

November 14, 2023

Erin Russell, Editor-in-Chief

CMAJ Open

[editorial-open@cmaj.ca](mailto:editorial-open@cmaj.ca)

CC: Canadian Medical Association (CMA) Board of Directors  
CMAJ Governing Council  
CMAJ Editorial Advisory Board  
CMAJ Advisory Panels  
CMAJ Editorial Staff  
CMAJ Open Editorial Staff

Dear Ms. Russell,

We received your final decision rejecting our paper on October 24, 2023.

Our submission of the scientific article “Compartmental mixing models for vaccination-status-based segregation regarding viral respiratory diseases”, first to CMAJ, then to CMAJ Open, has been a tedious saga, in which the editors acted in a palpably political and biased manner.

The Table below gives the detailed chronology of all the steps, and versions of the article are documented at medRxiv.<sup>1</sup>

The editorial treatment of our paper by CMAJ and CMAJ Open has been contrary to the public interest, and contrary to the advancement of science, not to mention ethical norms.

The process included a proven egregious editorial conflict of interest by a CMAJ editor, which we described in detail in an appeal (appeal submission attached as Appendix 1, below). The appellate editor said “The model outlined and its attributes are well described and informative and it may be appropriate for CMAJ Open”. We then continued the process, with CMAJ Open.

CMAJ Open rejected our submission, refusing to have it peer reviewed. We appealed, on the basis that the editors did not understand that the paper is about the limits of epidemiological modeling, rather than a particular application (appeal submission attached as Appendix 2, below). We won the appeal, and our submission was sent for peer review.

Despite the two appeal results, despite positive external peer reviews, and despite that no technical or scientific errors were ever identified, the editors and an anonymous editorial “statistician” twice concocted a multitude of ancillary and unnecessary objections, apparently intended to be unsurmountable barriers.

We showed that the only scientific objection, formulated by the in-house anonymous statistician, is unambiguously false. They (and the editors) sought to introduce a bogus result previously published in CMAJ (Fisman et al.’s “ $\Psi$ ”) into our paper, not recognizing that the said result is demonstrably incorrect.

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<sup>1</sup> Revision history of the medRxiv preprint of our paper:

<https://www.medrxiv.org/content/10.1101/2022.08.21.22279035v5.article-info>

This proves that the statistician and the editors incorrectly believed they had the competence to review our work, while not trusting their own expert external reviewers. Our response to the editorial statistician's suggestion to apply Fisman et al.'s incorrect analysis based on " $\Psi$ " is attached as Appendix 3, below.

The expert peer reviewers, not finding any scientific or technical error in our work, made the following positive comments:

- **Peer Reviewer Amal Khan, Comment #1:** "1. The topic is exceptionally relevant and of practical importance."
- **Peer Reviewer Jesse Knight, Summary Comment:** "Specifically, the paper explores conditions when separation of these groups might i) decrease or ii) increase contacts among unvaccinated, with additional conditions further explored in the appendix. The analysis of these conditions — especially the more plausible (i) — is a helpful addition to prior modelling which assumed that group-specific contact rates are equal and remain fixed under all mixing conditions."

We responded to the detailed and rigorous comments of the peer reviewers and revised and resubmitted our manuscript.

One month later, you wrote back to us stating that the journal had mistakenly failed to send us comments of the internal statistician and internal editors, in addition to the peer reviews.

The statistician made the following positive comment about our paper:

- **CMAJ Open internal statistician, Comment #14:** "[T]he authors have demonstrated that such models needed to be used and interpreted with care and that extreme public health measures can have unintended consequences."

Three months after our resubmission, on October 21, 2023, we inquired seeking an update on the status of our paper. Only following our request did you write to us, on October 24, 2023, to inform us that our manuscript was rejected.

We were told that the rejection could not be appealed because CMAJ Open "can only consider one appeal per paper, therefore this decision is not open to appeal."

We are appalled by the editorial behaviour at CMAJ and CMAJ Open, including the extensive use of anonymous editorial and "statistician" comments at odds with external peer reviews and containing scientific errors.

We have copied the members of the Canadian Medical Association (CMA) Board of Directors, the CMAJ Governing Council, CMAJ Editorial Advisory Board, CMAJ Advisory Panels, CMAJ Editorial Staff, and CMAJ Open Editorial Staff, in the hope that the editorial standards and practices at these journals can be overhauled. The flagrant and documented conflict of interest, in particular, should not be ignored.

Sincerely,

Joseph Hickey, PhD  
Denis G. Rancourt, PhD

**Attachments:**

Table of steps in the submission process for our article	
Appendix 1:	Appeal of CMAJ's decision to reject our submission without peer review
Appendix 2:	Appeal of CMAJ Open's decision to reject our manuscript without peer review
Appendix 3:	Authors' response to CMAJ Open internal statistician's suggestion that we use Fisman et al.'s incorrect " $\Psi$ " index

**Table of steps in the submission process for our article**

2022-08-21	We submitted our manuscript to CMAJ
2022-08-29	Our submission to CMAJ was rejected without peer review by CMAJ Editor Dr. Matthew Stanbrook
2022-09-01	We wrote to Dr. Stanbrook and the CMAJ editorial board expressing our disagreement with Dr. Stanbrook's decision to reject our manuscript without peer review and noting particulars of Dr. Stanbrook's apparent conflict of interest with Dr. David N. Fisman, whose CMAJ publication we criticized in our manuscript
2022-09-07	Dr. Stanbrook informed us he had forwarded our 2022-09-01 email to CMAJ Editor-in-Chief Dr. Kirsten Patrick
2022-09-20	Dr. Patrick wrote to us directing us to submit a formal appeal of Dr. Stanbrook's decision using CMAJ's online system
2022-09-20	We submitted our appeal to CMAJ
2022-11-16	We received the decision on our CMAJ appeal from CMAJ Editor Dr. George A. Wells, who was of the opinion that "The model outlined and its attributes are well described and informative and it may be appropriate for CMAJ Open"
2022-11-24	We submitted a revised version of our manuscript to CMAJ Open. The cover letter of our submission included a copy of Dr. Wells' 2022-11-16 message to us, a full record of the correspondence with CMAJ editors concerning our manuscript, and a copy of our manuscript showing, in "Track Changes", the revisions that we made prior to submitting to CMAJ Open
2022-12-12	We received CMAJ Open's editorial decision to reject our manuscript without peer review
2022-12-13	We wrote to CMAJ Open Editor-in-Chief Erin Russell expressing our disagreement with the decision to reject our manuscript without peer review and requesting that the manuscript be sent for peer review

