

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Understanding national trends in COVID-19 vaccine hesitancy in Canada – results from five sequential cross-sectional representative surveys spanning April 2020 to March 2021
AUTHORS	Lavoie, Kim; Gosselin-Boucher, Vincent; Stojanovic, Jovana; Gupta, Samir; Gagné, Myriam; Joyal-Desmarais, Keven; Séguin, Katherine; Gorin, Sherri; Ribeiro, Paula; Voisard, Brigitte; Vallis, Michael; Corace, Kimberly; Presseau, Justin; Bacon, Simon

VERSION 1 – REVIEW

REVIEWER	Patil, Sonal South India division
REVIEW RETURNED	23-Jan-2022

GENERAL COMMENTS	<p>My comments are as follows:</p> <ol style="list-style-type: none"> 1. Abstract- Well structured and summarizes the t overall purpose of the study and the research problem(s) investigated. The basic design of the study; major findings and trends found as a result of the study is also showcased. 2. Materials and methods- The authors have included a proper survey questionnaire along with the assessment scale to analyze their objectives. 3. Statistics: The involvement of regression methods (logistic and linear models) provides clearance of bias that may have generated by the different variables. The confounding/impending factors are well neutralized by the statistical methods. 4. Discussion: The discussion requires more additional statements with regards to the existing literature search. Include the following references and citations reflecting the COVID-19 updates to strengthen the manuscript: <ul style="list-style-type: none"> - Origin and transmission (use reference and cite: Umakanthan S, Sahu P, Ranade AV, et al. Origin, transmission, diagnosis and management of coronavirus disease 2019 (COVID-19). Postgrad Med J. 2020;96(1142):753-758. doi:10.1136/postgradmedj-2020-138234) - To mention in brief about vaccines (use reference and cite: “Francis AI, Ghany S, Gilkes T, et al. Review of COVID-19 vaccine subtypes, efficacy and geographical distributions [published online ahead of print, 2021 Aug 6]. Postgrad Med J. 2021;postgradmedj-2021-140654. doi:10.1136/postgradmedj-2021-140654”) - Definition of vaccine resistance and hesitance (use reference and cite: Umakanthan S, Patil S, Subramaniam N, Sharma R. COVID-19 Vaccine Hesitancy and Resistance in India Explored through a
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	<p>Population-Based Longitudinal Survey. <i>Vaccines</i> (Basel). 2021;9(10):1064. Published 2021 Sep 24. doi:10.3390/vaccines9101064)</p> <p>- Compare the global vaccine status and relate it with the Canadian vaccine status (refer and cite: Umakanthan S, Chauhan A, Gupta MM, Sahu PK, Bukelo MM, Chattu VK. COVID-19 pandemic containment in the Caribbean Region: A review of case-management and public health strategies. <i>AIMS Public Health</i>. 2021;8(4):665-681. Published 2021 Sep 27. doi:10.3934/publichealth.2021053)</p> <p>5. Conclusion: The authors have shown the importance of variables that can influence the adherence of preventive measures and willingness to vaccinate against COVID-19. The main bulletin messages showcases the summary of the manuscript very well.</p> <p>I advocate this article for revision pending inclusion of the points as recommended by me.</p>
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REVIEWER	Umakanthan, Srikanth The University of the West Indies at St Augustine, Medical Sciences
REVIEW RETURNED	23-Jan-2022

GENERAL COMMENTS	<p>The manuscript adopts survey analysis of 5 surveys performed in Canada.</p> <p>The following points need to be addressed by the authors:</p> <ol style="list-style-type: none"> 1. Definition of vaccine hesitancy has to be addressed. 2. is this a longitudinal study or a compilation of 5 different surveys conducted on different population or the same population? 3. Was the survey questionnaire validated? if so where there any edits from the original survey? outliers if identified should be mentioned. 4. Psychiatric disorders mentioned are very vague. where there any definitions or specific disorders identified by specialist psychiatrist? 5. Bias generated from variables (depending and non-dependending) should be stated clearly. Was there any statistical analysis performed to limit/reduce the bias generated in this study? 6. Discussion does give any note on the the origin of COVID-19, vaccine comparison with other neighboring countries. 7. Was survey done on particular hot-spots or was it on a general population.
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1 (Dr. Sonal Patil, South India division)

1. Abstract- Well structured and summarizes the t overall purpose of the study and the research problem(s) investigated. The basic design of the study; major findings and trends found as a result of the study is also showcased.

