications, conditions, techniques, and available interventions around their disease, especially in the early stages. Besides, there are some useful topics which are still taboo, such as contraception, drug addiction, and acquired immunodeficiency syndrome (AIDS); courses focused on these topics help people educate themselves without having to visit an office.

The MOOCs found around psychology and mental health turn out to be a learning opportunity for stress management in times of compulsory social isolation. The results end up being part of recommendations to review said web-based interventions in mental health literacy promotion. Because adolescents and young people present more difficulties for decision-making in health often searching for information on the web, it is evident that they do not differentiate between reliable and less reliable information and that they do not know how to translate what they read into healthy behaviors.

Among other issues, community health and social rights take a position in the context of compulsory social isolation since many decisions about health can be taken collectively in the community environment; additionally, many of them can be taken at the family level or by the influence of peers, without considering the repercussions of community leadership in some scenarios. Therefore, individual decisions can be even more relevant; for example, vaccination can affect a significant group of the population and have an impact on a higher incidence of some pathologies at the community level, especially when there is an increase in those who will not be vaccinated even during the COVID-19 pandemic.

### Table 2. Distribution of MOOC topics by platform.

<table>
<thead>
<tr>
<th>Topics</th>
<th>Coursera n (%)</th>
<th>Future Learn n (%)</th>
<th>Class Central n (%)</th>
<th>Edx n (%)</th>
<th>Other n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health promotion</td>
<td>21 (50)</td>
<td>6 (14.3)</td>
<td>8 (19.1)</td>
<td>6 (14.3)</td>
<td>1 (2.3)</td>
<td>42 (100)</td>
</tr>
<tr>
<td>Food and nutrition</td>
<td>9 (29.0)</td>
<td>10 (32.3)</td>
<td>8 (25.8)</td>
<td>1 (3.2)</td>
<td>3 (9.7)</td>
<td>31 (100)</td>
</tr>
<tr>
<td>Psychology and mental health</td>
<td>12 (52.2)</td>
<td>8 (34.8)</td>
<td>1 (4.3)</td>
<td>0 (0.00)</td>
<td>2 (8.7)</td>
<td>23 (100)</td>
</tr>
<tr>
<td>Health care</td>
<td>2 (15.4)</td>
<td>3 (23.0)</td>
<td>2 (15.4)</td>
<td>5 (38.5)</td>
<td>1 (7.7)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>Climate change and health</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>4 (100)</td>
<td>4 (100)</td>
</tr>
<tr>
<td>Community health/social rights</td>
<td>3 (75)</td>
<td>1 (25)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>4 (100)</td>
</tr>
</tbody>
</table>

*The rows represent 100%.*
## Table 3. Distribution of MOOC topics by language and origin.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Language</th>
<th>Origin</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>English</td>
<td>Spanish</td>
<td>French</td>
<td>Russian</td>
<td>Other</td>
<td>America</td>
<td>Asia</td>
<td>Europe</td>
<td>Oceania</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Health promotion</td>
<td>20 (47.6)</td>
<td>6 (14.3)</td>
<td>6 (14.3)</td>
<td>5 (11.9)</td>
<td>5 (11.9)</td>
<td>11 (26.2)</td>
<td>10 (23.8)</td>
<td>16 (38.1)</td>
<td>1 (2.4)</td>
<td>4 (9.5)</td>
</tr>
<tr>
<td>Food and nutrition</td>
<td>16 (51.6)</td>
<td>5 (16.1)</td>
<td>3 (9.7)</td>
<td>1 (3.2)</td>
<td>6 (19.4)</td>
<td>7 (22.6)</td>
<td>10 (32.3)</td>
<td>9 (29)</td>
<td>2 (6.4)</td>
<td>3 (9.7)</td>
</tr>
<tr>
<td>Psychology and mental health</td>
<td>15 (65.2)</td>
<td>1 (4.4)</td>
<td>1 (4.4)</td>
<td>4 (17.4)</td>
<td>2 (8.6)</td>
<td>5 (21.7)</td>
<td>4 (17.4)</td>
<td>10 (43.5)</td>
<td>2 (8.7)</td>
<td>2 (8.7)</td>
</tr>
<tr>
<td>Health care</td>
<td>8 (61.5)</td>
<td>1 (7.7)</td>
<td>2 (15.4)</td>
<td>0 (0.0)</td>
<td>2 (15.4)</td>
<td>1 (7.7)</td>
<td>2 (15.4)</td>
<td>8 (61.5)</td>
<td>1 (7.7)</td>
<td>1 (7.7)</td>
</tr>
<tr>
<td>Climate change and health</td>
<td>0 (0.0)</td>
<td>4 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>4 (100)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Community health/social rights Total</td>
<td>3 (75)</td>
<td>1 (25)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (75)</td>
<td>0 (0)</td>
<td>1 (25)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

