# PEER REVIEW HISTORY

## ARTICLE DETAILS

| TITLE (PROVISIONAL) | Study protocol for a transversal study to develop a screening model for excessive gambling behaviors on a representative sample of users of French authorized gambling websites. |
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| AUTHORS | Perrot, Bastien; Hardouin, Jean-Benoit; Costes, Jean-Michel; Caillon, Julie; Grall-Bronnec, Marie; Challet-Bouju, Gaëlle |

## VERSION 1 - REVIEW

| REVIEWER | Céline Bonnaire<br>Paris Descartes University, France |
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| REVIEW RETURNED | 20-Dec-2016 |

| GENERAL COMMENTS | Review on the article « Study protocol for screening excessive gambling behaviors on French online gambling sites »<br><br>The aim of this study is to develop a (better) model for screening excessive gambling pratices based on the online gambling behaviors observed on French gambling websites (ARJEL and FDJ) (e.g. gambling indicators and PGSI), coupled with a clinical validation (telephone clinical interview including DSM-5 criteria for pathological gambling).<br>The article is well-writting and concise. The three successive stages proposed are well described. Gambling indicators are interesting and the third stage is very relevant.<br>I believe that it would made an interesting contribution to the literature in this area and that an interesting model could emerged for an early prediction of online gambling problems. Indeed, it responds to certain weaknesses of the previous studies and combines at the same time interesting indicators of gambling behaviors, a self-assessment of gambling behavior and a clinical evaluation.<br><br>I just have some minor points I have noticed :<br><br>- Page 3, line 56, you must put the reference of the DSM-5 (APA, 2013)<br>- Page 4, line 16, in order to substantiate your comments, it would be interesting to add references from studies that have shown that the prevalence rates of online pathological gambling are significantly higher than those of offline pathological gamblers.<br>- Page 4, line 28, It would be necessary to say a few words in order to explain what is the FDJ<br>- Page 6, line 12 : what do you mean by « among other problems » ?<br>- Page 6, line 26, what mean « EDEIN study » ?<br>- Page 7, line 21, what do you mean by « similar gambling practices » ? Could you give an example to illustrate that.<br>- Page 7, line 28-42 : This paragraph is not very clear. What are the |

indicators evoked on line 30? What are these « 9 observations for each gamblers »? Why you're talking about 9 months since you've talked about behavior changes over 3 months ? Please be more specific here.

- Page 8, line 7, authors said that « there were no variables specific to poker » but what about the number of table of poker played by the gambler ? Indeed, the illusion of control is related to the fact that the more the gambler plays at several tables at the same time, the more he thinks increase his chances of winning. Is it also possible to have some information about the gender of the avatar choosen by the gambler ? Once again, it could be a stratgegy used to increase chances of winning.

- Page 9, table 1 : in the set 1, the total number of deposits is very interesting. I think it could be interesting to also add the total amount of deposits and maybe the amount of each deposits. Indeed, chasing also depend on the initial amount deposit.

- Page 13, line 36, the world « patients » is wrong.

- Page 13, line 46, who will do the telephone clinical interview ?

- Page 16, line 39, the third stage is very important because with internet gambling, the time spent on gambling is very important to evaluate and this data is difficult to measure by other means than asking the gambler.

-Page 17, line 2-3, could you be more specific and give some examples of « specific information and advice could be early provided for individuals identified as at risk or problem gamblers » ? Indeed, it is important to think about gambling prevention and gambling moderators related to your study.

| REVIEWER | Yasser Khazaal |
| | Geneva University |
| REVIEW RETURNED | 25-Dec-2016 |

| GENERAL COMMENTS | A very nice study protocol, and promising one |
| | I have however some comments: |
| | |
| | 1. Please can you check for adhesion to STARD 2015 standards: Updating standards for reporting diagnostic accuracy: the development of STARD 2015 http://researchintegrityjournal.biomedcentral.com/articles/10.1186/s41073-016-0014-7 . It's already the case to some extent but some details are however missing. |
| | 2. The manuscript is well written. I however would like to suggest to the authors to edit the final version with an English mother tongue speaker |
| | 3. The Canadian Problem Gambling Index is a good screening tool. The tool and cutoffs are however more accurate for non-problem gambling and for the most severe group. The intermediate thresholds are less robust [1]. Please add the adequate references, the one suggested here and possibly others and include such considerations in your methods and discussion. |
| | 4. « With regard to online gambling only, the prevalence of gambling problems rises to 17%, including 6.6% of excessive gamblers [3]." Please be carful with such claim. The study was probably carried out on self-selected samples and may have other limitations. Please rephrase and check. |
| | 5. « Several factors can explain the fact that online gambling is more addictive than offline gambling; especially greater accessibility, increased disinhibition and higher event frequency[4]." Please intead |

of "can" use "may" …rather than "is more addictive".… something like "possibly more addictive"