2022-12-15	We received an email from CMAJ Open editorial staff instructing us to submit an appeal using CMAJ Open's online system
2022-12-19	We submitted our appeal to CMAJ Open
2023-01-09	We received a message from Dr. Kirsteen Burton, Associate Editor of CMAJ Open, informing us that our appeal was granted, and inviting us to resubmit our manuscript
2023-01-16	We wrote to CMAJ Open Associate Editor Dr. Kirsteen Burton informing her that we had resubmitted our manuscript pursuant to having been granted the appeal
2023-05-12	We received an email from CMAJ Open Associate Editor Dr. Kirsteen Burton providing us with copies of two peer reviews of our manuscript and inviting us to revise and resubmit our manuscript pursuant to the reviewers' comments within six weeks
2023-06-01	We submitted our revised manuscript along with detailed responses to each of the peer reviewers' comments
2023-06-29	We received an email from CMAJ Open Editor-in-Chief Erin Russell stating that comments made by CMAJ Open's internal editors and statistician regarding our manuscript had been erroneously excluded from the email we received on 2023-05-12, and stating "We apologise for this technical error." Ms. Russell's 2023-06-29 email asked us to respond to the internal editors' and statistician's comments within six weeks.
2023-07-18	We resubmitted our revised manuscript along with detailed responses to each of the comments of the CMAJ Open editors and statistician.
2023-07-18 to 2023-10-21 (3 months)	Status given on the CMAJ Open online submission system: "Undergoing internal review. At an editorial meeting".
2023-10-21	We emailed CMAJ Open Editor-in-Chief Erin Russell requesting an update on the status of our submission
2023-10-24	Email from CMAJ Open Editor-in-Chief Erin Russell informing the authors of the decision to reject the revised manuscript.

# Appendix 1

September 20, 2022

Editor of the Canadian Medical Association Journal (CMAJ)

**Re: Appeal of Rejection of Manuscript CMAJ-22-1229**

Dear Editor:

Further to CMAJ Editor-in-Chief Dr. Patrick's email to us of Sept. 20, 2022 (appended below), we hereby appeal CMAJ Editor Dr. Stanbrook's rejection of our submission entitled "Compartmental mixing models for vaccination-status-based segregation regarding viral respiratory diseases" (submission CMAJ-22-1229, medRxiv preprint at <https://doi.org/10.1101/2022.08.21.22279035>).

Dr. Stanbrook summarily rejected our submission prior to any peer review.

Dr. Patrick's email describes conditions for this appeal.

Please consider the entirety of the attached correspondence as our appeal submission.

Sincerely,

Joseph Hickey, PhD

Denis G. Rancourt, PhD

# Appendix 1

RE: [External] Re: CMAJ - Decision on Manuscript ID CMAJ-22-1229

Kirsten Patrick <Kirsten.Patrick@cmaj.ca>

Tue 20/09/2022 08:03

To: Joseph Hickey <joseph.hickey@ucalgary.ca>

Cc: denis.rancourt@gmail.com <denis.rancourt@gmail.com>; Editorial <Editorial@cmaj.ca>

[ΔEXTERNAL]

Dear Dr. Hickey

Thanks for being in touch. I was away on vacation and then at a conference. Please forgive the delayed reply.

I note that you say, “Please do not divert our request using the journal’s pro forma appeal suggestion. We ask that the editors themselves consider our critique of their decision, communicated to us by Dr. Stanbrook, which has not involved peer reviewers.”

However, we are not able to consider rebuttals in any way other than via the formal appeals process, I’m afraid. Please be assured that the formal appeals process is taken seriously by editors. A senior editor who was not connected with the original decision on the paper independently considers the appeal. This means that Dr. Stanbrook will not be involved at all with making a decision on your appeal.

I have copied our editorial office so that the appeal, should you choose to submit one, will be expected.

Kind regards,

Kirsten Patrick

**Dr. Kirsten Patrick**

Editor in Chief, CMAJ

Redactrice en Chef, JAMC

Pronouns: She/her

Pronoms : Elle/la

500-1410 Blair Towers Place / 500-1410, place des tours Blair  
Ottawa ON K1J 9B9

T 800-663-7336 • 613-731-8610 *keep number if applicable)*

@KirstyPatrick*keep cell number if applicable)*

**cmaj**GROUP  
GROUPE**jamc**

# Appendix 1

**From:** Joseph Hickey <joseph.hickey@ucalgary.ca>  
**Sent:** September 12, 2022 12:57 PM  
**To:** Kirsten Patrick <Kirsten.Patrick@cmaj.ca>  
**Cc:** denis.rancourt@gmail.com  
**Subject:** Re: [External] Re: CMAJ - Decision on Manuscript ID CMAJ-22-1229

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Dear Dr. Patrick,

Please confirm that you have received our emails (appended below) regarding our submission CMAJ-22-1229, which were forwarded to you by CMAJ editor Dr. Stanbrook on Sept. 7, 2022.

Please inform us of the process going forward.

