PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<u>http://bmjopen.bmj.com/site/about/resources/checklist.pdf</u>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Is exposure to e-cigarette communication associated with perceived
	harms of e-cigarette secondhand vapor? Results from a national
	survey of U.S. adults
AUTHORS	Tan, Andy; Bigman, Cabral; Mello, Susan; Sanders-Jackson, Ashley

VERSION 1 - REVIEW

REVIEWER	Brian Southwell
	RTI International, USA
REVIEW RETURNED	06-Dec-2014

GENERAL COMMENTS	The authors have submitted a timely and reasonably compelling analysis of generally useful data. Their focus on information influences on perceptions of e-cigarette vapor harm provides national data that highlight the possibility that increased salience of messages in support of e-cigarettes might be dampening concern in the U.S. The paper is limited in important ways by the cross- sectional nature of the data, but the authors are clear in noting that limitation and this paper nonetheless could offer a useful foundation for future discussion of these issues.
	There are some steps the authors could take to make this a more rich theoretical contribution. As it stands, we are left with regression results suggesting important correlations but are not quite able to make a forecast for future belief patterns based on this nor do we necessarily have a great explanation for the state of current perceptions, aside from the idea that social diffusion of beliefs might be at play. Extending the discussion a bit further and possibly adding one additional analysis might be useful.
	First, on a mundane level, I think that the phrase "e-cigarette communications" does not quite connect with current scholarship on communication as a behavioral phenomenon rather than as a set of sent messages. At the very least, I would make "communication" singular.
	More importantly, the authors make a couple of analysis decisions that might be worth revisiting or at least further justifying. You might reconsider the grouping of social media with news and late-night coverage, for example; wouldn't entering social media as a separate predictor potentially be compelling? Now, doing so would offer further potential multicollinearity with interpersonal communication, although you already run the risk of that by having it embedded with

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the other media scale/index. In that regard, you need to help us make sense of how social media is potentially cannibalizing variance explained by the interpersonal communication predictor (or vice versa). At the very least, it would be useful to know how that three- item other media scale hung together; do you have justification on that basis for grouping the items together? More detail would be useful in that regard.
The separation of analysis of predictors into volume of exposure analyses and valence analyses is not an unreasonable move, but it would be useful to know that the authors had considered alternatives that would have allowed them to combine more predictors into a single model. Might, for example, the authors consider an interpersonal communication predictor coded -1 for negative conversation, 0 for no conversation, and 1 for positive conversation? If they opted to do something similar for the other predictors, might it be possible to include everything in one model? It might not be for good reason, or perhaps that analytical shift would imply a theoretical relationship different than hypothesized, but regardless some further discussion of the coding and analysis decisions made would likely be useful for some readers.
Beyond those considerations, I wonder whether the authors might do more to highlight the main finding here, that interpersonal interaction seems to matter in substantial ways with regard to vapor harm perceptions, perhaps even over and above the broader media environment. The authors could signal that a bit more in the abstract. More importantly, if there is room, they might present an additional model with interpersonal communication about e- cigarettes as the outcome variable. Who is having these conversations? Does that tell us anything compelling about the state of public understanding of this new product?
Given the open nature of these reviews, I also can share a couple of suggestions for additional citations that I think might help to contextualize the piece a bit further. One is a paper that has been in press for a long time now by a former grad student of mine; the e-publication ahead of print at least is available now. The paper shows a time-lagged correspondence between exposure to social media depictions of tobacco at one time and subsequent tobacco use and thus would help to make the case that social media content and social interactions generally do seem to matter in encouraging positive perceptions. Here is the citation: Depue, J. B., Southwell, B. G., Betzner, A. E., & Walsh, B. M. (2014) Encoded exposure to tobacco use in social media predicts subsequent smoking behavior. American Journal of Health Promotion. E-publication ahead of print.
Also, as you discuss further the issue of who is actually talking about e-cigarettes, you might find my recent book useful to justify that assessment: Southwell, B. G. (2013). Social Networks and Popular Understanding of Science and Health: Sharing Disparities. Baltimore, MD: Johns Hopkins University Press. I've called for people to look directly at that question and you have the opportunity to follow up on that here.

Overall, the data here are noteworthy and the analysis is generally useful. The results are not earth shattering in their povelty or
useful. The results are not earth-shattening in their hoverty of
implication but nonetheless do suggest the importance of the
evolving information environment in shaping popular understanding
of smokeless tobacco products.

REVIEWER	Ban Majeed School of Public Health, Georgia State University, Georgia, USA
REVIEW RETURNED	22-Dec-2014

GENERAL COMMENTS	This manuscript presents the findings of an observational study (online survey) among US adults conducted in Oct-Dec 2013, to study risk perceptions regarding second hand vaping and the potential effect of exposure to e-cigarette communications. The study showed that adults perceived second hand vaping to be moderately harmful to one's health and that these harm perceptions were associated with e-cigarette advertisements and interpersonal discussions. The study adds to limited and needed information regarding risk perceptions of second hand manuscript could benefit from some revisions and clarifications. Abstract:
	1. Line 29: "primary and secondary outcome measures" it is unclear to me which outcome measures were primary and which were secondary. Either edit the title or the clarify the types of outcome measures
	 2. Line 39: "tobacco use", since cigarette smoking status and ever use of e-cigarettes were adjusted for, it would be clearer to use "cigarette smoking status and e-cigarette use" instead of tobacco use.
	3. Line 44: results: "exposure to advertising perceived as positive was" This sentence is not clear, did you mean exposure to advertisement that promoted e-cigarettes?
	 4. Line 51: "exposure to interpersonal discussion perceived as" this sentence is unclear. Introduction:
	 Page 6, line 3: the sentence "prevalence of e-cigarette use in public places has steadily increased" is not supported by a citation. Page 6, line 8: "the frequent claims about SHV in the media environment…" This sentence is unclear to me. Do you mean the frequent claims regarding the safety/ harmlessness of second hand waper?
	3. Page 6, line 15: "is associated with risk perceptions" did you mean with reduced risk perception?
	4. Page 6, line 20: the objectives are understandable but would be better if they were more specific and used the same terminology
	used for the study dependent and independent variables, example to describe the perceived harms of SHV among US adults.
	1. Page 6, line53: Did you mean that the university contracted with GfK to field the survey or the survey done by Gfk? Who designed the survey questionnaire?
	2. Page 7: the description of the study sample and completion rates