6. « operator: data from Bwin were used by [6], [7], [8], [9] and [10] , data from GTECH G2 were used in [11] and data from Winamax were used in [12]." Please check for this problem across the manuscript: rather than "data from Bwin were used by [6], [7], [8] »…you can write « data from Bwin[6], [7], [8] » or « data from Bwin were used by X et al.[6], y et al… »

7. « specificity of the model developed was only 49.3 %. Although the authors argue that 75 % of false positive gamblers had responded positively to at least one question on the PGSI, a more discriminant model might have been achieved by using another type of algorithm." Unclear sentence, please check again. "false positive gamblers???" All included people are gamblers. Some precisions are missing

8. « French online gamblers » , probably more accurate to write : users of French online gambling websites (maybe some are from other countries and not French but French speaking

9. Is it possible from people in France to play with gambling websites other than the official ones? (Probably yes…to some extent. Please check for such possibilities and include something (and possible references) in the discussion as a possible limitation)

10. « The study population will be a sample of 20,000 users » any details about sample selection procedure and sample estimation?

11. « will be 9 observations for each gambler » any details about the 9 observations ? Included in the sets of variables described later?

12. How the variables were collected from the websites?

13. « the likelihood of the model (AIC, BIC) », explain AIC, BIC before using abbreviations

14. Any additional precisions about the methods of selection and recruitment to the second and third stages.

15. « The third stage of the study aims at clinically validating the screening model obtained at the second stage, by comparing the predictions of the model to current diagnosis of gambling disorder based on the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS). We will use a version of the NODS that takes into account the changes in the gambling disorders section in the DSM-5" Unclear for me DSM-IV or DSM-5??

16. If possible, you can add the references and brief description of the assessments planned for the third stage

17. Any gifts for the participants?

18. In the methods, the comments related to the reference 9, « The results show that none… » have probably to be moved to the introduction (not compulsory, but check please for the better option )

19. In discussion and conclusion : « real-life gambling » not well defined (all gambling behaviors including the off-line activities ?, all on-line gambling activities including possible activities on not allowed websites… ?) . check also for accuray between discussion and conclusion.

20. I was surprised by the absence of references in the discussion and conclusion. You have at least to add some references related to the limitations of the study, particulary the self-selection bias in the second and third stages (i.e [2] ). Furthermore, comments and references related to the importance of your work for future prevention strategies are welcome (i.e. [3-7])

NB: The no answers in the checklist are rather incomplete field. And the comments upper aimed to improve such aspects

1. Currie SR, Hodgins DC, Casey DM. Validity of the Problem

Gambling Severity Index interpretive categories. Journal of gambling studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming 2013;29(2):311-27 doi: 10.1007/s10899-012-9300-6[published Online First: Epub Date]|.

2. Khazaal Y, van Singer M, Chatton A, et al. Does self-selection affect samples' representativeness in online surveys? An investigation in online video game research. Journal of medical Internet research 2014;16(7):e164 doi: 10.2196/jmir.2759[published Online First: Epub Date]|.

3. Nelson SE, LaPlante DA, Peller AJ, et al. Real limits in the virtual world: self-limiting behavior of Internet gamblers. Journal of gambling studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming 2008;24(4):463-77

4. Khazaal Y, Chatton A, Bouvard A, et al. Internet poker websites and pathological gambling prevention policy. Journal of gambling studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming 2013;29(1):51-9 doi: 10.1007/s10899-011-9288-3[published Online First: Epub Date]|.

5. Potenza MN, Wareham JD, Steinberg MA, et al. Correlates of at-risk/problem internet gambling in adolescents. Journal of the American Academy of Child and Adolescent Psychiatry 2011;50(2):150-59 e3 doi: 10.1016/j.jaac.2010.11.006[published Online First: Epub Date]|.

6. Auer M, Malischnig D, Griffiths M. Is "pop-up" messaging in online slot machine gambling effective as a responsible gambling strategy? Journal of Gambling Issues 2014;1-10

7. Caillon J, Grall-Bronnec M, Hardouin JB, et al. Online gambling's moderators: how effective? Study protocol for a randomized controlled trial. BMC public health 2015;15:519 doi: 10.1186/s12889-015-1846-7[published Online First: Epub Date]|.

