PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	The effects of health behaviors and beliefs based on message framing among patients with chronic diseases: A systematic review
AUTHORS	Gao, Ruitong; Guo, Hui; Li, Fei; Liu, Yandi; Shen, Meidi; Xu, Linqi; Yu, Tianzhuo; Li, Feng

VERSION 1 – REVIEW

REVIEWER	Elisabeth Grey University of Bath, Department for Health
REVIEW RETURNED	05-Sep-2021

GENERAL COMMENTS	Overall This systematic review sought to examine the effects of gain and loss framing health information aimed at chronic disease patients. I believe this is an interesting area to study, however I have some reservations about this manuscript. My main concern is that the authors do not seem to have considered the literature highlighting that health behaviour message framing effects vary according to the behaviour being advocated (e.g. a positive thing to take up versus a negative action to be avoided; Lee &Aaker, 2004) and the recipients' existing beliefs and perceptions towards the behaviour (e.g. Werrij et al., 2011). The chronic diseases they have included have very different impacts on patients' lives, making me question the extent to which the findings can be combined – at the very least this should be mentioned in the Limitations section and temper their conclusions, but it would also be helpful to the reader to see more details of the individual studies when they are mentioned in the text of the Results. Below are listed further minor comments on the manuscript. Please check and correct the grammar throughout. Abstract Line 40: "improve better communication effects" this is a bit confusing – do you mean that the interventions could enhance the positive effects of communication? Line 46: "Thus, behavioral attitude" this sentence does not clearly relate to the previous sentences in the Results section, so I think the "thus" should be removed. Strengths and limitations The first of these bullet points is neither a strength nor a limitation, just a statement of what was done – could this be changed to highlight a strength or weakness of the study? Please check the grammar and correct the final statement. Introduction P7, lines 8-10: "At the same time, it is more cost-effective than improving the social environment and healthcare system." Assuming

	the “it” refers to “providing health information” (as mentioned in the previous sentence), this statement is incorrect and seems to have misinterpreted the references cited. Perhaps more explanation of what the authors mean by “cost-effective”, “improving the social environment and healthcare system” is required. Or delete this sentence. P8, line 36: “without changing the content” – I think this needs to state “without changing the meaning of the content” as the content will change if the presentation is changed. P8, line 44: “The previous study” – it isn’t clear to which study this is referring, could a little detail be added on what this study involved? P9, lines 11-20: It is not clear what the comparators are in these studies – diabetes patients vs healthy samples? Or gain framing vs loss framing? P9, line 28: “to introduce an innovative view” – this is a little vague, perhaps change to “inform the design of future health information interventions” (or something similar)? Methods Seach strategy: could the authors explain why they chose certain chronic disease names to use in the search strategy but not others (e.g., they included neoplasm but not cancer and chronic conditions such as asthma and kidney disease were not included)? Study selection: “intervention methods or contents involved in the application of message framing” – the meaning of this is not clear. Also could the authors clarify whether they only sought interventions where messages were delivered in paper or electronic format rather than by person? The Introduction suggests the focus is to be on interventions delivered by nurses but nurses are not mentioned in the Methods section. Results Literature search: “articles” would be a more accurate term to use than “pieces of literature” Figure 1: This appears to be a PRISMA flowchart so should be recognised as such, citing the relevant PRISMA template. Characteristics of the included studies: Lines 40-44: Reconsider the focus on Asian studies if this is for an international audience. Line 46: “an average age of 40 to 71” – this is unclear as an age range is provided rather than an average. Main effects of framing: it would be helpful here to include in the text what diseases and behaviours are involved in each of the studies – while I appreciate that the review only includes 11 studies, so not enough to draw firm conclusions about the impact of these factors on the results, as previous literature has highlighted that gain- and loss-framed messages will likely have different impacts depending on the behaviour in question, it would be helpful to comment on this. Moderator and mediator variables: Lines 19-27 – could more detail be given on the nature of these indirect effects? E.g., what attitudes or control beliefs were associated with positive or negative outcomes? Line 27 – HBM needs to defined Discussion P13, line 56: “without changing the content” – for accuracy, consider changing to “without changing the meaning of the content”. P13, lines 56-57: “However, there has not been sufficient research on integrating message framing into educational details” – I was not sure what this meant, could the authors clarify?