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nee info 3.1 be 4.1 ser rec 5. 6.1 cle line pai be 7.	ed some clarifications. How many adults were contacted? The ormation is there, the section just need some minor edits. Page 7, line 53: "perceived harms was measured", I think it should perceived harms were measured. Page 7, line 44: "the second item asked respondents" this intence needs to be edited for clarification. Did all respondents eive all three perceived harms questions? There is no need to give the (n=) in the methodology section. Page 9, line 32: how was smoking status defined? It would be arer to use never-smoker instead of non-smoker. One the same e, "prior use of e-cigarettes" was a little bit confusing to me, as if ticipants used and then stopped e-cigarette use. I think it would clearer to say "use of e-cigarettes." Page 10, line 25, the sentence "this enabled the examination t was perceived as favorable" is vague. Was the channel
fav	orable? or the message?
8.1	Page 10, line 44: please specify tobacco use variables.
Ta	ple 1:
1.	The title is not descriptive. It could be changed to something like
	ecussion:
1. j	bage 20, line 33: the sentence needs clarification "This analysis ther indicated that"
2. j pro cla	bage 21, line 28 "differentially associated with support for five posed policies …" what are the five policies? Would you please rify the sentence.
1. I we lite and Ris wa	noticed that the terms "risk perceptions" and "harm perceptions" re used interchangeably. I've seen both terms used in the rature, and some define risk perception as perceived risk of harm, d National Survey of Drug Use and Health used Perceived k/Harm of Use to define the domain. I think it is correct either y, but would be easier to follow if one term was used consistently
es; fine	becially when defining the outcome measures and reporting the lings.

REVIEWER	Kelvin Choi
	National Insititute on Minority Health and Health Disparities, USA
REVIEW RETURNED	22-Dec-2014

GENERAL COMMENTS	The authors aimed at investigating public beliefs related to second- hand electronic cigarette vapor, which is a novel topic. Using an online survey panel, they found that the public believed that second- hand vaping was somewhat safer than secondhand smoking, and were not very concern about the health effect of second-hand vaping. They also found that exposure to e-cigarette related messages were somewhat associated with these beliefs. However, I have the following concerns about the manuscript:
	INTRODUCTION 1, While the focus on public concern on health effects related to second-hand vaping is novel, the introduction did not summarize the current evidence on the potential harm associated with second-hand vaping. Given what we know about e-cigarette to date, it may not be

wrong to believe that second-hand vaping is safer than second-hand smoking, hence the public's beliefs are correct and the educational campaign suggested by the authors are unnecessary. Thus, the importance of this research hinges on whether second-hand vaping is harmful, which the authors did not make a case for.
2, The authors missed a citation that showed e-cigarette related beliefs prospectively predict e-cigarette experimentation in young adults (Choi & Forster, 2014, AJPM), which went beyond self-report reasons for e-cigarette experimentation.
METHODS 3, While the Knowledge Panel attempted to be nationally representative, previous research suggested that results related to e-cigarette use from Knowledge Panel differed from those of non- online survey (see Pearson et al, 2012, AJPH). The authors need to note this and discuss how an online sample, although attempted to be nationally representative, can still introduce bias.
4, The exact items used to measure media exposure should be included in the manuscript for clarify and reproducibility.
5, The valence construct is interesting. However, given the item was asking about e-cigarette advertisements, why would someone respond anything but positive (i.e., promoting e-cigarettes). This implies that the valence measures have limited variability, which may not add much to the analysis. The other issue is that the valence measures were only asked of those exposed to e-cigarette messages of a specific channel. This created a systematic missing value issue, and introduced selection bias by design, which may explain the discrepancies in the results between the frequency vs. valence-weighted exposure measures on second-hand vaping beliefs. The authors should conduct sensitivity analysis to understand the potential bias introduced by these systematic missing values.
6, I am not sure about the rationale for sub-categorizing ever e- cigarette users into whether they had use e-cigarettes in the past 3 months. The conventional definition of current e-cigarette use is past 30 days.
RESULTS 7, The authors modeled the outcome variables (second-hand vaping related beliefs) as normally distributed continuous variables. Did they actually test whether the distributions of these outcome variables did fulfill this statistical assumption?
8, Please indicate, when presenting the descriptive statistics of the valence-weighted exposure measures, that only respondents who reported exposure to e-cigarette messages were asked these question.

REVIEWER	Scott McIntosh, PhD University of Rochester Medical Center, Rochester, NY, USA.
REVIEW RETURNED	30-Dec-2014

GENERAL COMMENTS	A well-written manuscript of this thorough investigation of a very
	timely issue with available national data.

VERSION 1 – AUTHOR RESPONSE

Reviewer NameBrian Southwell Institution and Country RTI International, USA Please state any competing interests or state 'None declared': None declared.

Please leave your comments for the authors below

The authors have submitted a timely and reasonably compelling analysis of generally useful data. Their focus on information influences on perceptions of e-cigarette vapor harm provides national data that highlight the possibility that increased salience of messages in support of e-cigarettes might be dampening concern in the U.S. The paper is limited in important ways by the cross-sectional nature of the data, but the authors are clear in noting that limitation and this paper nonetheless could offer a useful foundation for future discussion of these issues.