**VERSION 1 – AUTHOR RESPONSE**

Reviewer 1:
- Page 3, line 56, you must put the reference of the DSM-5 (APA, 2013)
Response: The reference of the DSM-5 is given in the References section.

- Page 4, line 16, in order to substantiate your comments, it would be interesting to add references from studies that have shown that the prevalence rates of online pathological gambling are significantly higher than those of offline pathological gamblers.
Response: We added a reference to a large sample study (Wood and Williams, 2011) also showing a higher rate of problem gambling among Internet gamblers compared to non-Internet gamblers (page 4, line 29).

- Page 4, line 28, It would be necessary to say a few words in order to explain what is the FDJ
Response: We added a brief definition of the FDJ (page 4, line 54).

- Page 6, line 12 : what do you mean by « among other problems » ?
Response: By "among other problems", we are referring to the fact that categorizing continuous variables into quartiles implies considering "extreme values" (e.g. top 5 % values) as equivalent to all the top 75 % values, which can be problematic when studying "extreme" gambling behaviors. But thinking about it, this is actually related to the loss of information which we believe to be the most important problem here, thus we deleted this part of the sentence ("among other problems") from the

manuscript.

- Page 6, line 26, what mean « EDEIN study » ?
Response: The English meaning of EDEIN (Screening for Excessive Gambling Behaviors on the Internet) has been added (page 6, line 56).

- Page 7, line 21, what do you mean by « similar gambling practices » ? Could you give an example to illustrate that.
Response: We mean similar "gambling behavior" (e.g. similar gambling frequencies, similar number of deposits per month, etc.). This has been added (page 8, line 7).

- Page 7, line 28-42 : This paragraph is not very clear. What are the indicators evoked on line 30? What are these « 9 observations for each gamblers »? Why you're talking about 9 months since you've talked about behavior changes over 3 months ? Please be more specific here.
Response: We added examples of the indicators evoked in line 30 (page 8, line 21). In fact, these are almost all the indicators of Table 1, except for the ones that we think are not very useful. For instance, the evolution of coefficients of variations may be difficult to interpret. We modified the paragraph to be more specific (page 8, line 24).

- Page 8, line 7, authors said that « there were no variables specific to poker » but what about the number of table of poker played by the gambler ? Indeed, the illusion of control is related to the fact that the more the gambler plays at several tables at the same time, the more he thinks increase his chances of winning. Is it also possible to have some information about the gender of the avatar choosen by the gambler ? Once again, it could be a stratgegy used to increase chances of winning.
Response: Indeed, these are interesting indicators. Unfortunately, for technical and confidentiality reasons, we do not have access to this information. This is now mentioned in the manuscript (page 7, line 49).

- Page 9, table 1 : in the set 1, the total number of deposits is very interesting. I think it could be interesting to also add the total amount of deposits and maybe the amount of each deposits. Indeed, chasing also depend on the initial amount deposit.
Response: The total amount of deposits is what we call "Total deposit" (first line of set 1). The amount of each deposit is an interesting indicator, but we do not have access to this information for the reasons mentioned previously.

- Page 13, line 36, the world « patients » is wrong.
Response: Yes, you are right. We made the correction (page 14, line 41).

- Page 13, line 46, who will do the telephone clinical interview ?
Response: The telephone interviews will be conducted by well-trained staff members with experience with pathological gamblers. This has been added in the manuscript (page 16, line 50).

- Page 16, line 39, the third stage is very important because with internet gambling, the time spent on gambling is very important to evaluate and this data is difficult to measure by other means than asking the gambler.
Response: We totally agree with the comment. This is one strength of this study.

-Page 17, line 2-3, could you be more specific and give some examples of « specific information and advice could be early provided for individuals identified as at risk or problem gamblers » ? Indeed, it is important to think about gambling prevention and gambling moderators related to your study.
Response: We added such examples in the Conclusion (page 18, line 57).

Reviewer 2:

1. Please can you check for adhesion to STARD 2015 standards: Updating standards for reporting diagnostic accuracy: the development of STARD 2015 http://researchintegrityjournal.biomedcentral.com/articles/10.1186/s41073-016-0014-7 . It's already the case to some extent but some details are however missing.

Response: We have checked the STARD standards. Methods for measuring the model accuracy (sensitivity, specificity, AUC and positive and negative predictive values) have been added (page 3, line 8). Information on sample size has been added (page 17, line 22). The sample size of 30 was chosen as a tradeoff between technical constraints and a minimum reasonable sample size for statistical comparisons. Concerning the missing data handling, it will be normally impossible to observe missing data for the player account-based gambling data. For the reference test, potential missing data will concern participants enrolled in stage 3 but who in the end refuse to do the telephone interview. They will be excluded in this case.

