PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Adherence to stay-at-home orders: Awareness, implementation and difficulties of officially ordered quarantine measures in the context of the COVID-19 pandemic in Cologne – A retrospective cohort study
AUTHORS	Book, Julian; Broichhaus, Lukas; Grüne, Barbara; Nießen, Johannes; Wiesmüller, Gerhard A.; Joisten, Christine; Kossow, Annelene

VERSION 1 – REVIEW

REVIEWER	Rajkumar, Ravi Jawaharlal Institute of Postgraduate Medical Education, Psychiatry
REVIEW RETURNED	28-Apr-2022

GENERAL COMMENTS	This study examines the frequency and correlates of adherence to stay-at-home orders related to the COVID-19 pandemic in a large sample of individuals from Cologne, Germany. This study has significant contemporary relevance, given the need to identify the factors that facilitate or hinder adherence to public health measures. The paper is well-written and organized logically, and I could not identify any major methodological flaws or any grounds for ethical concerns. The following are suggestions for further improvement of the manuscript: 1. Title: A cohort study can be either retrospective or prospective, but not "cross-sectional". If the authors have conducted a retrospective cohort study, this may be mentioned clearly; otherwise, the word "cohort" can simply be removed from the title. 2. Abstract: "influencing factors" may be better worded as "factors influencing xxx" or more simply "correlates". "Females" may be replaced with "women" (alternately, the sentence could be rephrased "60.4% of the sample belonged to the female gender"). Under "outcome measures", please state that the scores for adherence were based on an instrument developed by the researchers themselves. 3. Introduction: a) "Non-pharmaceutical" (p.4, line 18) is confusing in this context as there are no "pharmaceutical" interventions to prevent COVID-19 (unless one considers vaccines "pharmaceutical"). It is better to refer to "public health interventions" or "behavioural interventions." b) The authors have mentioned that a major limitation of earlier studies of adherence to health recommendations was the

	heterogeneity of instruments used. How did the authors address this in their study, particularly when designing their instrument to measure adherence? c) Attitudinal, cultural and mental health correlates of adherence to recommendations should also be discussed in the Introduction; their omission from the current study may be mentioned as a limitation thereof in the Discussion section. 4. Methodology: a) To what extent was the study sample of 3000-5000 representative of the general population (c. 1,000,000 as per the authors) of Cologne in terms of age, gender, socio-economic status or ethnicity? How could this have influenced the results? b) On what basis was the instrument to measure adherence developed (e.g., expert consensus, inputs from patients or public health professionals, adaptation from prior research...) Was any attempt made to test the reliability and validity of this instrument (e.g., in a smaller "pilot" sample) prior to its use in the current study? 5. Discussion: a) What are the other variables that were associated with adherence to public health recommendations across studies? Were there any variables that were found significant in these studies but which were not examined (either by design or unintentionally) in the current study? b) What are the implications of the current research for potential methods to improve adherence to these recommendations in the future?

REVIEWER	Kumar, Arvind All India Institute of Medical Sciences, Department of Medicine
REVIEW RETURNED	26-Jun-2022

GENERAL COMMENTS	Manuscript decision: Manuscript ID BMJ open-2022-063358, entitled "Adherence to stay-at-home orders: awareness, implementation, and difficulties of the officially ordered quarantine measures in the context of the SARS-CoV2 pandemic in Cologne - a cross-sectional cohort study." The paper has been reviewed. The concept of the study and its possible benefits to the readership is well appreciated. This paper can be accepted after revision. The suggestions/comments are the following: 1. Kindly mention the basis of the questionnaire (previous research/ validation by any society/ authority). If you have made it, please mention the process of development of the questions in the methodology. 2. What was the status of the legality/reporting if any breach/misconduct/non-compliance in the COVID-19 appropriate behaviour was not followed at that time in your place of study in view of pandemic? If such COVID-19 inappropriate behaviour was to be reported to the concerned authority, how was this taken care of in your study? Were the authors just silent observers? Who took care of reporting? 3. What could be the new strategies/education/awareness/suggestions that will help the government to improve the efficiency of quarantine based on the obtained data?

	4. There are lots of grammatical errors throughout the paper, and the format was not followed properly. So, kindly request you to check the paper in this context. 5. References were not formatted properly. For example; DOI, the page numbers, issue numbers, etc. are not mentioned in all the references. Kindly cite the literature used for the research question and methods developed (the first line of the heading "Patient and Public Involvement" 6. Based on this study, some learning suggestions can be mentioned. 7. In some paragraphs, there were high plagiarism (for example; the personal environment were first approached................ no individual results are given to the patients). Kindly requesting the author to correct all the plagiarism. I would be eager to see it again before clearing it from my side.