Authors' response: Thank you for this feedback. We have revised the manuscript to address the following concerns.

There are some steps the authors could take to make this a more rich theoretical contribution. As it stands, we are left with regression results suggesting important correlations but are not quite able to make a forecast for future belief patterns based on this nor do we necessarily have a great explanation for the state of current perceptions, aside from the idea that social diffusion of beliefs might be at play. Extending the discussion a bit further and possibly adding one additional analysis might be useful.

Authors' response: We added to the discussion a brief statement to suggest potential theoretical explanations about the diffusion of e-cigarette harm information and cited selected literature on Social Cognitive Theory. However, we are limited by the space constraints within BMJ Open to be able elaborate the theoretical pathways in a more detailed manner and suggested future work to accomplish this.

"Psychosocial constructs including observational learning, social modeling, and injunctive or descriptive norms[46,47] are potential mechanisms through which interpersonal communication could influence perceived harms about e-cigarette vapors; these have not been tested in the present study and further research is recommended to investigate these pathways."

We did not include the suggested analysis (with interpersonal communication about e-cigarettes as the outcome variable) because this has already been reported in an earlier paper published in Tobacco Control (Tan, Bigman, & Sanders-Jackson, 2014). Instead, we've briefly summarized the results of this analysis in the results section (under Descriptives of Perceived Harm and Exposure Variables) and added a reference to this paper for readers.

Tan, A. S. L., Bigman, C. A., & Sanders-Jackson, A. (2014). Sociodemographic correlates of self-reported exposure to e-cigarette communications and its association with public support for smoke-free and vape-free policies: results from a national survey of US adults. *Tobacco Control (published Online First)*. doi:10.1136/tobaccocontrol-2014-051685.

First, on a mundane level, I think that the phrase "e-cigarette communications" does not quite connect with current scholarship on communication as a behavioral phenomenon rather than as a set of sent messages. At the very least, I would make "communication" singular.

BMJ Open: first published as 10.1136/bmjopen-2014-007134 on 26 March 2015. Downloaded from http://bmjopen.bmj.com/ on June 9, 2025 at Agence Bibliographique de Enseignement Superieur (ABES) . Protected by copyright, including for uses related to text and data mining, Al training, and similar technologies.

Authors' response: We replaced all instances to the singular "communication."

More importantly, the authors make a couple of analysis decisions that might be worth revisiting or at least further justifying. You might reconsider the grouping of social media with news and late-night coverage, for example; wouldn't entering social media as a separate predictor potentially be compelling? Now, doing so would offer further potential multicollinearity with interpersonal communication, although you already run the risk of that by having it embedded with the other media scale/index. In that regard, you need to help us make sense of how social media is potentially cannibalizing variance explained by the interpersonal communication predictor (or vice versa). At the very least, it would be useful to know how that three-item other media scale hung together; do you have justification on that basis for grouping the items together? More detail would be useful in that regard.

Authors' response:

As suggested, we analyzed the three-item other media scale items and found that these three items demonstrated moderate internal consistency (Cronbach's alpha=0.70). We also examined the inter-item Spearman correlations, which ranged from 0.33 to 0.50 (all *P*s<.00005).

We performed the suggested sensitivity analysis grouping news and late-night TV as "other media" and including social media as a separate predictor. The substantive results were identical to what we reported in the original manuscript. As in Table 2 of the manuscript, frequency of interpersonal discussion was associated with reduced perceptions that breathing vapor is harmful to health and reduced perceptions of breathing vapor being more harmful than smoke. The regression coefficients for interpersonal discussion were also very similar to the original analyses. The social media variable was not a significant predictor for the three perceived harm outcomes. Therefore, we decided to retain the original analyses. We present the sensitivity analysis results in the table below for your reference. However, there was no multicollinearity with interpersonal discussion (VIF (ranging from 1.09-1.15) and tolerance (ranging from 0.87-0.92) were within normal limits for all the models). We further highlight this sensitivity analysis in a note to Table 2 in the manuscript.

Sensitivity Analysis – Multivariate analyses predicting perceived harm measures with self-reported frequency of exposure measures (advertising, other media, social media, and interpersonal) (N=1449)

		naginigi compared to breathing
harmful to health	impact of vapor	shokĕ
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-0.833*** [-1.389,-0.277]	-1.069**** [-1.693,-0.446]	-0.4545° [-0.756,-0.152]
-0.13 [-0.419,0.158]	-0.066 [-0.386,0.254]	-0.04 [[0.209,0.129]
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0.126	0.129	<u>0.080 cč</u>
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	harmful to health b (95% Cl) $0.116 [-0.113, 0.345]$ $-0.034 [-0.264, 0.196]$ $0.096 [-0.172, 0.363]$ $-0.251* [-0.483, -0.020]$ $0.008 [-0.000, 0.016]$ $0.143 [-0.090, 0.376]$ $0.268 [-0.199, 0.735]$ $0.3 [-0.095, 0.694]$ $0.289 [-0.202, 0.779]$ $-0.049 [-0.341, 0.244]$ $0.165 [-0.145, 0.475]$ $0.097 [-0.308, 0.502]$ $0.213 [-0.165, 0.590]$ $0.023 [-0.111, 0.157]$ $-0.493^{***} [-0.776, -0.211]$ $-1.114^{***} [-1.512, -0.717]$ $-0.622^{**} [-1.074, -0.171]$ $-0.833^{**} [-1.389, -0.277]$ $-0.13 [-0.419, 0.158]$ 3.453 0.126	harmful to healthimpact of vaporb (95% Cl)b (95% Cl) $0.116 [-0.113, 0.345]$ $0.041 [-0.196, 0.277]$ $-0.034 [-0.264, 0.196]$ $-0.029 [-0.270, 0.213]$ $0.096 [-0.172, 0.363]$ $0.112 [-0.157, 0.381]$ $-0.251^* [-0.483, -0.020]$ $-0.18 [-0.430, 0.070]$ $0.008 [-0.000, 0.016]$ $0.013^{**} [0.004, 0.021]$ $0.143 [-0.090, 0.376]$ $0.208 [-0.037, 0.454]$ $0.268 [-0.199, 0.735]$ $0.284 [-0.210, 0.779]$ $0.3 [-0.095, 0.694]$ $0.355 [-0.048, 0.758]$ $0.289 [-0.202, 0.779]$ $0.233 [-0.269, 0.734]$ $-0.049 [-0.341, 0.244]$ $-0.145 [-0.451, 0.160]$ $0.165 [-0.145, 0.475]$ $0.142 [-0.179, 0.462]$ $0.097 [-0.308, 0.502]$ $0.029 [-0.399, 0.458]$ $0.213 [-0.165, 0.590]$ $0.176 [-0.218, 0.570]$ $0.023 [-0.111, 0.157]$ $-0.379^* [-0.676, -0.082]$ $-1.114^{***} [-1.512, -0.717]$ $-0.987^{***} [-1.418, -0.556]$ $-0.622^{**} [-1.074, -0.171]$ $-0.980^{***} [-1.449, -0.511]$ $-0.33^{**} [-1.389, -0.277]$ $-1.069^{***} [-1.693, -0.446]$ $-0.13 [-0.419, 0.158]$ 3.328 0.126 0.129