*The rows represent 100%.*
Therefore, access to information through a MOOC could empower people who would not otherwise know about the options offered. This study shows that various institutions and organizations worldwide have seen MOOCs as an educational opportunity due to their relatively low cost and whose success depends on the quality of their contents, the teacher's strategies, and the focused courses.

Similar to previous studies, evidence that the Coursera platform was the one that hosted the largest number of MOOCs. Regarding the origin of the MOOCs, the largest number were from developed countries, from institutions in Europe and North America, similar results were described in other studies, being, by default, smaller quantity offered by Latin American countries. This predominant origin could be because more than half of the MOOCs were offered and developed in English and only 22% in Spanish. Proof of this is that of the 23, 13, and four MOOCs on psychology and mental health, health care, community health and social rights, respectively, only one MOOC for each topic was in Spanish.

Because the majority of MOOCs are in English, it may be a limitation for access and learning opportunities in times of pandemic for the Latin American population. As well as language, aspects such as the absence of a computer and internet, or educational level may also limit access to MOOCs in times of compulsory social isolation.

Considering the fact that these courses were offered by developed countries, this could limit the topics addressed to being oriented with a different health reality from that of developing countries, where diseases such as anemia, malnutrition, or infectious diseases are most frequent. This scenario could explain the high level of MOOCs from North America and Europe compared with South America, Africa, and Oceania. It is known that courses are built based on a context and socioeconomic condition for a target population, and participation levels were higher when considered these variables. MOOCs with an approach based on the reality of LMICs could be an opportunity, addressing issues such as chronic malnutrition, anemia, among frequent health problems that this population suffers, even more so in times of pandemic due to the restricted care of primary health centers to provide services on these issues.

Among the limitations were that the chosen courses are based exclusively on the authors' criteria. The possibility of including studies that did not meet the inclusion criteria was lowered by performing the peer review. Courses classified into topics related to health education considered when compiling MOOCs for the review. However, if a MOOC has an incorrect classification, it would not have been identified for review. In cases for which MOOCs were offered in languages different than English, we used Google Translate for content translation. Finally, the study aimed not to evaluate the quality of the contents in the MOOCs; however, almost all the MOOCs declared their institutional origin, which was predominantly universities.

Finally, the study showed most of the MOOC courses in health education aimed at the general population or users of health systems were framed mainly in the themes of health promotion and food and nutrition, originating from European institutions and North America and with a higher predominance of the English language.

MOOCs are shown as key tools to empower people, so in a pandemic context, the need to invest in alternative methods of dissemination of knowledge for knowledge-based empowerment would arise, covering the capacities of the general public that at present it is affected by not having access to care in health services of the first level of care. In addition to this, a critical shortage of human resources in health and healthcare, comprising a limited number of medical professors and limitations in physical infrastructures are reasons that increase the need to access online courses in health education of the level primary. Although the MOOCs’ origin was mainly from university institutions a future analysis of the quality of the contents must be addressed for greater comprehensiveness.

**Data availability**

**Underlying data**

Open Science Framework: Underlying data for ‘Massive Open Online Course (MOOC) Opportunities on in Health Education (HE) during of mandatory social isolation context’, https://doi.org/10.17605/OSF.IO/UFQYC.