- We thank the reviewer for their positive comments.

2. Materials and methods- The authors have included a proper survey questionnaire along with the assessment scale to analyze their objectives.

- We thank the reviewer for their positive comments.

3. Statistics: The involvement of regression methods (logistic and linear models) provides clearance of bias that may have generated by the different variables. The confounding/impending factors are well neutralized by the statistical methods.

- We thank the reviewer for their positive comments.

4. Discussion: The discussion requires more additional statements with regards to the existing literature search. Include the following references and citations reflecting the COVID-19 updates to strengthen the manuscript:

- Origin and transmission (use reference and cite: Umakanthan S, Sahu P, Ranade AV, et al. Origin, transmission, diagnosis and management of coronavirus disease 2019 (COVID-19). *Postgrad Med J.* 2020;96(1142):753-758. doi:10.1136/postgradmedj-2020-138234)

- We appreciate the author's suggestion. However, since we discussed the origin and transmission in the introduction, we have added this reference to the end of the first sentence of the introduction.

- To mention in brief about vaccines (use reference and cite: "Francis AI, Ghany S, Gilkes T, et al. Review of COVID-19 vaccine subtypes, efficacy and geographical distributions [published online ahead of print, 2021 Aug 6]. *Postgrad Med J.* 2021;postgradmedj-2021-140654. doi:10.1136/postgradmedj-2021-140654")

- We thank the reviewer for their suggestion. However, since we introduced the critical role of vaccines in the introduction of the manuscript, we have elected to include this reference in the first paragraph of the introduction.

- Definition of vaccine resistance and hesitance (use reference and cite: Umakanthan S, Patil S, Subramaniam N, Sharma R. COVID-19 Vaccine Hesitancy and Resistance in India Explored through a Population-Based Longitudinal Survey. *Vaccines (Basel).* 2021;9(10):1064. Published 2021 Sep 24. doi:10.3390/vaccines9101064)

- We thank the reviewer for their suggestion. We are happy to include a reference that includes the definition of vaccine hesitancy, but have elected to reference the paper written by Noni E. MacDonald, on behalf of the SAGE Working Group on Vaccine Hesitancy, as this is the gold standard reference on the topic. Since we introduce this in the introduction, we have added this reference to the middle of the first paragraph of the introduction. We hope this is acceptable.

- Compare the global vaccine status and relate it with the Canadian vaccine status (refer and cite: Umakanthan S, Chauhan A, Gupta MM, Sahu PK, Bukelo MM, Chattu VK. COVID-19 pandemic containment in the Caribbean Region: A review of case-management and public health strategies. *AIMS Public Health.* 2021;8(4):665-681. Published 2021 Sep 27. doi:10.3934/publichealth.2021053)

- We thank the reviewer for their suggestion. Indeed, it is important to compare rates of vaccine hesitancy in Canada to those of other countries. To do so, we have elected to reference the living systematic review by Crawshaw et al, which summarizes the results of more than 175 studies to date. We noticed the above reference is specific only to the Caribbean, so may not be as appropriate as citing the systematic review. We hope this is acceptable.

5. Conclusion: The authors have shown the importance of variables that can influence the adherence of preventive measures and willingness to vaccinate against COVID-19.

- We thank the reviewer for their positive comments.

6. The main bulletin messages showcases the summary of the manuscript very well.

- We thank the reviewer for their positive comments.