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Authors' response: Thank you for the suggestion to include all respondents and predictors into the analytic models. We agree that this would be an appropriate alternate analytic approach. To address the reviewer's suggestion and a similar comment from the second reviewer, we conducted additional analyses using an alternate measure of valence. We recoded the valence measure into four categories (no exposure, negative exposure (combining mostly or completely negative), mixed exposure, and positive exposure (combining mostly and completely positive)) and fitted regression models to predict each of the perceived harm measures, adjusting for all covariates. We decided against collapsing no exposure with mixed valence as 0 because we believe that conceptually those who have no exposure to e-cigarette information would have different perceptions about harms of SHV compared to those who had mixed exposure.

Although this revised analysis potentially represents a slight loss of information—because we now categorized the valence-weighted measure instead of having a continuous variable—we believe this is outweighed by the benefit of including all the 1449 respondents and all three perceived valence measures as predictors in the same model and substantially reducing the number of tables in the manuscript. We further found that this alternate analytic approach yielded substantively similar findings to the original submission (perceived positive valence of ads and interpersonal discussion were associated with lower perceived harms) along with several additional findings and have now revised the manuscript to interpret and discuss these findings. An explanation was included as a footnote in the methods section regarding this revised analytic approach.

Beyond those considerations, I wonder whether the authors might do more to highlight the main finding here, that interpersonal interaction seems to matter in substantial ways with regard to vapor harm perceptions, perhaps even over and above the broader media environment. The authors could signal that a bit more in the abstract. More importantly, if there is room, they might present an additional model with interpersonal communication about e-cigarettes as the outcome variable. Who is having these conversations? Does that tell us anything compelling about the state of public understanding of this new product?

Authors' response: As suggested, we highlighted the main finding about interpersonal interaction by discussing potential mechanisms through which interpersonal discussion could influence perceptions of harms from vapors and potential implications of disparities in interpersonal discussion about e-cigarettes on tobacco-related health disparities.

We did not include the suggested analysis (with interpersonal communication about ecigarettes as the outcome variable) because this has already been reported in an earlier paper in Tobacco Control (Tan, Bigman, & Sanders-Jackson, 2014). Instead, we've briefly summarized the results of this analysis in the results section (under Descriptives of Perceived Harm and Exposure Variables) and added a reference to this paper for readers.

Given the open nature of these reviews, I also can share a couple of suggestions for additional citations that I think might help to contextualize the piece a bit further. One is a paper that has been in press for a long time now by a former grad student of mine; the e-publication ahead of print at least is available now. The paper shows a time-lagged correspondence between exposure to social media depictions of tobacco at one time and subsequent tobacco use and thus would help to make the case that social media content and social interactions generally do seem to matter in encouraging positive perceptions of nicotine products and/or promote particular social norm perceptions. Here is the

citation: Depue, J. B., Southwell, B. G., Betzner, A. E., & Walsh, B. M. (2014) Encoded exposure to tobacco use in social media predicts subsequent smoking behavior. American Journal of Health Promotion. E-publication ahead of print.

Authors' response: Thank you for this citation. We added a statement about this set of findings to the introduction section.

Also, as you discuss further the issue of who is actually talking about e-cigarettes, you might find my recent book useful to justify that assessment: Southwell, B. G. (2013). Social Networks and Popular Understanding of Science and Health: Sharing Disparities. Baltimore, MD: Johns Hopkins University Press. I've called for people to look directly at that question and you have the opportunity to follow up on that here.

Authors' response: We included a brief discussion about disparities in sharing e-cigarette information and potential implications for tobacco-related health disparities in the discussion:

"In this study population, we reported in an earlier paper that women, those who have tried e-cigarettes, observed others vaping, and who identified as being Democrat were more likely to have discussed e-cigarettes with others.[12] Southwell has suggested that disparities in sharing or receiving health information through one's social networks could exacerbate health disparities, including tobacco-related health disparities.[52] More research will be necessary to investigate who is sharing (or not sharing) e-cigarette information and the extent to which interpersonal discussion affects tobaccorelated health disparities."

Overall, the data here are noteworthy and the analysis is generally useful. The results are not earthshattering in their novelty or implication but nonetheless do suggest the importance of the evolving information environment in shaping popular understanding of smokeless tobacco products.