	P15, lines 26-30: “chronic disease patients usually have a longer duration of disease, more severe illness, and may have lower health awareness” – these propositions need to be supported with reference to the literature. Limitations: I think the authors need to comment on the heterogeneity of the studies they included in the review – was it appropriate to combine findings across different patient samples and health messages? This would seem to strongly limit the strength of their conclusions. P17, lines 4-6: Again reconsider the focus on Asian studies if this is for an international audience. Conclusion “Message framing is an effective strategy for health communication” – this seems too broad, can the authors be more specific, e.g. ‘message framing can be an effective tool when providing health promotion information in order to…’?

REVIEWER	Arsenio Paez Northeastern University Bouve College of Health Sciences
REVIEW RETURNED	12-Oct-2021

GENERAL COMMENTS	Dear authors, This is a very interesting systematic review. I have some questions and concerns about the methods and believe the paper would be improved by clarification of key points. Please see my comments and queries, below: Page 6 Line 43: These are important statistics, giving a sense of the scale of the issue. However, how do these indicate that the trend will increase? The statistics tell you what is, not what will be. Suggest starting another sentence, with a reason why this trend will continue or increase (ex: aging populations, lifestyle factors influencing disease….). Lines 49-52: This is an important section, but it is difficult to understand it as written. It needs editing for grammar and syntax. Page 7, line 20: This would benefit from a citation. Line 31: I don’t quite understand how the message presented is different than the content presented. Does this mean that the overall message implied by the content is more important than the content? This is part of your reason for doing the review, and it is important for it to be clear to the reader. Line 45-46: When you say, “the previous study,” this is unclear. What previous study is that? Would be more clear to say something like: In (fill in name)’s study of ……. “ It’s just not clear what study you are referring to here. Line 50-51: Effect sizes for what effect? Please add more information about this. As written, this is unclear, and it detract from an important part of your introduction. Also, why might this have been the case (only small effect sizes for whatever the effect was)? Page 8: Line 4: are involved would be better if replaced by “are examined in…” Line 10: Rather than impact, it seems like you are implying that the effects of message framing. Line 20: These may be influenced by cultural factors. There is a great deal of evidence for cultural preferences or differences influencing patients (or participants, or groups) viewpoints and response to healthcare options. Could this be the case here? If so, please describe and cite.

	Line 22-23: Why? I agree, of course, but why is this the case? The reader may not know. It is always helpful to assume the reader doesn't have the perspective or experience you have, and describe concepts explicitly, with citations where possible. Lines 28-30: This purpose statement begins well, but becomes difficult to understand. The second section: "to introduce an innovative view in delivering health-related information." would be better expressed as either a second sentence, or linked with a phrase like "and to…" Page 9 Study selection section: Why only in English, and not also in Chinese, for example? This limitation would potentially have limited your results unnecessarily, and reduced the generalizability of your results. Also, how do you define diseases as being chronic. It is important to be explicit with these descriptions to support reproducibility of your methods. Line 51-52: was this statistical heterogeneity, clinical heterogeneity, or both? Line 58: This is unclear. Revman doesn't do quality assessment (please let me know if I am mistaken). Rather, quality assessment would be undertaken with a tool like the ROB-2, and the results inputed into Revman. What tool did you use for quality assessment? If the Cochrane risk of bias, which version? Page 9 Lines 10-12: Please explain why this was the case. Again, it may not be as clear to readers. Lines 40-48. This may reflect a limitation of your search strategy. Would studies in Asian countries only be published in English, and not Chinese, Japanese, Malay, etc? Line 50 through Page 10 Line 22: Please provide citations in these statements that reflect which studies belong in these results. Page 10: Line 24, overall, what was the quality of the evidence, as a whole? How many at low risk of bias, unclear, or high risk as overall judgements? Lines 54-55: What is meant by assessed "intentions?" Intentions of for what? Page 11: Line 29: Please define intention somewhere in the paper. Page 12 Lines 10-13: Would framing have influenced patients' behaviours, which would then have influenced these outcomes? Lines 17-22: This relates to, and may answer, my question about lines 10-13. Lines 25-27: How would, or might, they be predictors of the behaviours? Line 57: Why would this be of benefit (presenting information in different frames without changing content)? Page 13 Line 6: By saying "the cognition," you are implying the cognitive abilities or participants, though I believe you mean the thinking or the perspectives of participants, not their cognitive abilities. Line 18-22: Why even more effective? I may have missed this from you results section. Also, given that you only reviewed papers written in English, is this likely true? Could papers in Mandarin, Cantonese, Japanese, or other languages have offered different results or more results, and might these have influenced your findings? Line 30: As persons with chronic diseases may likely have more interactions with healthcare than "healthy" persons, wouldn't they