REVIEWER	Naughton, Bernard Trinity College Dublin, Pharmacy and Pharmaceutical Sciences
REVIEW RETURNED	05-Jul-2022

GENERAL COMMENTS	Page 3 of 30: Line 44& 45: Abstract: In the results section of the abstract there are two percentages listed as 6,6% and 14,4%. Should that be 6.6% and 14.4% (i.e. a full stop rather than a comma). Page 3 of 30: Line 59: You use the word witch and I expect you mean which? Page 5 of 30: Line 56-60: Was the sample size statistically significant, perhaps the authors could include the confidence interval and margin of error in this section. I expect this sample size was appropriate but it would be helpful to make it clearer. Page 9 of 30: Line 14-20: I think a few more lines to explain table 2 would be useful. Please make it clear to the audience why there are P. values in this table and what they refer to. Page 6 of 30: Survey items. How were the survey items selected? Were there any other variables which may have adversely affected your adherence results? If so I would like to see their absence listed as study limitations. For examples there may have been some situations where individuals had a moral obligation to break the stay at home rules, such as a caring for a loved one or financial pressure to work. Page 13 of 30 Line 58-60: I would like to see some elaboration on the Health Belief Model. Please explain what it is and why its applicable in this context. It would also be helpful to explain how it relates to the outcomes of this study. It might also be helpful to expand the discussion to link in further with existing literature.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Dr. Ravi Rajkumar, Jawaharlal Institute of Postgraduate Medical Education

Comments to the Author:
This study examines the frequency and correlates of adherence to stay-at-home orders related to the COVID-19 pandemic in a large sample of individuals from Cologne, Germany.

This study has significant contemporary relevance, given the need to identify the factors that facilitate or hinder adherence to public health measures. The paper is well-written and organized logically, and I could not identify any major methodological flaws or any grounds for ethical concerns.

The following are suggestions for further improvement of the manuscript:

1. Title: A cohort study can be either retrospective or prospective, but not "cross-sectional". If the authors have conducted a retrospective cohort study, this may be mentioned clearly; otherwise, the word "cohort" can simply be removed from the title.

Thank you very much for this comment. We have adjusted the title.

2. Abstract: "influencing factors" may be better worded as "factors influencing xxx" or more simply "correlates". "Females" may be replaced with "women" (alternately, the sentence could be rephrased "60.4% of the sample belonged to the female gender"). Under "outcome measures", please state that the scores for adherence were based on an instrument developed by the researchers themselves.

We would also like to thank you for these comments. All suggested changes have been implemented accordingly.

3. Introduction:
a) "Non-pharmaceutical" (p.4, line 18) is confusing in this context as there are no "pharmaceutical" interventions to prevent COVID-19 (unless one considers vaccines "pharmaceutical"). It is better to refer to "public health interventions" or "behavioral interventions."

Thank you. We have replaced non-pharmaceutical with public health.

b) The authors have mentioned that a major limitation of earlier studies of adherence to health recommendations was the heterogeneity of instruments used. How did the authors address this in their study, particularly when designing their instrument to measure adherence?

Thank you, we have revised this section. However, the problem of different approaches remains. We have therefore tried to present our procedure even more clearly in the methodology. For example, we have closely followed the recommendations of the World Health Organization, the European Centre for Disease Prevention and Control, the Robert Koch Institute and the German Society for General and Family Medicine. To enable comparability of adherence in our study population with other cohorts, we recorded behavior in isolation and quarantine with a total of 19 recommendations in as fine a detail as possible. Definitions of adherence that, for example, only consider not leaving home (Steens 2020, Smith 2021) or only selected WHO recommendations (Lin 2021) could thus also be recreated from our dataset.

c) Attitudinal, cultural and mental health correlates of adherence to recommendations should also be discussed in the Introduction; their omission from the current study may be mentioned as a limitation thereof in the Discussion section.

We also thank you for this reference and have added these aspects.

4. Methodology:
a) To what extent was the study sample of 3000-5000 representative of the general population (c. 1,000,000 as per the authors) of Cologne in terms of age, gender, socio-economic status or ethnicity? How could this have influenced the results?