Reviewer NameBan Majeed

Institution and Country School of Public Health, Georgia State University, Georgia, USA Please state any competing interests or state 'None declared': none

Please leave your comments for the authors below

This manuscript presents the findings of an observational study (online survey) among US adults conducted in Oct-Dec 2013, to study risk perceptions regarding second hand vaping and the potential effect of exposure to e-cigarette communications. The study showed that adults perceived second hand vaping to be moderately harmful to one's health and that these harm perceptions were associated with e-cigarette advertisements and interpersonal discussions. The study adds to limited and needed information regarding risk perceptions of second hand manuscript could benefit from some revisions and clarifications.

Authors' response: Thank you for this feedback. We have revised the manuscript to address the following concerns.

Abstract:

1. Line 29: "primary and secondary outcome measures" it is unclear to me which outcome measures were primary and which were secondary. Either edit the title or the clarify the types of outcome measures.

Authors' response: We replaced the phrase with "Outcome measures".

2. Line 39: "tobacco use", since cigarette smoking status and ever use of e-cigarettes were adjusted for, it would be clearer to use "cigarette smoking status and e-cigarette use" instead of tobacco use.

Authors' response: We replaced the phrase with "cigarette smoking status and e-cigarette use".

3. Line 44: results: "exposure to advertising perceived as positive was …." This sentence is not clear, did you mean exposure to advertisement that promoted e-cigarettes?

4. Line 51: "exposure to interpersonal discussion perceived as ..." this sentence is unclear.

Authors' response: We clarify that these phrases refer to information in advertisements promoting e-cigarettes perceived as positive and information from interpersonal discussion (close friends or family members) about e-cigarettes perceived as positive. We revised these statements in the abstract accordingly.

Introduction:

1. Page 6, line 3: the sentence "prevalence of e-cigarette use in public places has steadily increased" is not supported by a citation.

Authors' response: We cited the research article by Frances Stillman and colleagues to support this statement.

2. Page 6, line 8: "the frequent claims about SHV in the media environment..." This sentence is unclear to me. Do you mean the frequent claims regarding the safety/ harmlessness of second hand vapor?

Authors' response: We revised this as, "Given the frequent claims about the safety and harmlessness of SHV in the media environment..."

3. Page 6, line 15: "is associated with risk perceptions …" did you mean with reduced risk perception?

Authors' response: We revised this as, "... is associated with reduced harm perceptions".

4. Page 6, line 20: the objectives are understandable but would be better if they were more specific and used the same terminology used for the study dependent and independent variables, example ... to describe the perceived harms of SHV among US adults.

Authors' response: We standardized the terminology to perceived harms throughout the manuscript.

Methods:

1. Page 6, line53: Did you mean that the university contracted with GfK to field the survey or the survey done by Gfk? Who designed the survey questionnaire?

Authors' response: We clarify that the university contracted with GfK to field the survey; the survey questionnaire was designed by two of the authors (Tan and Bigman).

2. Page 7: the description of the study sample and completion rates need some clarifications. How many adults were contacted? The information is there, the section just need some minor edits.

Authors' response: We included additional information on the numbers of adults contacted in each month.

3. Page 7, line 53: "perceived harms was measured", I think it should be perceived harms were measured.

Authors' response: We revised this as "perceived harms were measured...".

4. Page 7, line 44: "the second item asked respondents" this sentence needs to be edited for clarification. Did all respondents receive all three perceived harms questions?

Authors' response: We clarified that all respondents were asked all three questions.

5. There is no need to give the (n=) in the methodology section.

Authors' response: We deleted this information.

6. Page 9, line 32: how was smoking status defined? It would be clearer to use never-smoker instead of non-smoker. One the same line, "prior use of e-cigarettes" was a little bit confusing to me, as if participants used and then stopped e-cigarette use. I think it would be clearer to say "use of e-cigarettes."

Authors' response: We clarified that smoking was defined using two standard items on lifetime cigarette use and current use of cigarettes and added a citation. Non-smokers were those who have never smoked over 100 cigarettes. Former smokers were those who have smoked over 100 cigarettes but are not smoking at all currently. Current smokers were those who have smoked over 100 cigarettes and currently smoke on some days or everyday. We replaced prior use of e-cigarettes with ever use of e-cigarettes.

7. Page 10, line 25, the sentence "this enabled the examination ... that was perceived as favorable" is vague. Was the channel favorable? or the message?

Authors' response: We clarify that these phrases refer to information from each channel perceived as favorable and revised the statement accordingly.

8. Page 10, line 44: please specify tobacco use variables.

Authors' response: We specified these variables as "smoking status and e-cigarette use"

Table 1:

1. The title is not descriptive. It could be changed to something like "Descriptive characteristics of the study population... "

Authors' response: We replaced this with "Study population characteristics"

Discussion:

1. page 20, line 33: the sentence needs clarification "This analysis further indicated that ..."

Authors' response: We revised this statement to clarify that we are referring to the information from ads and interpersonal discussion perceived as positive was associated with lower perceived harms.

2. page 21, line 28 "differentially associated with support for five proposed policies …" what are the five policies? Would you please clarify the sentence.

Authors' response: We clarified that the five proposed policies in the study were (1) requiring anti-smoking PSAs before movies that show smoking, (2) requiring anti-smoking PSAs before televised movie trailers that show smoking, (3) regulating producers' and actors' acceptance of money for portrayals of smoking in movies, (4) limiting the appearance of tobacco brands and logos in movies, and (5) requiring movies that show smoking to be rated 'R'. This information is now added as a footnote in the discussion section.

General:

1. I noticed that the terms "risk perceptions" and "harm perceptions" were used interchangeably. I've seen both terms used in the literature, and some define risk perception as perceived risk of harm, and National Survey of Drug Use and Health used Perceived Risk/Harm of Use to define the domain. I think it is correct either way, but would be easier to follow if one term was used consistently especially when defining the outcome measures and reporting the findings.