	have more health awareness, not less? Please explain what you mean here and how you arrived at it? Lines 43-44: This would greatly benefit from citation, if available, to back up these points. Page 14 Limitations: Many, many of these limitations may result from your only having included papers written in English. This is an important limitation that should be included and acknowledged. Language limits are also associated with bias in systematic reviews. This needs to be considered in this limitations section. This is striking in light of your statement that few studies were from Asia. It seems likely that you found few from Asia because you only included papers published in English. Page 34 Figure 1: Why were 152 studies excluded before duplicates removed? for what reason(s)? Please include that on the flow diagram.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Ms. Elisabeth Grey, University of Bath

Comments to the Author:

Overall

This systematic review sought to examine the effects of gain and loss framing health information aimed at chronic disease patients. I believe this is an interesting area to study, however I have some reservations about this manuscript. My main concern is that the authors do not seem to have considered the literature highlighting that health behaviour message framing effects vary according to the behaviour being advocated (e.g. a positive thing to take up versus a negative action to be avoided; Lee &Aaker, 2004) and the recipients' existing beliefs and perceptions towards the behaviour (e.g. Werrij et al., 2011). The chronic diseases they have included have very different impacts on patients' lives, making me question the extent to which the findings can be combined – at the very least this should be mentioned in the Limitations section and temper their conclusions, but it would also be helpful to the reader to see more details of the individual studies when they are mentioned in the text of the Results. Below are listed further minor comments on the manuscript.

Please check and correct the grammar throughout.

Responds: We are so appreciated for your instructive suggestions, and giving us such a precious opportunity to reply to the comments. According to your valuable advice, we have carefully reorganized the results and discussion section in the revised manuscript. The modified portion has

been marked in red in the revised manuscript text. And we have further polished the language of this article and submitted proofs of English Language Editing. We sincerely thank you for your comments.

Abstract

1. Line 40: “improve better communication effects” this is a bit confusing – do you mean that the interventions could enhance the positive effects of communication?

Responds: Thank you very much for pointing out ambiguous information. We have changed the statement as follow, “We found that educational intervention based on both gain and loss frames could enhance the positive effects of communication.” on page 5 from line 49 to line 52 in the revised manuscript. Thank you for your detailed comments.

2. Line 46: “Thus, behavioral attitude” this sentence does not clearly relate to the previous sentences in the Results section, so I think the “thus” should be removed.

Responds: Thank you for reading our manuscript carefully. We are sorry for our unclear statement. We have removed the “thus”. We sincerely thank you for your comments.

Strengths and limitations

3. The first of these bullet points is neither a strength nor a limitation, just a statement of what was done – could this be changed to highlight a strength or weakness of the study?

Responds: Thank you for your patience and suggestions. We have revised the ‘Strengths and limitations’ section of the revised manuscript. We sincerely appreciate for your comments.

4. Please check the grammar and correct the final statement.

Responds: Thank you very much for your careful work. We have further polished the language of this article and submitted proofs of English Language Editing. Thank you very much.

Introduction

5. P7, lines 8-10: “At the same time, it is more cost-effective than improving the social environment and healthcare system.” Assuming the “it” refers to “providing health information” (as mentioned in the previous sentence), this statement is incorrect and seems to have misinterpreted the references cited. Perhaps more explanation of what the authors mean by “cost-effective”, “improving the social environment and healthcare system” is required. Or delete this sentence.

Responds: Thank you for your patience and suggestions. We have deleted the sentence. We sincerely appreciate for your comments.

6. P8, line 36: “without changing the content” – I think this needs to state “without changing the meaning of the content” as the content will change if the presentation is changed.

Responds: Thank you for reading our manuscript carefully. We are sorry for our unclear statement. We have changed the statement as follow, “Message framing is a message tailoring method that can influence an individual’s behavioral decision by adjusting the presentation of a message without changing the meaning of the content, thereby promoting a particular behavior.”, from page 7 line 58 to page 8 line 4 in the revised manuscript. Thank you for the kind suggestion.

