

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Referendum Opposition to Fluoridation and Health Literacy: A Cross-Sectional Analysis Conducted in Three Large U.S. Cities
AUTHORS	Curiel, John; Slade, Gary; Christian, Thu-Mai; Lafferty-Hess, Sophia; Carsey, Thomas; Sanders, Anne

VERSION 1 – REVIEW

REVIEWER	Santhosh Kumar Tadakamadla Griffith University, Australia
REVIEW RETURNED	11-May-2018

GENERAL COMMENTS	<p>This is a well-written article that aimed to assess the effect of population health literacy on community support for CWF. The objective of the study in the abstract and the introduction are not the same.</p> <p>It is clear from the introduction that main hypothesis of the authors was that high health literacy could be associated with a high percentage of voting for CWG. However, the objective is not specific and does not mention about health literacy. The rationale for choosing health literacy against education status is repeating and presented both in the introduction and the methods.</p> <p>More information on National Association of Adult Literacy (NAAL) survey data would be helpful, the content of this survey and how the score transforms into 0-500.</p> <p>There is no information on how the statistical analyses were done (SPSS or Stata or other packages), the p-value adopted for hypothesis testing is not provided.</p> <p>According to this reviewer, it is not a common practice to refer to external sources while interpreting the results. The discussion section might be a better place to describe the R square.</p> <p>I did not understand why references were provided to the sentence " These models suggest that once accounting for the high level of statistical noise in interpreting election outcomes [23,24], healthy literacy" which is the authors own finding.</p>
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REVIEWER	Hiroko Iida NYS Oral Health Center of Excellence, USA
REVIEW RETURNED	10-Jun-2018

GENERAL COMMENTS	<p>Reviewer Comment</p> <p>This is a manuscript examining the influence of health literacy on the outcomes of CWF referenda in three large US cities, San Antonio TX, Wichita KS, and Portland OR. While this is not clearly stated in the objective statement (Page 4, lines 4-8 as well as in the abstract), I think they should.</p>
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	<p>The authors are the mix of experts in political science and dental public health/epidemiology in UNC Chapel Hill and have records of peer-review journal publications and federal research funding. The same group of investigators recently published another case study, in JADA, concerning the same events/populations, which examined if media coverage played a potential role in the referenda on CWF.</p> <p>The research question they investigated in this manuscript is an important and obvious one (it is not hard to imagine adults with limited literacy would not fully understand the languages and health benefit on CWF described in the ordinance and effectively cast their votes). The data and analysis are at precinct-level, not individual-level, thus this study explores the effect of “macro-level” health literacy on population behavior/decision making for the often polarized public health issues such as CWF. While ecological fallacy is a limitation, CWF is a community-based intervention strategy, and winning community’s support/will to fluoridate is a goal of CWF campaign, therefore I think the unit of analysis is appropriate.</p> <p>I am a bit confused regarding their application of IRT model to “match predictors of NAAL results with available demographic data at census block then estimating health literacy scores at precinct-level” part that is described in detail in the Appendix B. Determining appropriateness of these complex modeling and estimation procedures in Appendix B is probably critical to validate the findings but unfortunately beyond my expertise, and I hope the journal invited others who can review this area critically. Otherwise, I believe the authors discuss the limitations of health literacy data sufficiently.</p> <p>Initially it was a bit challenging to read back and forth the “main” text, tables, and figures and those in “appendix”, but when reading second time, the distribution of information in main text tables/figures and appendix actually seemed appropriate.</p> <p>In the Article Summary, the authors say “understanding these effects could assist the ADA when promoting their campaigns”. It would be nice if the authors could elaborate public health practice implications of their findings and potential intervention strategies to enhance health literacy at population-level in the Discussion if such scientific evidence is available.</p> <p>I sort of disagree with the discussion (page 8, lines 4-9) on “more educational attainment= more access to FAN resources without understanding the methodological flaws etc.”, although the authors may base this statement on the assumption that those who have higher educational attainment may tend to do their own research. I would suggest the authors to either elaborate the discussion based on available evidence (i.e. research on how people seek health information online today and how such behavior is associated with educational attainment) or consider deleting this statement as it has weak evidential support.</p>
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REVIEWER	Mark E Moss East Carolina University, School of Dental Medicine, USA
REVIEW RETURNED	11-Jun-2018