Sincerely,

Joseph Hickey, PhD  
Denis G. Rancourt, PhD

---

**From:** Matthew Stanbrook <[Matthew.Stanbrook@cmaj.ca](mailto:Matthew.Stanbrook@cmaj.ca)>  
**Sent:** 07 September 2022 17:13  
**To:** Joseph Hickey <[joseph.hickey@ucalgary.ca](mailto:joseph.hickey@ucalgary.ca)>  
**Cc:** [denis.rancourt@gmail.com](mailto:denis.rancourt@gmail.com) <[denis.rancourt@gmail.com](mailto:denis.rancourt@gmail.com)>; Kirsten Patrick <[Kirsten.Patrick@cmaj.ca](mailto:Kirsten.Patrick@cmaj.ca)>  
**Subject:** Re: [External] Re: CMAJ - Decision on Manuscript ID CMAJ-22-1229

[△EXTERNAL]

Dear Dr. Hickey,

I have forwarded your e-mail to CMAJ's Editor-in-Chief, Kirsten Patrick.

Yours sincerely,

Matthew Stanbrook

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Matthew Stanbrook MD PhD  
(he/his)  
Deputy Editor, Scientific / Rédacteur adjoint scientifique  
CMAJ  
Associate Professor, Department of Medicine  
and Institute of Health Policy, Management and Evaluation

# Appendix 1

University of Toronto

*CMAJ showcases innovative research and ideas aimed at improving health for people in Canada and globally. We publish original clinical research, analyses and reviews, news, practice updates and topical editorials that are read in Canada and around the world. CMAJ has an impact factor of 16.859 and is ranked among the top general medical journals worldwide.*

*CMAJ acknowledges with gratitude that we operate on territories that have, since time immemorial, been the traditional lands of Indigenous Peoples in Canada.*

---

**From:** Stanbrook, Matthew <[Matthew.Stanbrook@uhn.ca](mailto:Matthew.Stanbrook@uhn.ca)>  
**Sent:** Thursday, September 1, 2022 11:34 AM  
**To:** Matthew Stanbrook <[Matthew.Stanbrook@cmaj.ca](mailto:Matthew.Stanbrook@cmaj.ca)>  
**Subject:** FW: [External] Re: CMAJ - Decision on Manuscript ID CMAJ-22-1229

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**From:** Joseph Hickey <[joseph.hickey@ucalgary.ca](mailto:joseph.hickey@ucalgary.ca)>  
**Sent:** September 1, 2022 11:32 AM  
**To:** Stanbrook, Matthew <[Matthew.Stanbrook@uhn.ca](mailto:Matthew.Stanbrook@uhn.ca)>  
**Cc:** [editorial@cmaj.ca](mailto:editorial@cmaj.ca); [laupacisa@smh.ca](mailto:laupacisa@smh.ca); Cheryl Carmelle Marie Barnabe <[ccbarnab@ucalgary.ca](mailto:ccbarnab@ucalgary.ca)>; [lcaulley@toh.ca](mailto:lcaulley@toh.ca); [francois.champagne@umontreal.ca](mailto:francois.champagne@umontreal.ca); [physicianworkforce@nosm.ca](mailto:physicianworkforce@nosm.ca); Tom Noseworthy <[tnosewor@ucalgary.ca](mailto:tnosewor@ucalgary.ca)>; [deanfhs@queensu.ca](mailto:deanfhs@queensu.ca); [Philpott@queensu.ca](mailto:Philpott@queensu.ca); [kenneth.rockwood@dal.ca](mailto:kenneth.rockwood@dal.ca); [jsukhera@uwo.ca](mailto:jsukhera@uwo.ca); [maureen.taylor@medportal.ca](mailto:maureen.taylor@medportal.ca); Taylor, Maureen - Toronto East General Hospital <[Maureen.Taylor@tehn.ca](mailto:Maureen.Taylor@tehn.ca)>; [lfontai@ualberta.ca](mailto:lfontai@ualberta.ca); [alika.lafontaine@gmail.com](mailto:alika.lafontaine@gmail.com); [denis.rancourt@gmail.com](mailto:denis.rancourt@gmail.com)  
**Subject:** [External] Re: CMAJ - Decision on Manuscript ID CMAJ-22-1229

September 1, 2022

Matthew Stanbrook MD PhD  
Deputy Editor, Scientific  
Canadian Medical Association Journal (CMAJ)  
Associate Professor  
Department of Medicine and Institute of Health Policy, Management and Evaluation  
University of Toronto

Dear Professor Stanbrook,

We thank unspecified editors of CMAJ for reviewing our paper "Compartmental mixing models for vaccination-status-based segregation regarding viral respiratory diseases" (submission CMAJ-22-1229,



# Appendix 1

medRxiv preprint at <https://doi.org/10.1101/2022.08.21.22279035>).

Your decision letter is appended below, for reference.

Your stated reasons for declining our manuscript prior to any peer review are false.

Contrary to your statements:

- None of our original approach to implement infectious contact frequencies that depend on the degree and type of segregation was in issue in our prior critiques of the CMAJ article of Fisman et al.
- Here, we developed a general framework for segregation models, in which the Fisman et al. approach is an incidental special case, which is demonstrably not applicable to respiratory transmission under realistic conditions of segregation.
- Using constant contact frequencies, *à la* Fisman et al., is contrary to objective reality, necessarily leads to incorrect predictions, and represents a significant potential to cause harm if used to guide policy.
- 

As such, our work does not “merely reanalyze a previously published study”.

Using a biological analogy, our model can be thought of as a new branch on the phylogenetic tree of SIR modeling representing simplest-possible-sufficiently-realistic models of vaccination-status-based segregation, on which many sub-branches may flourish and on which Fisman et al.’s unrealistic special case is a dead-end.

The decision of editors to decline our manuscript amounts to barring publication of a significant advance in theoretical epidemiology, because the said advance conflicts with positions expressed in a prior CMAJ article.

Ours is an important paper that resolves nontrivial and consequential difficulties first introduced in the pages of CMAJ, wherein we concluded:

“Using SIR modelling, we have shown that vaccination-status-based segregation can lead to significantly different and counter-intuitive epidemic outcomes depending on how segregation is applied, and depending on complex cultural and physical factors that co-determine infectious contact frequencies (i.e., the products  $\beta c$ ), including negative health consequences for either segregated group, even disregarding the expected deleterious health impacts of the segregation policies themselves (Cohen, 2004; Cohen et al., 1991; Cohen et al., 1997). Given the lack of reliable empirical evaluations of needed infectious contact frequency values, given the now proven outcome sensitivities to the infectious contact frequencies, and given the intrinsic limitations of SIR models in this application, we cannot recommend that SIR modelling be used to motivate or justify segregation policies regarding viral respiratory diseases, in the present state of knowledge.”