This project contains the following underlying data:

A database with information from the MOOCS, institutions, platform and language.

Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).
Acknowledgements
We express our acknowledgement to Corali Torres Paz de Fatuya for her review of the English version of our manuscript. JLC is a doctoral student studying an Epidemiological Research Doctorate at Universidad Peruana Cayetano Heredia under FONDECYT/CIENCIACTIVIA award EF033-235-2015 and supported by training grant D43 TW007393 awarded by the Fogarty International Center of the US National Institutes of Health.


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Reviewer Report 16 February 2022

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Maya Adam
Stanford University, Stanford, CA, 94305, USA

In general, I think this is a very interesting manuscript and it makes a potentially valuable contribution to the literature on open online public health education.

Some suggestions for improvement follow:

In the background/rationale for the study, I wonder if the authors might also consider adding some brief statistics about the rise in global engagement with online courses that was spurred by the pandemic? Then the narrative would roughly go: 1) Routine care and preventive health visits went down, 2) General education through open online courses went up, 3) Can open online public health courses function as a potential bridge at times like these when face-to-face interactions are limited?

In the methods section of the abstract, it would be helpful to briefly (but a bit more clearly) describe the inclusion and exclusion criteria for the courses described in this study.

I think the conclusion in this study could be more clearly worded, especially in the abstract. Phrases like “in health promotion issues” and “multiply initiatives in distant territories” are somewhat vague and could be stated more clearly. I also think this study speaks to the potential for massive open online public health courses to increase access to important health promotion messages, even outside of “times of pandemic and compulsory social isolation”. This is an interesting direction for future research that could be stated here.

I have to preface this next comment by applauding the authors for their ability to write an academic manuscript in a language that may not be their first, based on their institutional affiliations. I could not have written an academic manuscript like this in a second language. One comment that I hope will be helpful: In general, the use of strong, active verbs throughout would strengthen the writing stylistically. For example, a sentence like “In December 2019, the COVID-19 pandemic was triggered by severe acute respiratory syndrome coronavirus 2 (SARSCov-2), revealing the fragility of the health systems of developing countries.” Could be rewritten to read: “In December
2019, the severe acute respiratory syndrome coronavirus 2 (SARSCov-2) triggered the COVID-19 pandemic.” Another example “It has been estimated that maternal and child neglect in LMICs could be devastating...” could be more strongly worded as “Researchers suggest that maternal and child health neglect...” (or similar).

Secondly, longer “run-on” sentences can become sources of confusion. An example of this is your sentence: “The pandemic context requires changes and identification of strategies that can help meet the indirect effects of neglect of diseases not related to COVID-19 in health systems.” Perhaps this sentence could be revised to be simpler and more direct so that it’s easier to understand on first pass.

My final suggestion: it might be interesting to include information about enrollment number for the different courses. These are often available to the public and could give a better sense of the potential for global reach and scaling of these courses.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?
No source data required

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Health communication, health promotion

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 12 May 2022

GANDY KERLIN GANDY KERLIN, Unidad de Conocimiento y Evidencia (CONEVID), Universidad Peruana Cayetano Heredia, Lima, Peru

Dear Maya Adam
We are very grateful for your comments and suggestions. Below are the responses to each of the comments:

In general, I think this is a fascinating manuscript and it makes a potentially valuable contribution to the literature on open online public health education. Some suggestions for improvement follow:

**First suggestion:**
In the background/rationale for the study, I wonder if the authors might also consider adding some brief statistics about the rise in global engagement with online courses that was spurred by the pandemic? Then the narrative would roughly go: 1) Routine care and preventive health visits went down, 2) General education through open online courses went up, 3) Can open online public health courses function as a potential bridge at times like these when face-to-face interactions are limited?

**Answer:**
Thank you very much for your comments; it's very interesting. We have added statistics about online courses during the pandemic according to class central and Shravan Goli, boss of the products to MOOCs Coursera. Also, we have structured the introduction according to your suggestion.