GENERAL COMMENTS	Review Disparities in opposition to community water fluoridation: the health literacy linkage. Bmjopen – 2018- -022580
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	<p>This is an important contribution to the literature in that it identifies a construct for health literacy as a modifiable dimension of voter behavior related to health policy – in this case, specifically dealing with community water fluoridation decisions.</p> <p>The study used Item Response Theory methods to assign Health Literacy scores to voter registration precincts.</p> <p>A major finding of this analysis is that an imputed measure for Health Literacy explains voter patterns beyond what can be explained using sociodemographic data alone. And this constructed measure of health literacy is not specific to oral health or community water fluoridation.</p> <p>Major concerns</p> <ol style="list-style-type: none"> 1. One limitation is the use of American Community Survey from 2012 to inform estimates of voter health literacy status in 2002 for San Antonio. The authors should address this. 2. The confusion/uncertainty hypothesis is introduced (on page 3) and not raised again in the discussion. One option would be to revise the following sentence from page 8 to return to the confusion/uncertainty hypothesis: “In the debate on fluoride, more education may simply lead voters to reach out to sources like FAN or their affiliated journals without understanding the methodological flaws in much of the anti-fluoridation research, and the false equivalence between scientific and anti- fluoride research.” A suggested revision would be: “In the debate on fluoride, more education may simply make individuals skeptical consumers of information and lead voters to reach out to sources like FAN or their affiliated journals without understanding the methodological flaws in much of the anti-fluoridation research, and the false equivalence between scientific and anti- fluoride research. The uncritical examination of the new conflicting information presented in a quasi-scientific manner may allow uncertainty to raise anxiety, leading to choices that avoid perceived risk. It is somewhat ironic that the confusion/uncertainty hypothesis would be at play among the more educated voters, but this seems to be the case. <p>Minor concerns</p> <ol style="list-style-type: none"> 1. On page 2, ARTICLE SUMMARY Strengths and Limitations of the Study, last bullet point: I recommend revising to state: “Findings ...may not be generalizable to other US cities”. 2. On page 5, first line, MML needs to be spelled out. 3. On page 6, line 54, “... where lower values denote a better fit.” The word “fit” is missing. 4. Page 7, last sentence in Results section, change; “These models suggest that once accounting for ...” to “These models suggest that after accounting for ...”. 5. Page 7, Discussion section, first sentence of second paragraph, change “...without making an ecological fallacy.” to “... without risking the error of making an ecological fallacy”. 6. Page 7, Discussion section, missing words in two places: Line 47 “... of a geographic area effectively reflects ...” and Line 55 “The effect of educational attainment was non-linear, ...”
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1:

The objective of the study in the abstract and the introduction are not the same.

Response: The study's objective is now concordant in the Abstract and the Introduction. We achieved this by modifying the objective statement to clarify that we seek to understand opposition to fluoride. We state that we achieve this through a test of what we posit is the most likely answer to this opposition.

It is clear from the introduction that main hypothesis of the authors was that high health literacy could be associated with a high percentage of voting for CWG. However, the objective is not specific and does not mention about health literacy. The rationale for choosing health literacy against education status is repeating and presented both in the introduction and the methods.

Response : We added in health literacy into the objective statement and clarified that we were specifically seeking to test the confusion hypothesis as the basis for opposition to fluoridation. We repeat the distinction between educational attainment and health literacy due to the concerns of other reviewers, and go into more detail about confirmation/cognitive bias as yet another explicit reason as to the rationale in using health literacy.

More information on National Association of Adult Literacy (NAAL) survey data would be helpful, the content of this survey and how the score transforms into 0-500.

Response : We now describe the NAAL within the methods section as a representative survey. We explicitly address the construct of health literacy, along with item difficulty in the appendix. We also added some more detail in the methods section, along with references to MRP methods. Further, the appendix states the specific difficulty and rigor of the individual items in appendix figure 2.

There is no information on how the statistical analyses were done (SPSS or Stata or other packages), the p-value adopted for hypothesis testing is not provided.

Response : We revise the methods section to state that we run the robust regression models in Stata, and that the levels of significance used to judge results is at $p < 0.05$. We state the programs and packages in the appendix used for the construction of health literacy, which are R, and TAM packages. More detailed information is provided in the online supplementary material.

According to this reviewer, it is not a common practice to refer to external sources while interpreting the results. The discussion section might be a better place to describe the R square.

Response : We understand and sympathize with your concern. We believe it necessary to point to sources in order to provide the necessary context. If we postpone these sources until the discussion, then readers would not have a benchmark from which to judge the performance of the models. Postponing the interpretation would also lead to a higher word count.

I did not understand why references were provided to the sentence " These models suggest that once accounting for the high level of statistical noise in interpreting election outcomes [23,24], healthy literacy" which is the authors own finding.

Response: This is related to the response above. We clarify this sentence to make explicit that the references refer to the interpretation of robust regression. We eliminated the citation as requested, assuming that the reader will look to the aforementioned source related to robust regression.

Reviewer 2:

One limitation is the use of American Community Survey from 2012 to inform estimates of voter health literacy status in 2002 for San Antonio. The authors should address this.

Response: We do not use 2012 ACS data for San Antonio. We use U.S. Census information for San Antonio for the 2002 elections. We clarify this in the appendix and the manuscript. We should also note that the need to remodel health literacy from previous work is that previous models do not match up with categories on the Census.