For these reasons, we respectfully request that CMAJ editors reconsider their decision to dismiss our manuscript and agree to have our submission peer reviewed.

Please do not divert our request using the journal’s pro forma appeal suggestion. We ask that the editors themselves consider our critique of their decision, communicated to us by Dr. Stanbrook, which has not involved peer reviewers.

Finally, based on public records, we note that you, Dr. Stanbrook, and CMAJ author Dr. Fisman are collaborators working in the same institute and area of research:

# Appendix 1

- you are both professors at the same Institute of Health Policy, Management and Evaluation,
- you have the same stated “clinical epidemiology” research interest,
- you have University of Toronto addresses in the same building at 155 College Street,
- you have been co-recipients of research-grant funding,
- you have been co-authors on published scientific articles, and
- you have been co-instructors of a health-policy graduate course.
- 

Therefore, we would ask you to recuse yourself after you ensure that the unidentified editors responsible for the decision to dismiss our manuscript are duly informed of the present letter.

Please acknowledge this email.

Sincerely,

Joseph Hickey, PhD

Denis G. Rancourt, PhD

Cc: CMAJ Editor-in-Chief Dr. Kirsten Patrick; CMAJ Senior Deputy Editor Dr. Andreas Laupacis; CMAJ editorial staff; CMAJ Editorial Advisory Board; CMA President Dr. Alika Lafontaine

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**From:** CMAJ <[onbehalf@manuscriptcentral.com](mailto:onbehalf@manuscriptcentral.com)>

**Sent:** 29 August 2022 15:06

**To:** Joseph Hickey <[joseph.hickey@ucalgary.ca](mailto:joseph.hickey@ucalgary.ca)>

**Cc:** Joseph Hickey <[joseph.hickey@ucalgary.ca](mailto:joseph.hickey@ucalgary.ca)>; [denis.rancourt@gmail.com](mailto:denis.rancourt@gmail.com) <[denis.rancourt@gmail.com](mailto:denis.rancourt@gmail.com)>

**Subject:** CMAJ - Decision on Manuscript ID CMAJ-22-1229

29-Aug-2022

Dear Dr. Hickey:

Thank you for giving CMAJ’s editors an opportunity to review your manuscript, "Compartmental mixing models for vaccination-status-based segregation regarding viral respiratory diseases" (our reference CMAJ-22-1229). I am sorry to tell you that we have decided to decline your manuscript for publication in CMAJ.

Editors perceive that the submission represents a reanalysis and critique of the study by Fisman and colleagues published in CMAJ earlier this year. Please note that CMAJ does not publish articles in our Research section that merely reanalyze a previously published study, as we would consider such articles to represent a comment on the work of another group of researchers and not an independent, original research study. CMAJ only considers comments on previously published articles for publication as letters. You have already published an electronic letter in CMAJ in response to the study by Fisman and colleagues, in which you outlined your basic objections to the analytic approach and conclusions of that study, on which your present submission somewhat elaborates. Your perspective on this issue is thereby already publicly available on CMAJ's website where interested readers can access it.

Each year we receive over a thousand research manuscripts, and we have room to publish only about 8% of them. This means we have to reject some good quality manuscripts that are not as suitable for CMAJ as those we accept. When deciding on acceptability of a manuscript for publication in CMAJ, we consider factors such as its application to medical practice and other manuscripts recently published.

Thank you again for giving us a chance to consider your manuscript for CMAJ. I am sorry to disappoint you on

# Appendix 1

this occasion.

Sincerely,  
Matthew Stanbrook MD PhD  
Deputy Editor, Scientific  
CMAJ  
Associate Professor, Department of Medicine  
and Institute of Health Policy, Management and Evaluation  
University of Toronto

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Last month, our time to a first action (declining the manuscript or sending it to peer review) for research submissions was an average of 3.42 days.

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# Appendix 2

December 19, 2022

Appeal Committee, CMAJ Open

**Re: Appeal of editorial rejection of submission CMAJOpen-2022-0237 “Compartmental mixing models for vaccination-status-based segregation regarding viral respiratory diseases”**

Dear CMAJ Open Appeal Committee,

We appeal the rejection without peer review of our submission (ID # CMAJOpen-2022-0237). The decision to reject was communicated to us on Dec. 12, 2022, by CMAJ Open Editor-in-Chief Ms. Erin Russell.

It is clear, from their comments in the Dec. 12 rejection letter to us (attached below), that Ms. Russell and unnamed CMAJ Open editors did not understand our submission, nor recognize that they did not understand it.

We ask that the Appeal Committee find that CMAJ Open should send our manuscript for peer review by experts familiar with sensitivity analysis in SIR modeling, rather than rejecting it out-of-hand using unidentified editors who clearly did not grasp the purpose, content, and results of our work.

In our article, we show that the attack rates in both the vaccinated and unvaccinated groups depend crucially on the type and degree of segregation of the two groups, which has not previously been considered.

The point of our model is not to attempt to use an epidemic model to predict the outcome of a particular segregation policy, as demanded by the rejecting editor, but rather to demonstrate that such predictions cannot be made and are meaningless, due to the sensitivity of the model results to the parameters describing the segregation, and due to the current lack of sufficient knowledge about the real values of infectious contact frequencies. This is emphasized in our approach and is stated clearly in our Conclusion:

“Given the lack of reliable empirical evaluations of needed infectious contact frequency values, given the now proven outcome sensitivities to the infectious contact frequencies, and given the intrinsic limitations of SIR models in this application, we cannot recommend that SIR modelling be used to motivate or justify segregation policies regarding viral respiratory diseases, in the present state of knowledge.”