Thank you for this important hint. We apologize that this has caused irritation. We did a full survey of all patients in quarantine, regardless of the total population of Cologne. A general problem of such surveys is the selection bias, which of course we cannot exclude. However, we have listed this aspect in the limitations and tried to work it out even more clearly.

b) On what basis was the instrument to measure adherence developed (e.g., expert consensus, inputs from patients or public health professionals, adaptation from prior research...) Was any attempt made to test the reliability and validity of this instrument (e.g., in a smaller "pilot" sample) prior to its use in the current study?

Thank you for this comment. We have taken the recommendations of the World Health Organization, the European Centre for Disease Prevention and Control, the Robert Koch Institute and the German Society for General and Family Medicine as a basis for the survey and added further questions from previous surveys such as Betsch 2022 (COSMO), Al-Sabbagh 2022 and Tong 2020. The survey was first tested by experts from the context of public health and infectious diseases and then piloted. We have made these points clearer in the methodology.

5. Discussion:
a) What are the other variables that were associated with adherence to public health recommendations across studies? Were there any variables that were found significant in these studies but which were not examined (either by design or unintentionally) in the current study?

Thank you for this comment. In addition to the variables considered in this study, psychological factors (Kunzler 2021, Rajkumar 2020) and religious beliefs (Al-Sabbagh 2022) also seem to have an influence on adherence to isolation and quarantine measures. Psychological variables were also assessed in the CoCoFakt study (Cologne-Corona Counselling and Support for Index- and Contact Persons during the Quarantine Period); an evaluation of the influence of quarantine on the psychological well-being of the cohort is planned in a further paper. Variables on religious belief or practices were not assessed in this study. We have included this aspect in the Introduction and in the Strengths and Limitations section.

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b) What are the implications of the current research for potential methods to improve adherence to these recommendations in the future?

Thank you very much, we have added implications.

Reviewer: 2
Dr. Arvind Kumar, All India Institute of Medical Sciences

Comments to the Author:
Manuscript decision: Manuscript ID BMJ open-2022-063358, entitled "Adherence to stay-at-home orders: awareness, implementation, and difficulties of the officially ordered quarantine measures in the context of the SARS-CoV2 pandemic in Cologne - a cross-sectional cohort study."

The paper has been reviewed. The concept of the study and its possible benefits to the readership is well appreciated. This paper can be accepted after revision.

The suggestions/comments are the following:
1. Kindly mention the basis of the questionnaire (previous research/ validation by any society/ authority). If you have made it, please mention the process of development of the questions in the methodology.

Thank you, we have presented this development and the testing of the questionnaire in more detail in the methodology.

2. What was the status of the legality/reporting if any breach/misconduct/non-compliance in the COVID-19 appropriate behavior was not followed at that time in your place of study in view of pandemic? If such COVID-19 inappropriate behavior was to be reported to the concerned authority, how was this taken care of in your study? Were the authors just silent observers? Who took care of reporting?

Thank you very much for this very important question. However, in this survey we asked anonymously about the knowledge of the quarantine rules or their implementation. This means that there were no negative consequences for our study group. Due to this study design, it was not possible to match the answers to individual participants. Thus, it was not possible to report any violations of the quarantine rules to the responsible authorities.

3. What could be the new strategies/education/awareness/suggestions that will help the government to improve the efficiency of quarantine based on the obtained data?

Thank you very much. We have added the relevant implications in the discussion.

4. There are lots of grammatical errors throughout the paper, and the format was not followed properly. So, kindly request you to check the paper in this context.

5. References were not formatted properly. For example; DOI, the page numbers, issue numbers, etc. are not mentioned in all the references. Kindly cite the literature used for the research question and methods developed (the first line of the heading "Patient and Public Involvement"

Many thanks for the advice. The manuscript and the references have been reworked.

6. Based on this study, some learning suggestions can be mentioned.

Thank you very much. We have added the implications for the future.

7. In some paragraphs, there were high plagiarism (for example; the personal environment were first approached................ no individual results are given to the patients). Kindly requesting the author to correct all the plagiarism.

We apologize for this aspect and reworked the manuscript completely.

Reviewer: 3
Mr. Bernard Naughton, University of Oxford Said Business School, Oxford University Hospitals NHS Foundation Trust

Comments to the Author:
Dear Authors,

Thank you for submitting this paper to BMJ Open. Overall I found this to be an interesting and useful paper. To improve this paper I suggest the following amendments.

Page 3 of 30: Line 44& 45: Abstract: In the results section of the abstract there are two percentages listed as 6,6% and 14,4%. Should that be 6.6% and 14.4% (i.e. a full stop rather than a comma).