2. The manuscript is well written. I however would like to suggest to the authors to edit the final version with an English mother tongue speaker

Response: The revised manuscript has been edited with a translation agency.

3. The Canadian Problem Gambling Index is a good screening tool. The tool and cutoffs are however more accurate for non-problem gambling and for the most severe group. The intermediate thresholds are less robust [1]. Please add the adequate references, the one suggested here and possibly others and include such considerations in your methods and discussion.

Response: Yes, the possibility to use other intermediate thresholds for the PGSI is now mentioned in the discussion (page 17, line 52).

4. « With regard to online gambling only, the prevalence of gambling problems rises to 17%, including 6.6% of excessive gamblers [3]." Please be carful with such claim. The study was probably carried out on self-selected samples and may have other limitations. Please rephrase and check.

Response: We rephrased the sentence (page 4, line 23).

5. « Several factors can explain the fact that online gambling is more addictive than offline gambling; especially greater accessibility, increased disinhibition and higher event frequency[4]." Please intead of "can" use "may" …rather than "is more addictive"…. something like "possibly more addictive"

Response: We made the correction (page 5, line 7).

6. « operator: data from Bwin were used by [6], [7], [8], [9] and [10] , data from GTECH G2 were used in [11] and data from Winamax were used in [12]." Please check for this problem across the manuscript: rather than "data from Bwin were used by [6], [7], [8] »…you can write « data from Bwin[6], [7], [8] » or « data from Bwin were used by X et al.[6], y et al… »

Response: We made the corrections in the manuscript.

7. « specificity of the model developed was only 49.3 %. Although the authors argue that 75 % of false positive gamblers had responded positively to at least one question on the PGSI, a more discriminant model might have been achieved by using another type of algorithm." Unclear sentence, please check again. "false positive gamblers???" All included people are gamblers. Some precisions are missing

Response: "false positive gamblers" is the term used by the authors of the study we refer to. It refers to gamblers wrongly classified as problem gamblers by the model. This precision has been added in the manuscript (page 6, line 33).

8. « French online gamblers » , probably more accurate to write : users of French online gambling websites (maybe some are from other countries and not French but French speaking

Response: Yes, you are right. We replace "French online gamblers" by "users of French authorized gambling websites" when necessary in the manuscript.

9. Is it possible from people in France to play with gambling websites other than the official ones? (Probably yes…to some extent. Please check for such possibilities and include something (and possible references) in the discussion as a possible limitation)
Response: Yes, this is now mentioned in the discussion including a reference to a study that estimated the percentage of gamblers gambling on unlicensed websites (page 18, line 5).

10. « The study population will be a sample of 20,000 users » any details about sample selection procedure and sample estimation?
Response: This will be a random sample drawn from the gamblers who satisfy the inclusion criteria (i.e. who have a validated account and who have placed at least one bet during the inclusion period). There will be 10,000 users extracted from the ARJEL database and 10,000 users extracted from the FDJ database. We did not calculate a specific sample size for the first stage, as the objective is to have a large representative sample in an epidemiologic view.

11. « will be 9 observations for each gambler » any details about the 9 observations ? Included in the sets of variables described later?
Response: The "9 observations" correspond to the 9 repetitions of the same variables for each month (we do not have 12 observations because we need a 3-month "follow-up" each time (i.e. each month) we do the classification). We acknowledge the whole sentence may not be very clear, so we rephrased our explanation in the manuscript (page 8, line 19).

12. How the variables were collected from the websites?
Response: As mentioned in the introduction, the ARJEL compiles data from all accounts created on authorized online gambling sites in France. Data will be anonymized (this precision has been added on page 7, line 36) and personally transmitted by the ARJEL and FDJ.

13. « the likelihood of the model (AIC, BIC) », explain AIC, BIC before using abbreviations
Response: We have replaced the abbreviations by their full meaning (page 11, line 52).

14. Any additional precisions about the methods of selection and recruitment to the second and third stages.
Response: In the second stage, the questionnaire will be diffused to a random sample of active gamblers. We added in the manuscript that we expect a response rate of 3%. Contrary to what we originally wrote in the manuscript, we aim for 10,000 responses from the users of the FDJ (not 6,000). For the third stage, participation will be proposed at the end of the questionnaire issued in the second stage (contact details and information on stage 3 will be given). We will also propose participation in stage 3 to gamblers registered in our clinical unit's volunteer base (this possibility is now mentioned on page 14, line 50).