Authors' response: We standardized the phrase to be consistently "perceived harm/ harm perceptions" throughout the manuscript and removed "perceived risk/ risk perceptions" from

the paper.

Reviewer NameKelvin Choi

Institution and Country National Institute on Minority Health and Health Disparities, USA Please state any competing interests or state 'None declared': None

Please leave your comments for the authors below

The authors aimed at investigating public beliefs related to second-hand electronic cigarette vapor, which is a novel topic. Using an online survey panel, they found that the public believed that second-hand vaping was somewhat safer than secondhand smoking, and were not very concern about the health effect of second-hand vaping. They also found that exposure to e-cigarette related messages were somewhat associated with these beliefs. However, I have the following concerns about the manuscript:

INTRODUCTION

1, While the focus on public concern on health effects related to second-hand vaping is novel, the introduction did not summarize the current evidence on the potential harm associated with second-hand vaping. Given what we know about e-cigarette to date, it may not be wrong to believe that second-hand vaping is safer than second-hand smoking, hence the public's beliefs are correct and the educational campaign suggested by the authors are unnecessary. Thus, the importance of this research hinges on whether second-hand vaping is harmful, which the authors did not make a case for.

Authors' response: We did summarize on p.5 of the original submission a number of citations that detected tobacco specific pollutants and particulate matter present in SHV that impairs indoor air quality (references 28 to 33). However, we do agree with the reviewer that current evidence has not demonstrated that these levels of pollutants in SHV resulted directly in harm to human health; definitive evidence of harmful health effects may require more years of research. Therefore, in this study we consciously refrained from judging beliefs about harm as being "correct" or "wrong" and qualified in the discussion section that these perceived harm measures do not represent objective knowledge about SHV harms (p. 21).

2, The authors missed a citation that showed e-cigarette related beliefs prospectively predict ecigarette experimentation in young adults (Choi & Forster, 2014, AJPM), which went beyond selfreport reasons for e-cigarette experimentation.

Authors' response: We included this citation as suggested.

METHODS

3, While the Knowledge Panel attempted to be nationally representative, previous research suggested that results related to e-cigarette use from Knowledge Panel differed from those of non-online survey (see Pearson et al, 2012, AJPH). The authors need to note this and discuss how an online sample, although attempted to be nationally representative, can still introduce bias.

Authors' response: We referred to the Pearson et al. paper that the reviewer highlighted. The authors in that paper noted that the differences in the estimates across the online and nononline surveys "are likely associated with the distinct target populations, sample frames, selection criteria, and methods used in the 2 studies" (p. 1765). For instance, the KnowledgePanel sample in that study were all adults 18 years and older from a national sampling frame while the LLSC sample were smokers or recent quitters aged 18-49 years living in 8 selected metro areas. The data collection for the two surveys was also conducted between 2-5 months apart. We think then that it is not surprising to have found differences in e-cigarette awareness and use between these two samples. While this specific example does not show that findings from an online sample would be likely to be biased, we recognized that certain subgroups were under-represented in this KnowledgePanel sample. This suggests a need to replicate survey research across survey modes to ensure that the findings are robust across a variety of approaches. We included this discussion in p. 23 in the revision. 4, The exact items used to measure media exposure should be included in the manuscript for clarify and reproducibility.

Authors' response: We included the exact items as suggested to clarify the measures for media exposure in an appendix.

5, The valence construct is interesting. However, given the item was asking about e-cigarette advertisements, why would someone respond anything but positive (i.e., promoting e-cigarettes). This implies that the valence measures have limited variability, which may not add much to the analysis. The other issue is that the valence measures were only asked of those exposed to e-cigarette messages of a specific channel. This created a systematic missing value issue, and introduced selection bias by design, which may explain the discrepancies in the results between the frequency vs. valence-weighted exposure measures on second-hand vaping beliefs. The authors should conduct sensitivity analysis to understand the potential bias introduced by these systematic missing values.

Authors' response: We clarify that the valence measure refers to respondents' perceptions of the information they encountered from each form of e-cigarette communication. Even though e-cigarette ads are presumably designed to promote the product in a positive light, they could elicit a range of responses among individuals. We sought to measure whether adults perceive e-cigarette communication to be positive or negative because a large body of literature indicates the importance of measuring both the quantity and valence of mediated health information. A short list of references is included below. Unfortunately, we do not have detailed qualitative data to parse out exactly what respondents mean by positive or negative and the content of the information associated with either positive or negative valence. We added a short definition and explanation of valence in the methods section. We also raise this as a limitation in the discussion and offer suggestions to study this dimension more thoroughly using qualitative research designs:

"The perceived valence measures were limited because they do not capture in detail what specific information within these sources respondents found to be positive or negative. Future qualitative work could be helpful to explore this dimension of e-cigarette-related information." (Discussion)

References:

- 1. Lang A. Using the limited capacity model of motivated mediated message processing to design effective cancer communication messages. J Commun. 2006;56:S57-S80.
- 2. Lang A, Yegiyan NS. Understanding the interactive effects of emotional appeal and claim strength in health messages. Journal of Broadcasting & Electronic Media. 2008;52(3):432-47.
- 3. Kim HS, Lee S, Cappella JN, Vera L, Emery S. Content Characteristics Driving the Diffusion of Antismoking Messages: Implications for Cancer Prevention in the Emerging Public Communication Environment. JNCI Monographs. 2013;2013(47):182-7.
- 4. Rhodes N, Roskos-Ewoldsen DR, Edison A, Bradford MB. Attitude and norm accessibility affect processing of anti-smoking messages. *Health Psychology*. 2008;27(3, Suppl):S224-S232. doi:10.1037/0278-6133.27.3(Suppl.).S224.
- Reardon J, Miller C, Foubert B, Vida I, Rybina L. Antismoking Messages for the International Teenage Segment: The Effectiveness of Message Valence and Intensity Across Different Cultures. *Journal of International Marketing*. 2006;14(3):115-138. doi:10.1509/jimk.14.3.115.