Thank you for your careful reading. We have corrected the points.

Page 3 of 30: Line 59: You use the word witch and I expect you mean which?

Thank you very much for that as well. You are correct. We intended which and have corrected the manuscript accordingly.

Page 5 of 30: Line 56-60: Was the sample size statistically significant, perhaps the authors could include the confidence interval and margin of error in this section. I expect this sample size was appropriate but it would be helpful to make it clearer.

Thank you very much. This was a full survey, so no case number estimate was made. We have tried to make this clearer in the methodology and in the section strengths and limitations.

Page 9 of 30: Line 14-20: I think a few more lines to explain table 2 would be useful. Please make it clear to the audience why there are P. values in this table and what they refer to.

Thank you, we have presented it in more detail and assigned the p-values.

Page 6 of 30: Survey items. How were the survey items selected? Were there any other variables which may have adversely affected your adherence results? If so I would like to see their absence listed as study limitations. For examples there may have been some situations where individuals had a moral obligation to break the stay at home rules, such as a caring for a loved one or financial pressure to work.

Thank you for this important comment. In the selection of the survey items, we have followed the recommendations of the World Health Organization, the European Centre for Disease Prevention and Control, the Robert Koch Institute and the German Society for General and Family Medicine, as well as currently available studies, for example Betsch 2022, Al-Sabbagh 2022 and Tong 2020. Since this is an anonymous survey, any traceability with possible punishment should be ruled out. However, we cannot assume that this was understood by all participants. We have added these aspects to the limitations. The last point, justified reasons for non-adherence, should also be recorded with the question "did you find it difficult...".

Page 13 of 30 Line 58-60: I would like to see some elaboration on the Health Belief Model. Please explain what it is and why its applicable in this context. It would also be helpful to explain how it relates to the outcomes of this study. It might also be helpful to expand the discussion to link in further with existing literature.

Thank you for your interest. We have made the importance and coverage of the health belief model more explicit in the introduction, but also in the methodology as well as the discussion.

References

1. Steens A, Freiesleben de Blasio B, Veneti L, et al. Poor self-reported adherence to COVID-19-related quarantine/isolation requests, Norway, April to July 2020. Euro Surveill 2020;25(37).
2. Smith LE, Potts HWW, Amlôt R, et al. Adherence to the test, trace, and isolate system in the UK: results from 37 nationally representative surveys. BMJ 2021;372:n608.
3. Lin Y, Hu Z, Alias H, et al. Quarantine for the coronavirus disease (COVID-19) in Wuhan city: Support, understanding, compliance and psychological impact among lay public. J Psychosom Res 2021;144:110420.
4. Al-Sabbagh MQ, Al-Ani A, Mafrachi B, et al. Predictors of adherence with home quarantine during COVID-19 crisis: the case of health belief model. Psychol Health Med 2022;27(1):215–27.
5. Tong KK, Chen JH, Yu EW-Y, et al. Adherence to COVID-19 Precautionary Measures: Applying the Health Belief Model and Generalised Social Beliefs to a Probability Community Sample. Appl Psychol Health Well Being 2020;12(4):1205–23.
6. Betsch C, Wieler L, Bosnjak M, et al. Germany COVID-19 Snapshot MOnitoring (COSMO Germany): Monitoring knowledge risk perceptions preventive behaviours and public trust in the current coronavirus outbreak in Germany 2020. Available at: https://psycharchives.org/en/item/e5acdc65-77e9-4fd4-9cd2-bf6aa2dd5eba Accessed September 17, 2022.
7. Kunzler AM, Röthke N, Günthner L, et al. Mental burden and its risk and protective factors during the early phase of the SARS-CoV-2 pandemic: systematic review and meta-analyses. Global Health 2021;17(1):34.
8. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. Asian Journal of Psychiatry 2020;52:102066.

VERSION 2 – REVIEW

REVIEWER	Rajkumar, Ravi Jawaharlal Institute of Postgraduate Medical Education, Psychiatry
REVIEW RETURNED	21-Sep-2022

GENERAL COMMENTS	The revisions made in the current version of the manuscript are satisfactory in my opinion. I have no further major changes or corrections to suggest.

REVIEWER	Naughton, Bernard Trinity College Dublin, Pharmacy and Pharmaceutical Sciences
REVIEW RETURNED	20-Sep-2022

GENERAL COMMENTS	Appropriate edits have been made. I am therefore happy to accept this paper for publication.