15. « The third stage of the study aims at clinically validating the screening model obtained at the second stage, by comparing the predictions of the model to current diagnosis of gambling disorder based on the National Opinion Research Center DSM-IV Screen for Gambling Problems (NODS). We will use a version of the NODS that takes into account the changes in the gambling disorders section in the DSM-5" Unclear for me DSM-IV or DSM-5??
Response: We will use a revised version of the NODS that we have created to take into account the changes in the gambling disorders section in the DSM-5. This is now specified in the manuscript (page 14, line 36).

16. If possible, you can add the references and brief description of the assessments planned for the

third stage
Response: The references of the assessments planned for the third stage have been added (page 15, line 7).

17. Any gifts for the participants?
Response: Yes, participants will be given a 50 € gift voucher in compensation for their participation. This is now specified in the manuscript (page 15, line 16).

18. In the methods, the comments related to the reference 9, « The results show that none… » have probably to be moved to the introduction (not compulsory, but check please for the better option )
Response: Yes, these comments could be moved to the introduction. However, because this is very specific to statistical methods and less related to the general methodology of the study, we believe these explanations are better suited for the Methods and Analysis section.

19. In discussion and conclusion : « real-life gambling » not well defined (all gambling behaviors including the off-line activities ?, all on-line gambling activities including possible activities on not allowed websites… ?) . check also for accuray between discussion and conclusion.
Response: We have replaced "real-life gambling data" by "player account-based gambling data" in the manuscript. We have checked the consistency of the discussion and the conclusion.

20. I was surprised by the absence of references in the discussion and conclusion. You have at least to add some references related to the limitations of the study, particulary the self-selection bias in the second and third stages (i.e [2] ). Furthermore, comments and references related to the importance of your work for future prevention strategies are welcome (i.e. [3-7])
Response: We have added the reference related to the self-selection bias (page 17, line 43). We have also added references related to the importance of prevention measures in the conclusion (page 18, line 45). In particular, we added the possibility to set up targeted prevention measures thanks to the identification of distinct gamblers' profiles (page 18 line 57).

NB: The no answers in the checklist are rather incomplete field. And the comments upper aimed to improve such aspects
Response: We are not sure if this comment is directly addressed to us.

1. Currie SR, Hodgins DC, Casey DM. Validity of the Problem Gambling Severity Index interpretive categories. Journal of gambling studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming 2013;29(2):311-27 doi: 10.1007/s10899-012-9300-6[published Online First: Epub Date]|.
2. Khazaal Y, van Singer M, Chatton A, et al. Does self-selection affect samples' representativeness in online surveys? An investigation in online video game research. Journal of medical Internet research 2014;16(7):e164 doi: 10.2196/jmir.2759[published Online First: Epub Date]|.
3. Nelson SE, LaPlante DA, Peller AJ, et al. Real limits in the virtual world: self-limiting behavior of Internet gamblers. Journal of gambling studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming 2008;24(4):463-77
4. Khazaal Y, Chatton A, Bouvard A, et al. Internet poker websites and pathological gambling prevention policy. Journal of gambling studies / co-sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming 2013;29(1):51-9 doi: 10.1007/s10899-011-9288-3[published Online First: Epub Date]|.
5. Potenza MN, Wareham JD, Steinberg MA, et al. Correlates of at-risk/problem internet gambling in adolescents. Journal of the American Academy of Child and Adolescent Psychiatry 2011;50(2):150-59 e3 doi: 10.1016/j.jaac.2010.11.006[published Online First: Epub Date]|.
6. Auer M, Malischnig D, Griffiths M. Is "pop-up" messaging in online slot machine gambling effective as a responsible gambling strategy? Journal of Gambling Issues 2014;1-10

7. Caillon J, Grall-Bronnec M, Hardouin JB, et al. Online gambling's moderators: how effective? Study protocol for a randomized controlled trial. BMC public health 2015;15:519 doi: 10.1186/s12889-015-1846-7[published Online First: Epub Date]|.

## VERSION 2 – REVIEW

| REVIEWER | Bonnaire, Céline<br>Paris Descartes University, France |
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| REVIEW RETURNED | 04-Mar-2017 |

| GENERAL COMMENTS | The authors made the requested changes. Thus, the article is ready for publication in your journal.<br>A simple remark: it would have been simpler to put directly in the answer to the reviewers the content of the text modified in the article. This avoids looking for changes in the article. |
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| REVIEWER | Khazaal Yasser<br>Geneva University |
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| REVIEW RETURNED | 15-Feb-2017 |

| GENERAL COMMENTS | The revised version of the manuscript is acceptable for publication |
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