In the decision to reject, Ms. Russell and unidentified CMAJ Open editors suggested, without the benefit of any disclosed peer review, that we show the utility of our model in reference to real data, whereas we have proven that such models cannot be used in this way with existing data. This is why we think they have not understood or chosen not to acknowledge what we advance.

We are taken aback by the CMAJ Open submission process so far.

Our submission needs to be reviewed by qualified experts, and we respectfully ask the Appeal Committee to find this result and to inform CMAJ Open accordingly. We note that the comments of Ms. Russell and the unidentified CMAJ Open editors regarding form would be easy to address, and that the CMAJ appeal editor Prof. George A. Wells stated that “The model outlined and its attributes are well

# Appendix 2

described and informative”, as per the record of correspondence that we provided to CMAJ Open on submission (pgs. 28-35 of this PDF file).

An index of the attached correspondence pertaining to our submission CMAJOpen-2022-0237 is as follows:

<b>Date</b>	<b>Description</b>	<b>Pages in this PDF file</b>
2022-11-24	Manuscript as submitted to CMAJ Open	3-26
2022-11-24	Authors’ cover letter accompanying manuscript submission to CMAJ Open	27-63
2022-12-12	CMAJ Open editor’s decision rejecting manuscript without peer review	64-65
2022-12-13	Authors’ letter to CMAJ Open editor critical of the decision to reject and requesting peer review	66-74
2022-12-15	Email from CMAJ Open editorial staff instructing authors to submit an appeal using CMAJ Open’s online system	75
2022-12-19	The present cover letter for appeal	1-2

Sincerely,

Joseph Hickey, PhD  
Denis G. Rancourt, PhD

**(Appendix 2 attachments omitted for brevity)**

# Appendix 3

<p><b>Statistician’s comment #7:</b></p> <p>7. “We also define <math>B_v</math> as the share of infections among vaccinated people that were due to contacts with infectious unvaccinated people.” <math>B_v</math> would not be useful if it is simply the raw proportion of infections among vaccinated people that were acquired from unvaccinated people since the unvaccinated population is considerably smaller. Fisman et al. 2022 use <math>\psi</math> which is more useful as it is standardized per contact.</p>	
<p><b>Authors’ response:</b></p> <p>There are two parts to this statistician’s comment: (1) “<math>B_v</math> would not be useful”, and (2) the Fisman et al. <math>\psi</math> “is more useful as it is standardized per contact”.</p> <p>Regarding the alleged lack of usefulness of <math>B_v</math>, we struggle to understand how the statistician could conclude that <math>B_v</math> is not useful. It is directly the risk of an infected vaccinated person having acquired their infection from an unvaccinated person. The said risk can then be evaluated as a function of separation (<math>\eta</math>), vaccine efficacy (<math>VE</math>) or population fraction of vaccinated (<math>P_v</math>), as we have done. In each case <math>B_v</math> has an immediate interpretation of interest to policy makers.</p> <p>Furthermore, <math>B_v</math> is an outcome that directly can be used in calculations of other policy-relevant outcomes. For example, the fraction of the total population that is vaccinated and that became infected from unvaccinated persons, <math>F_{iu}</math>, is <math>F_{iu} = P_v T_v B_v</math>, where</p>	

# Appendix 3

$T_v$  is the fraction of the vaccinated population that became infected (the fraction of breakthrough infections on completion of the epidemic).

Regarding the “Fisman et al. 2022  $\psi$ ” (Fisman  $\Psi$ ) being “more useful as it is standardized per contact”; with respect, the statistician has misguided themselves, as follows.

The Fisman  $\Psi$  is defined by Fisman et al. as “the fraction of all infections among vaccinated people that derived from contact with unvaccinated people [ $B_v$ ], divided by the fraction of all contacts [involving vaccinated people] that occurred with unvaccinated people [ $f_{vu}$ ]”. And Fisman et al. incorrectly interpreted their  $\Psi$ , for example, as:

“As like-with-like mixing increased (i.e., with reduced contact between vaccinated and unvaccinated subpopulations) ... the contribution of risk to vaccinated people caused by infection acquired from contact with unvaccinated people (as measured by  $\Psi$ ) increased. The larger the value of  $\Psi$ , the more unvaccinated people contributed to infections in the vaccinated subpopulation.”

This  $\Psi (=B_v/f_{vu})$  was introduced *ad hoc* by Fisman et al., without any reference. To our knowledge, it has no prior use or justification in the epidemiological literature.

Contrary to Fisman et al.’s assertion,  $\Psi$  is not a measure of “the contribution of risk to vaccinated people caused by infection acquired from contact with unvaccinated people” (which is  $B_v$ ) because one divides by all contacts, irrespective of whether the said contacts are benign or infectious, and the ratio of benign/infectious changes significantly with the circumstances. This leads to  $\Psi$  exhibiting absurd results, in the circumstances of interest, as shown below.

Furthermore, the Fisman et al. statement that “The larger the value of  $\Psi$ , the more unvaccinated people contributed to infections in the vaccinated subpopulation” is mathematically incorrect. The opposite is generally true, as also shown below.