In terms of variability of the valence measures, as the reviewer pointed out, a sizable proportion of responses to the ad valence measure tended to be completely positive or mostly positive though there was sufficient variability across the range of response options among those who were asked these questions (see table of distribution below).

Valence of ad exposure	I	Freq.	Percent	Cum.
Not asked	392	27.05	27.05	
Refused	1	0.07	27.12	

222 Completely positive | 15.32 42.44 Mostly positive | 466 32.16 74.60 A mix of positive and negative 321 22.15 96.76 Mostly negative | 30 2.07 98.83 Completely negative | 100.00 17 1.17 -----+---100.00 Total | 1,449 Valence of other media exposure Percent Cum. Freq. _____ Not asked | 750 51.76 51.76 Completely positive | 96 58.39 6.63 Mostly positive | 17.74 76.12 257 A mix of positive and negative | 293 20.22 96.34 Mostly negative | 41 2.83 99.17 Completely negative | 12 0.83 100.00 Total | 1.449 100.00 Valence of interpersonal exposure | Freq. Percent Cum. -----Not asked | 1,144 78.95 78.95 Completely positive | 52 3.59 82.54 Mostly positive | 111 7.66 90.20 A mix of positive and negative | 123 8.49 98.69 Mostly negative | 14 0.97 99.65 Completely negative | 5 0.35 100.00 ------+ 100.00 Total | 1,449

To address the concern about potential biases introduced by excluding those who reported no exposure to e-cigarette ads, other media, or interpersonal discussion, we conducted alternate analyses as suggested by this reviewer and the first reviewer. We recoded the valence measure into four categories (no exposure, negative exposure (combining mostly or completely negative), mixed exposure, and positive exposure (combining mostly and completely positive)) and fitted regression models to predict each of the perceived harm measures, adjusting for all covariates. Although this revised analysis potentially represents a slight loss of information-because we now categorized the valence-weighted measure instead of having a continuous variable-we think this is outweighed by the benefit of including all the 1449 respondents and all three perceived valence measures as predictors in the same model and substantially reducing the number of tables in the manuscript. We further found that this alternate analytic approach yielded substantively similar findings to the original submission (perceived positive valence of ads and interpersonal discussion were associated with lower perceived harms) along with several additional findings and have now revised the manuscript to interpret and discuss these findings. An explanation was included as a footnote in the methods section regarding this revised analytic approach.

6, I am not sure about the rationale for sub-categorizing ever e-cigarette users into whether they had use e-cigarettes in the past 3 months. The conventional definition of current e-cigarette use is past 30 days.

Authors' response: We apologize for this error, the survey measure asked respondents about e-cigarette use in the past 30 days. We have corrected this.

RESULTS

7, The authors modeled the outcome variables (second-hand vaping related beliefs) as normally distributed continuous variables. Did they actually test whether the distributions of these outcome variables did fulfill this statistical assumption?

Authors' response: The distributions of the outcome variables were slightly skewed and kurtotic; all univariate Shapiro–Wilk tests were significant at p < .0005.

Breathing vapor is harmful to health—skewness= 0.21; kurtosis=1.99 Concern about health impact of vapor —skewness=0.02; kurtosis=1.76 Breathing vapor is more harmful compared to breathing —skewness=0.56; kurtosis=3.72

In the current models, we utilized the SVY command in Stata and computed the standard errors using the linearized variance estimator; this is equivalent to the Huber White sandwich or robust estimator in non-survey contexts and is a reasonable approach for correcting for violations of distributional assumptions (Kline, 2010).

Reference:

StataCorp. 2013. Stata: Release 13. Statistical Software. College Station, TX: StataCorp LP. Available at: <u>http://www.stata.com/manuals13/svy.pdf</u> (p.6)

We further replicated the entire analysis using multiple regression and obtained bootstrapped standard errors (note that survey weights could not be included for bootstrapping). We found that the substantive conclusions were very similar to the original analysis with the exception of one additional significant finding—frequency of media exposure was associated with higher perceived relative harm of SHV than SHS). We therefore opted to retain the original analysis which had the advantage of being weighted to match the general adult population and reported this as a sensitivity analysis in the footnote of the results. This analysis is included below for the reviewer's reference.

Bootstrapped regression results (not weighted) – Frequency of exposure predicting harm measures

Linear regression	Number of obs=1440Replications= 2000 Wald chi2(17)= 277.78 Prob > chi2= 0.0000 R-squared= 0.1398 Adj R-squared= 0.1295 Root MSE= 1.7987	
Observed	Bootstrap Normal-based	
ecigsadexposure 03 ecigsmediaexposure .2	70371 .0967072 -0.38 0.7022265797 .152505 359094 .1311157 1.80 0.0720210726 .49289	56 914
ZSeciginterpersonalr 3	41112 .0940929 -3.34 0.001498529812969	25
ppage .009383 female .269571 black .2553573 hispanic .023649 other .2469281 somecollege .0541 bachelors .09063 incomecat3	1.0031136 3.01 0.003 .0032808 .015486 3.0996785 2.70 0.007 .0742055 .4649381 .2018323 1.27 0.206 1402267 .6509413 7 .17104 0.14 0.890 3115824 .3588819 .2062541 1.20 0.231 1573225 .6511787 951 .1212269 0.45 0.655 1834052 .2917954 28 .1286182 0.70 0.481 1614543 .3427199	
\$25000 to 49999 .12 Above \$50000 .201 	.8297 .1543585 0.83 0.4041737075 .431366 5522 .146774 1.37 0.1700861195 .4892239)8 }
healthstatus .00858 formersmoker 591 currentsmoker -1.26 triedecig 684871	55 .0542023 0.16 0.8740976491 .11482 3838 .1123124 -5.27 0.00081181213715555 386 .1576936 -8.02 0.000 -1.573469553124 1 .1574992 -4.35 0.00099356393761783	5