The confusion/uncertainty hypothesis is introduced (on page 3) and not raised again in the discussion. One option would be to revise the following sentence from page 8 to return to the confusion/uncertainty hypothesis: "In the debate on fluoride, more education may simply lead voters to reach out to sources like FAN or their affiliated journals without understanding the methodological flaws in much of the anti-fluoridation research, and the false equivalence between scientific and anti-fluoride research." A suggested revision would be: "In the debate on fluoride, more education may simply make individuals skeptical consumers of information and lead voters to reach out to sources like FAN or their affiliated journals without understanding the methodological flaws in much of the anti-fluoridation research, and the false equivalence between scientific and anti-fluoride research. The uncritical examination of the new conflicting information presented in a quasi-scientific manner may allow uncertainty to raise anxiety, leading to choices that avoid perceived risk. It is somewhat ironic that the confusion/uncertainty hypothesis would be at play among the more educated voters, but this seems to be the case."

Response: We thank you for the suggestion and added this into the article. We also mentioned near the end of the results section explicitly that the statistical relationship is more likely due to the confusion hypothesis rather than just noise alone in the data. We additionally add in two citations to point readers in the direction of a field of research on confirmation/cognitive bias in order to better support the recommended addition.

On page 2, ARTICLE SUMMARY Strengths and Limitations of the Study, last bullet point: I recommend revising to state: "Findings ...may not be generalizable to other US cities".

Response: Change made.

On page 5, first line, MML needs to be spelled out.

Response: Correction made.

On page 6, line 54, "... where lower values denote a better fit." The word "fit" is missing.

Response: Correction made.

Page 7, last sentence in Results section, change; "These models suggest that once accounting for ..." to "These models suggest that after accounting for ...".

Response: Correction made.

Page 7, Discussion section, first sentence of second paragraph, change "...without making an ecological fallacy." to "... without risking the error of making an ecological fallacy".

Response: Correction made.

Page 7, Discussion section, missing words in two places: Line 47 "... of a geographic area effectively reflects ..." and Line 55 "The effect of educational attainment was non-linear,

Response: Correction made.

Reviewer 3:

This is a manuscript examining the influence of health literacy on the outcomes of CWF referenda in three large US cities, San Antonio TX, Wichita KS, and Portland OR. While this is not clearly stated in the objective statement (Page 4, lines 4-8 as well as in the abstract), I think they should.

Response: The name of the 3 cities and health literacy are added to the objective statement.

I am a bit confused regarding their application of IRT model to “match predictors of NAAL results with available demographic data at census block then estimating health literacy scores at precinct-level” part that is described in detail in the Appendix B. Determining appropriateness of these complex modeling and estimation procedures in Appendix B is probably critical to validate the findings but unfortunately beyond my expertise, and I hope the journal invited others who can review this area critically. Otherwise, I believe the authors discuss the limitations of health literacy data sufficiently.

Response: We apologize for the lack of clarity. We sought to clarify the disconnect with more elaboration, along with some previous research conducted demonstrating the robustness of IRT methods and in turn using Multilevel Regression with Post-stratification (MRP).

Initially it was a bit challenging to read back and forth the “main” text, tables, and figures and those in “appendix”, but when reading second time, the distribution of information in main text tables/figures and appendix actually seemed appropriate.

Response: We understand your concerns, and attempted to balance the manuscript and appendix as best we could. We are glad that in the end it worked out, though we acknowledge that the set up can be a bit awkward, though we are uncertain as to a better formatting style given the word limit for the article.

In the Article Summary, the authors say “understanding these effects could assist the ADA when promoting their campaigns”. It would be nice if the authors could elaborate public health practice implications of their findings and potential intervention strategies to enhance health literacy at population-level in the Discussion if such scientific evidence is available.

Response: This is a good point, and we add a brief statement pointing readers to the National Action Plan on health literacy as to methods to increase health literacy in an area.

I sort of disagree with the discussion (page 8, lines 4-9) on “more educational attainment= more access to FAN resources without understanding the methodological flaws etc.”, although the authors may base this statement on the assumption that those who have higher educational attainment may tend to do their own research. I would suggest the authors to either elaborate the discussion based on available evidence (i.e. research on how people seek health information online today and how such behavior is associated with educational attainment) or consider deleting this statement as it has weak evidential support.

Response: We understand the skepticism, and have since included two additional references pointing readers to the wider field of educational attainment and motivated reasoning and confirmation/cognitive bias. While we do not draw a conclusion as to the extent of educational bias, we do note that given the threat of this bias, health literacy as a construct should have less noise. Due to other reviewer comments, we cannot delete the statement. We fortify this statement in both the methods and discussion sections.

VERSION 2 – REVIEW

REVIEWER	Santosh Kumar Tadakamadla Griffith University, Australia
REVIEW RETURNED	28-Aug-2018

GENERAL COMMENTS	Authors have done a commendable job. All my concerns in the previous review have been answered by the authors and the corresponding revisions have been made.
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REVIEWER	Mark E Moss East Carolina University, USA
REVIEW RETURNED	22-Aug-2018

GENERAL COMMENTS	I appreciate the care taken to address issues raised.
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