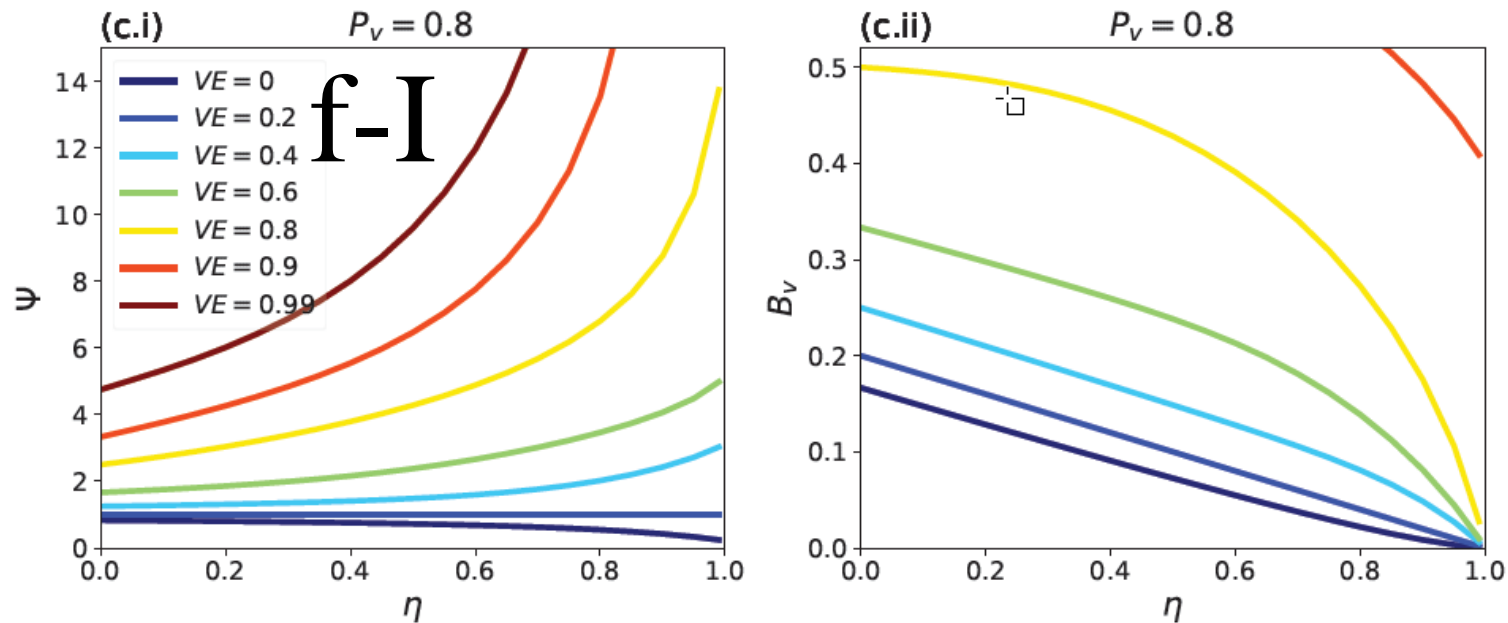
The following pairs of graphs (labelled f-I, f-II, f-III and f-IV) show  $\Psi$  (left) and  $B_v$  (right) versus  $\eta$ ,  $P_v$  and  $VE$ .

All graphs use the parameters considered by Fisman et al.:  $c_v^0 = c_u^0 = 437$ ,  $m_v = m_u = 0$ ,  $\beta_{ij} = 1$ ,  $\gamma_u = \gamma_v = 73$ ,  $NI = 0.2$ , and  $P_v = 0.8$  if not otherwise indicated. Here, “ $NI$ ” is the initial immunity of the unvaccinated.

# Appendix 3

In f-I (which has expanded Y-scales compared to f-II), we note that  $B_v$  decreases monotonically with increasing  $\eta$ , whereas  $\Psi$  increases monotonically with increasing  $\eta$  (for  $VE > NI$ ). According to Fisman et al., this behaviour of  $\Psi$  would mean that “the contribution of risk to vaccinated people caused by infection acquired from contact with unvaccinated people” increases with decreasing mixing (i.e., with increasing separation between vaccinated and unvaccinated), and is largest for complete separation ( $\eta = 1$ ), even though  $B_v$  itself decreases to zero at  $\eta = 1$  (for  $VE$  up to 0.8).

It is not unreasonable to advance that this ill-defined “risk” ( $\Psi$ ) (“standardized” by an unknown number of infectious contacts) that monotonically goes to its largest value when the agent of risk is removed ( $\eta = 1$ ) is an absurdity, of no practical utility in the real world.



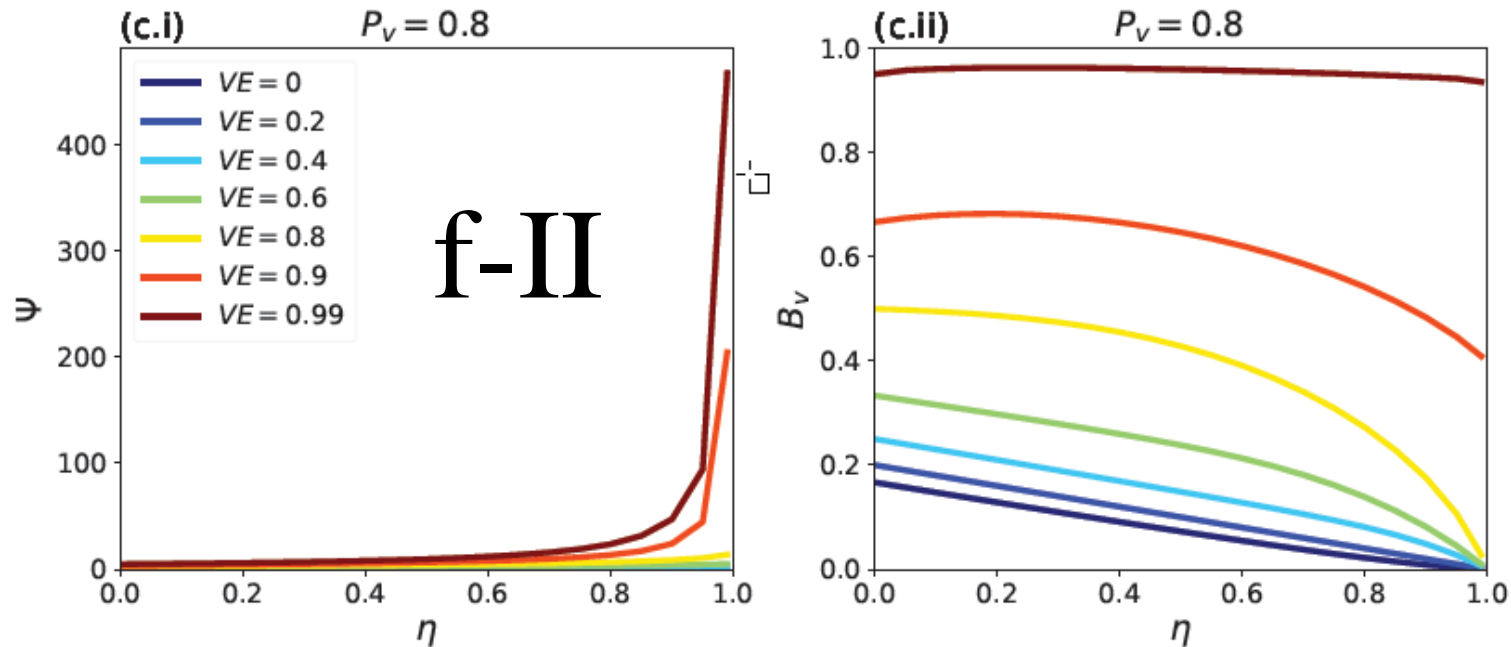
This meaningless result of largest “risk” ( $\Psi$ ) when nothing happens, and increasingly so for increasing  $VE$  (when the vaccinated should be increasingly protected), is maintained and amplified for larger values of  $VE$ , as shown in f-II.