**Second suggestion:**
In the methods section of the abstract, it would be helpful to briefly (but a bit more clearly) describe the inclusion and exclusion criteria for the courses described in this study.

**Answer:**
We consider this recommendation very precise. We briefly added the inclusion and exclusion criteria.

**Third suggestion:**
I think the conclusion in this study could be more clearly worded, especially in the abstract. Phrases like “in health promotion issues” and “multiply initiatives in distant territories” are somewhat vague and could be stated more clearly. I also think this study speaks to the potential for massive open online public health courses to increase access to important health promotion messages, even outside of “times of pandemic and compulsory social isolation“. This is an interesting direction for future research that could be stated here.

**Answer:**
Your comment is very pertinent. We have omitted some phrases and modified the conclusion in the abstract.

**Fourth suggestion**
I have to preface this next comment by applauding the authors for their ability to write an academic manuscript in a language that may not be their first, based on their institutional affiliations. I could not have written an academic manuscript like this in a second language. One comment that I hope will be helpful: In general, the use of strong, active verbs throughout would strengthen the writing stylistically. For example, a sentence like “In
December 2019, the COVID-19 pandemic was triggered by severe acute respiratory syndrome coronavirus 2 (SARSCov-2), revealing the fragility of the health systems of developing countries.” Could be rewritten to read: “In December 2019, the severe acute respiratory syndrome coronavirus 2 (SARSCov-2) triggered the COVID-19 pandemic.” Another example “It has been estimated that maternal and child neglect in LMICs could be devastating...” could be more strongly worded as “Researchers suggest that maternal and child health neglect...” (or similar).

Secondly, longer “run-on” sentences can become sources of confusion. An example of this is your sentence: “The pandemic context requires changes and identification of strategies that can help meet the indirect effects of neglect of diseases not related to COVID-19 in health systems.” Perhaps this sentence could be revised to be simpler and more direct so that it’s easier to understand on first pass.

Answer:
Thank you very much for your accurate comments and examples. We have identified different phrases longer and that can cause confusion. We have modified some sentences for a better understanding.

Fifth suggestion:
My final suggestion: it might be interesting to include information about enrollment number for the different courses. These are often available to the public and could give a better sense of the potential for global reach and scaling of these courses.

Answer:
Thank you very much for your comment. We are trying to keep up with the number of people enrolled, however most of these courses are currently closed and indicate future dates to start again. In other cases, they are in a new phase of registration for the course. So, it would be very difficult to know exactly the number of people enrolled in the course.

Competing Interests: No competing interests were disclosed.
2. The research problems are not clear. Therefore, the authors should address the research gap first, and I suggest adding new section to explain about the real problems.

3. I suggest adding research model, and test this model by Structural Equation Modeling (SEM), Why? Because we need to see the validation of theories applied in this research.

4. I suggest for authors to read and cite the following references:
   - A. The use of Massive Open Online Courses (MOOCs) in blended learning courses and the functional value perceived by students
   - B. Integrating innovation diffusion theory with technology acceptance model: Supporting students’ attitude towards using a massive open online courses (MOOCs) systems.
   - C. Massive Open Online Courses: enhancing caregiver education and support about dementia care towards and at end of life.
   - D. Massive Open Online Courses (MOOCs): Data on Higher Education.
   - E. Perceived user satisfaction and intention to use massive open online courses (MOOCs).
   - F. Predicting user perceived satisfaction and reuse intentions toward Massive Open Online Courses (MOOCs) in the Covid-19 pandemic: An application of the UTAUT model and quality factors.

5. The research methodology is not clear, the authors should explain more and add some references.

6. The results analysis is not enough to show the research contributions. Therefore, the authors should add more analysis.

7. The authors should explain more what is the difference between this research with prior experimental results, and related research.