Reviewer: 2 (Dr. Srikanth Umakanthan, The University of the West Indies at St Augustine)

1. Definition of vaccine hesitancy has to be addressed.

- We thank the reviewer for their suggestion. We have added a brief definition of vaccine hesitancy (SAGE Working Group definition, MacDonald et al.) to the second paragraph of the introduction. We hope this is acceptable.

2. Is this a longitudinal study or a compilation of 5 different surveys conducted on different population or the same population?

- We apologize for the lack of clarity. This study included data from five cross-sectional age, sex and province-weighted population-based samples who completed online surveys between April 2020 and March 2021. They were all recruited from the same polling service but represent distinct samples. This has been clarified in the title, abstract and methods.

3. Was the survey questionnaire validated? if so where there any edits from the original survey? outliners if identified should be mentioned.

- The iCARE survey was designed to assess sociodemographics, physical and mental health conditions, general health behaviours, previous COVID-19 infection, awareness of local government prevention policies, perceptions and attitudes about these policies, adherence to prevention behaviours, COVID-19-related concerns and impacts, and vaccine attitudes, intentions and behaviour. It was also designed to assess the constructs from the Capability, Opportunity, Motivation – Behaviour (COM-B) Model of the Behaviour Change Wheel (Michie et al) and from the Health Belief Model (Rosenstock et al, 1971; 1971) (see Bacon et al, BMJ Open 2021 for protocol paper). The core iCARE survey has remained stable over time, with only minor edits to reflect the evolving nature of the pandemic. All survey versions can be found at: www.osf.io/nswcm. The survey did not undergo any formal validation procedures, however, we did perform a principle component analysis on the items in the 'concerns' module, as detailed in the manuscript.

4. Psychiatric disorders mentioned are very vague. where there any definitions or specific disorders identified by specialist psychiatrist?

- We thank the reviewer for the question. To assess the presence of psychiatric disorders, we asked respondents to indicate if they currently had a physician-diagnosis of either a mood disorder (e.g., major depression) or anxiety disorder (e.g., panic disorder, generalized anxiety disorder, post-traumatic stress disorder). These examples were provided in the survey as guidance. These were self-reports of physician-diagnoses, and were not identified or validated by a psychiatrist.

5. Bias generated from variables (depending and non-depending) should be stated clearly. Was there any statistical analysis performed to limit/reduce the bias generated in this study?

- We thank the reviewer for their question. However, it is not clear what form of bias they are referring to. To clarify, in order to ensure as representative a sample as possible for this type of data capture, we have recruited participants through a reputable national polling firm whose panel is composed of more than 400,000 Canadians, most of which (61%) were recruited in the last 10 years. Further, more than two thirds of the panel were recruited randomly by telephone, with the remainder through advertising and social media. Using data from Statistics Canada, data were weighted within each province according to the sex and age of the participants. Main analyses were also adjusted for a-priori selected covariates to reduce the potential for confounding. Finally, we have attempted to be completely transparent by making our surveys and protocols fully open access, and are available at : www.osf.io/nswcm. We hope this is acceptable.

6. Discussion does give any note on the the origin of COVID-19, vaccine comparison with other neighboring countries.

- We thank the reviewer for the comment. We have added a reference on the origin of COVID-19 in the introduction as requested by reviewer 1, and have compared our rates of vaccine hesitancy to

those observed in the United States and 18,526 respondents from 15 other countries as reported by the World Economic Forum (see first paragraph of discussion). We hope this is satisfactory.

7. Was survey done on particular hot-spots or was it on a general population.

- It was done in the general population, recruited through a reputedly national polling service. Details can be found in the methods section.

VERSION 2 – REVIEW

REVIEWER	Umakanthan, Srikanth The University of the West Indies at St Augustine, Medical Sciences
REVIEW RETURNED	14-Feb-2022
GENERAL COMMENTS	The authors have clearly identified and responded to all my concerns. This manuscript stands endorsed to be published in the present format.