Furthermore, the curves with  $VE > NI$  ( $VE = 0.4$  through 0.99) in f-I and f-II prove that the Fisman et al. statement “The larger the value of  $\Psi$ , the more unvaccinated people contributed to infections in the vaccinated subpopulation” is unambiguously false.



# Appendix 3

We see that the opposite is true: on increasing separation  $\eta$ , where  $\Psi$  increases (left panels),  $B_v$  decreases (right panels).  $B_v$  is defined “as the share of infections among vaccinated people that were due to contacts with infectious unvaccinated people”, which is exactly the proportion that “unvaccinated people contributed to infections in the vaccinated subpopulation”.



Here (f-II), as the vaccine is made perfectly effective (near-1 values of VE), the “the contribution of risk to vaccinated people caused by infection acquired from contact with unvaccinated people”, supposedly and incorrectly represented by  $\Psi$ , now diverges ( $\Psi$  diverges) to large values, orders of magnitude outside of any reasonable range compared to its values at the lower values of  $\eta$  (f-II).

On the contrary, for VE near 1, the actual risk  $B_v$  does not diverge as one approaches  $\eta = 1$ , and there is virtually no change in  $B_v$  versus separation  $\eta$ , all the way to complete separation ( $\eta = 1$ ) (f-II). It is difficult to reconcile the “disproportionate” risk from the unvaccinated (inferred from  $\Psi$  as interpreted by Fisman et al.: “their choices affect risk of viral infection among those who

# Appendix 3

are vaccinated in a manner that is disproportionate to the portion of unvaccinated people in the population") with  $B_v$  decreasing with increasing  $\eta$  (f-II), while being virtually independent of  $\eta$  for large  $VE$  (f-II). In the real world, separation from the cause of risk reduces the risk. In the real world, there is no risk to the vaccinated, "disproportionate" or other, from the unvaccinated when  $VE = 1$ .

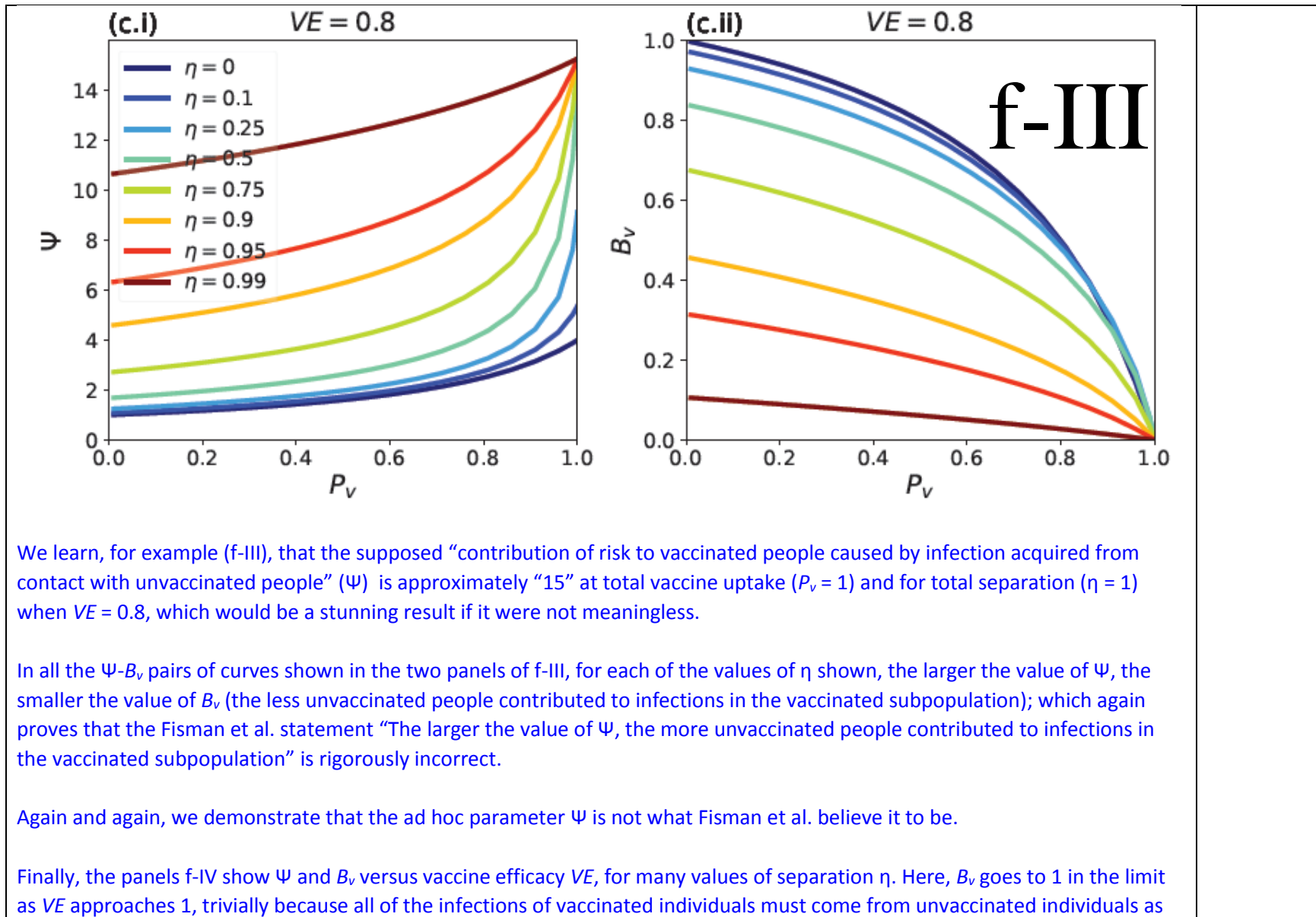
The two panels in f-II thus prove that the main stated inference of Fisman et al. based on their  $\Psi$  is false.