observeecig_r | -.0246521 .1285096 -0.19 0.848 -.2765263 .2272221 _cons | 3.365639 .3799813 8.86 0.000 2.620889 4.110388 _____ Linear regression Number of obs = 1439 Replications = 2000 Wald chi2(17) = 309.53Prob > chi2 = 0.0000R-squared = 0.1495 Adj R-squared = 0.1393 Root MSE = 1.9133 _____ Observed Bootstrap Normal-based ZSecigharm2r | Coef. Std. Err. z P>|z| [95% Conf. Interval] ecigsadexposure | -.0425029 .1063765 -0.40 0.689 -.2509969 .1659912 ecigsmediaexposure | .1988226 .1370518 1.45 0.147 -.069794 .4674392 ZSeciginterpersonalr | -.3020966 .1014137 -2.98 0.003 -.5008638 -.1033294

 ppage |
 .0141791
 .0034018
 4.17
 0.000
 .0075117
 .0208465

 female |
 .3339176
 .1039793
 3.21
 0.001
 .130122
 .5377132

 black |
 .4310447
 .2139635
 2.01
 0.044
 .011684
 .8504054

 hispanic |
 .1035346
 .186514
 0.56
 0.579
 -.2620261
 .4690953

 other |
 .1889427
 .2140995
 0.88
 0.378
 -.2306845
 .60857

 somecollege | -.0232614 .1303226 -0.18 0.858 -.278689 .2321663 bachelors | .1543498 .1353651 1.14 0.254 -.1109609 .4196606 incomecat3 | \$25000 to 49999 | .1551874 .1682094 0.92 0.356 -.174497 .4848719 Above \$50000 | .179119 .1570156 1.14 0.254 -.128626 .486864 healthstatus | .007761 .0580456 0.13 0.894 -.1060064 .1215283 formersmoker | -.5189221 .1257366 -4.13 0.000 -.7653614 -.2724829 currentsmoker | -1.213026 .1811534 -6.70 0.000 -1.56808 -.8579722 triedecig | -.9304219 .1800423 -5.17 0.000 -1.283298 -.5775456 observeecig_r | .0009525 .1424539 0.01 0.995 -.2782521 .2801571 _cons | 3.418076 .4046088 8.45 0.000 2.625057 4.211094 Number of obs = 1438 Linear regression Replications = 2000 = 110.90 Wald chi2(17) $\begin{array}{rcl} \text{Prob} > \text{chi2} & = & 0.0000 \\ \text{R-squared} & = & 0.0790 \end{array}$ Adj R-squared = 0.0680 Root MSE = 0.7731 _____ Observed Bootstrap Normal-based ZSeciglessharmr | Coef. Std. Err. z P>|z| [95% Conf. Interval] ----ecigsadexposure | -.0757059 .0456454 -1.66 0.097 -.1651692 .0137574 ecigsmediaexposure | .1339237 .0622288 2.15 0.031 .0119576 .2558898 ZSeciginterpersonalr | -.1646606 .0445459 -3.70 0.000 -.251969 -.0773523 ppage | .0022567 .0013425 1.68 0.093 -.0003745 .004888 female | .0491244 .0429107 1.14 0.252 -.0349791 .1332278 black | .2058602 .0863172 2.38 0.017 .0366816 .3750389 hispanic | .0805958 .0747548 1.08 0.281 -.0659208 .2271125 other .2017383 .0959955 2.10 0.036 .0135907 .389886 somecollege | -.0262736 .0544513 -0.48 0.629 -.1329962 .080449

bachelors .0111	1437 .0580177	0.19 0.848	1025689	.1248562
incomecat3				
\$25000 to 49999 0	0507829 .071822	22 -0.71 0.48	.191551	.089986
Above \$50000 0	745994 .066318	4 -1.12 0.26	1204581	.0553821
healthstatus 005	4481 .0249276	-0.22 0.827	0543052	.0434091
formersmoker 15	538363 .049853 ²	1 -3.09 0.002	.2515466	056126
currentsmoker 18	.0839768 .0839768	3 -2.20 0.028	3493417	0201588
triedecig 32632	273 .0879172	-3.71 0.000 -	.4986418	1540128
observeecig_r .02	77408 .0682413	0.41 0.684	1060096	.1614912
_cons 2.1766	633 .1795599 ⁻	12.12 0.000	1.824702 2	2.528564
•				

8, Please indicate, when presenting the descriptive statistics of the valence-weighted exposure measures, that only respondents who reported exposure to e-cigarette messages were asked these question.

Authors' response: We added this information.

Reviewer Name Scott McIntosh, PhD Institution and Country University of Rochester Medical Center, Rochester, NY, USA. Please state any competing interests or state 'None declared': None declared.

Please leave your comments for the authors below A well-written manuscript of this thorough investigation of a very timely issue with available national data.

Authors' response: Thank you for your encouraging comment.

VERSION 2 – REVIEW

REVIEWER	Brian Southwell
	RTI International
REVIEW RETURNED	06-Feb-2015

GENERAL COMMENTS	The authors have done a satisfactory job of addressing my
	suggestions and concerns.

REVIEWER	Ban Majeed Georgria State University, USA
REVIEW RETURNED	02-Mar-2015

GENERAL COMMENTS	The study is timely and provides insight into the effect of exposure to
	formal and informal communications on the perceptions of harmfulness of second hand vaping.
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REVIEWER	Kelvin Choi

	spanues
REVIEW RETURNED 25-Feb-2015	

GENERAL COMMENTS Thanks for responding to my comments. I have no more comments.		
	GENERAL COMMENTS	Thanks for responding to my comments. I have no more comments.