8. The authors should add new section about the limitations of this research, as well as what is the future research?

References

Is the work clearly and accurately presented and does it cite the current literature?  
Partly

Is the study design appropriate and is the work technically sound?  
Partly

Are sufficient details of methods and analysis provided to allow replication by others?  
No

If applicable, is the statistical analysis and its interpretation appropriate?  
No

Are all the source data underlying the results available to ensure full reproducibility?  
No source data required

Are the conclusions drawn adequately supported by the results?  
Partly

*Competing Interests:* No competing interests were disclosed.

*Reviewer Expertise:* computer and education

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 12 May 2022

GANDY KERLIN GANDY KERLIN, Unidad de Conocimiento y Evidencia (CONEVID), Universidad Peruana Cayetano Heredia, Lima, Peru

Dear Waleed Mugahed Al-Rahmi  
We are grateful for your comments. Our responses are described below.

1. **The aim of this research not clear. The authors should clarify the aims.**  
Thank you for your comments. We had improved the description of the aims in the last paragraph.

2. **The research problems are not clear. Therefore, the authors should address the research gap first, and I suggest adding new section to explain about the real problems.**  
We are grateful for your comments, so we have modified the introduction, reworded the justification of the study and included some additional references.
3. I suggest adding research model, and test this model by Structural Equation Modeling (SEM), Why? Because we need to see the validation of theories applied in this research.

Your comment is interesting and would certainly enhance research aimed at assessing causality itself. Structural equation modeling (SEM) is a multivariate statistical technique for testing and estimating causal relationships from statistical data and qualitative assumptions about causality. On the other hand, our study is of cross-sectional design and we set out from the beginning to perform descriptive analysis using secondary information. Therefore, the use of structural equation modeling (SEM) is not part of our methodology.

4. I suggest for authors to read and cite the following references:

A. The use of Massive Open Online Courses (MOOCs) in blended learning courses and the functional value perceived by students

B. Integrating innovation diffusion theory with technology acceptance model: Supporting students’ attitude towards using a massive open online courses (MOOCs) systems.

C. Massive Open Online Courses: enhancing caregiver education and support about dementia care towards and at end of life.

D. Massive Open Online Courses (MOOCs): Data on Higher Education.

E. Perceived user satisfaction and intention to use massive open online courses (MOOCs).

F. Predicting user perceived satisfaction and reuse intentions toward Massive Open Online Courses (MOOCs) in the Covid-19 pandemic: An application of the UTAUT model and quality factors.

Thank you for sharing these studies with us. We visualize that the studies focus on measures of effect on participants participating in massive open online courses (MOOCs). Therefore, we believe that our study aims to identify and describe MOOCs that provide health education, promotion and prevention opportunities for the general population during a COVID-19 pandemic. In this opportunity, we did not set out to learn about the results in the participants of this study.

5. The research methodology is not clear, the authors should explain more and add some references.

Thank you for your comment, we would like to know what part of the methodology is not clear to you. We would be happy to make modifications to make it more understandable for you.

6. The results analysis is not enough to show the research contributions. Therefore, the authors should add more analysis.

Thank you very much for your appreciation. We value more complex analyses such as multivariate statistical analyses in research. However, in this opportunity and due to the
context of the pandemic, we thought it was convenient to carry out a research that would allow us to demonstrate the offer of courses related to health education focused on prevention in a context where hospitals were not attending patients focused on disease prevention, given that the cases of COVID-19 were increasing.

7. **The authors should explain more what is the difference between this research with prior experimental results, and related research.**

   Thank you for your comment. In the second paragraph of the discussion, we note many courses that are specialized and aimed at professionals. These courses were not included in our research as our objective is to describe the supply of courses available on health education (prevention and promotion), not disease treatment. We did not find previous research describing these types of courses on virtual platforms.

8. **The authors should add new section about the limitations of this research, as well as what is the future research?**

   In the antepenultimate paragraph of the discussion, we describe our limitations for example the criteria for choosing a course were exclusively the decision of the researcher. Regarding future research, in the last paragraph of the discussion, we stated that future research should aim at assessing the quality of the content of these courses, as our research does not address this.

   **Competing Interests:** No competing interests were disclosed.

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