This should be sufficient to convince readers of the misguided approach of thus introducing  $\Psi$ , but there is more.

The panels f-III show  $\Psi$  and  $B_v$  versus  $P_v$ , for many values of  $\eta$ . Here,  $B_v$  monotonically decreases to zero as  $P_v$  is increased to 1, as expected, and has smaller and smaller values for larger and larger values of  $\eta$ .

In contrast, the "contribution of risk to vaccinated people caused by infection acquired from contact with unvaccinated people", supposedly and incorrectly represented by  $\Psi$ , monotonically increases as  $P_v$  is increased, and is systematically larger for larger values of  $\eta$ . This would mean that the "contribution of risk to vaccinated people caused by infection acquired from contact with unvaccinated people" increases the more people are vaccinated, and the more the vaccinated are separated from the unvaccinated, up to the extreme values of total vaccination uptake ( $P_v = 1$ ), and up to total separation ( $\eta = 1$ ), and both total vaccination uptake and total separation ( $P_v = 1$  and  $\eta = 1$ ).

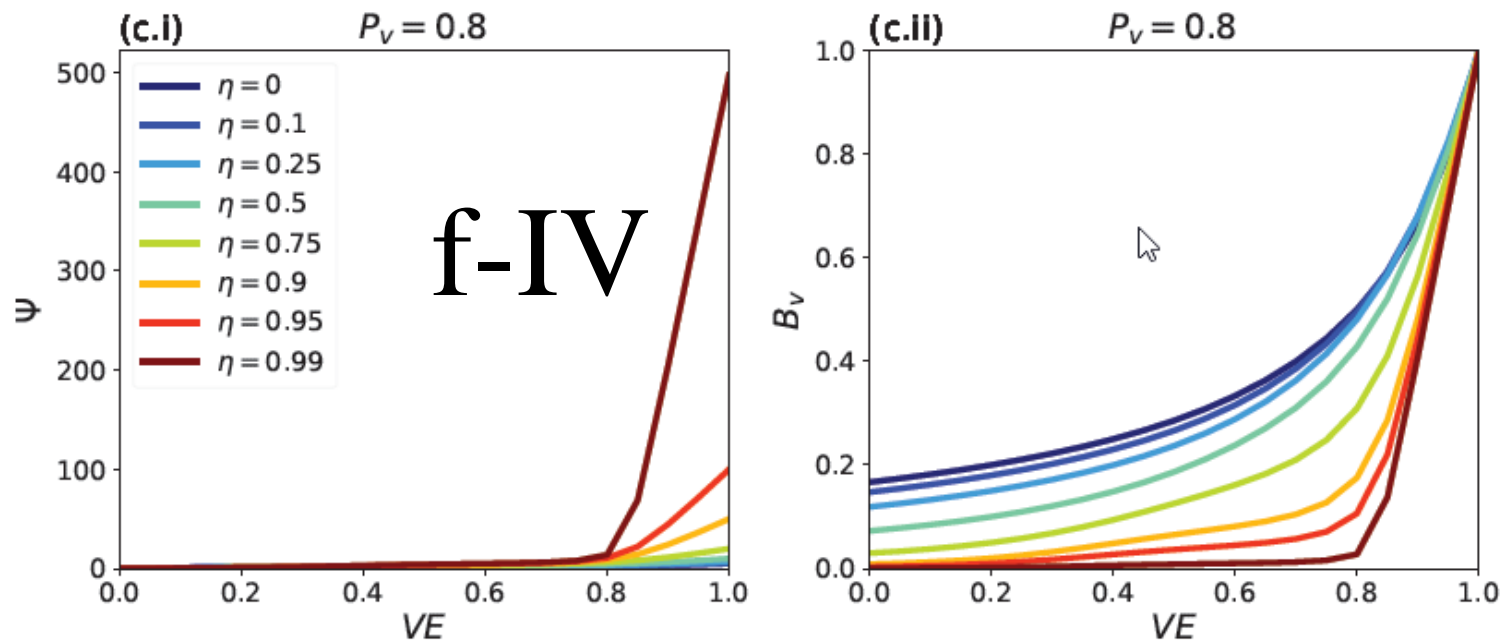
# Appendix 3



# Appendix 3

$VE$  approaches 1. Nonetheless,  $B_v$  values are systematically smaller for larger and larger separation  $\eta$ , as expected; and  $B_v$  is essentially independent of  $\eta$  when  $VE$  is near 1, as also shown above (f-III).

The opposite is true of  $\Psi$  (f-IV): the greater the separation  $\eta$ , the more  $\Psi$  increases; to astronomical values, as one goes to the larger values of  $VE$ . This inversion (compared to the behaviour of  $B_v$ ) would mean that the more one is separated, the greater the danger from being infected by the individuals one is separated from, and all the more so if  $VE$  is high. This is difficult to reconcile with reality because it is nonsense, arising from the ill-defined "standardization" used to construct  $\Psi$ .



We hope that the statistician did not mean to imply that we should adopt  $\Psi$  or find it useful.

We note that neither expert peer reviewer mentioned the Fisman et al.  $\Psi$ , which is a good approach.