7. P8, line 44: “The previous study” – it isn’t clear to which study this is referring, could a little detail be added on what this study involved?

Responds: Thank you for pointing this out. We have revised the sentence as follow, “In O’Keefe and Jensen’s reviews, they found that positive frames were slighter better for disease prevention. However, when they classified disease prevention behaviors, only a slight advantage of positive framing was showed in dental hygiene behavior, while there was no difference between the two frames for other disease prevention behaviors such as diet/nutrition behaviors, or exercise behaviors.[15 16.]”, on page 8 from line 11 to line 22 in the revised manuscript. We are so appreciated for your patient work.

8. P9, lines 11-20: It is not clear what the comparators are in these studies – diabetes patients vs healthy samples? Or gain framing vs loss framing?

Responds: We are so appreciated for your instructive suggestions. We have revised this section as follow, “Reviewing the past literature, several studies on health-related behaviors such as smoking, [17] physical activity, [18] dental hygiene, [19] have emerged in message framing research. Notably, many studies are examined in messaging framing effect on health-related behaviors in the general population rather than representative samples of people suffering from various diesases or high risk groups, such as diabetes and cardiovascular diseases. [20-22] At the same time, the effects of message framing on chronic disease education are inconsistent. For example, Grady et al. found that a gain-framed foot care message was more effective in changing foot care behavior in patients with diabetes. [23] In contrast, Lee and Gu’s study showed that loss-framed foot care message was more effective in activating attitudes and intentions to conduct foot care in patients with diabetes. [24]”, on page 8 from line 23 to line 44 in the revised manuscript. Many thanks for your detailed advice.

9. P9, line 28: “to introduce an innovative view” – this is a little vague, perhaps change to “inform the design of future health information interventions” (or something similar)?

Responds: Thank you very much for pointing out vague information. We have changed the statement as follow, “The primary purpose of this study was to review the impact of message framing educational interventions on the health behaviors and beliefs of patients with chronic disease, and to

inform the design of future health information interventions.", from page 8 line 54 to page 9 line 4 in the revised manuscript. Thank you for the kind suggestion.

Methods

10. Search strategy: could the authors explain why they chose certain chronic disease names to use in the search strategy but not others (e.g., they included neoplasm but not cancer and chronic conditions such as asthma and kidney disease were not included)?

Responds: Thank you very much for your thoughtful advice. We have revised the supplementary file with search strategies and cited it in the search strategy section, and revised the study selection section on page 9 from line 31 to line 34 in the revised manuscript. Thank you for the kind suggestion.

11. Study selection: "intervention methods or contents involved in the application of message framing" – the meaning of this is not clear. Also could the authors clarify whether they only sought interventions where messages were delivered in paper or electronic format rather than by person? The Introduction suggests the focus is to be on interventions delivered by nurses but nurses are not mentioned in the Methods section.

Responds: We are so appreciated for your instructive suggestions. We have revised the sentence as "intervention contents involved in the application of message framing" on page 9 from line 44 to line 47. We also revised this section as follow, "Messages could be delivered in paper or electronic form, and there were no restrictions on who had delivered the intervention." on page 9 from line 50 to line 53 in the revised manuscript. We sincerely thank you for your comments.

Results

12. Literature search: "articles" would be a more accurate term to use than "pieces of literature"

Responds: Thank you for pointing this out. According to your suggestion, we have revised "pieces of literature" to "articles" on page 11 from line 3 to line 4 in the revised manuscript. We sincerely thank you for your comments.

13. Figure 1: This appears to be a PRISMA flowchart so should be recognised as such, citing the relevant PRISMA template.

Responds: Thank you for your advice. We have revised the Figure 1. Thank you for your valuable and thoughtful comments.

Characteristics of the included studies:

14. Lines 40-44: Reconsider the focus on Asian studies if this is for an international audience.

Responds: We really appreciate for your instructive suggestions. We have revised the sentence as follow, “The included studies were published between 2004 and 2020 and came from Korea, Philippines, the United Kingdom, China, the United States and Canada.” on page 11 from line 14 to line 17 in the revised manuscript. Thank you for your careful reading of our manuscript and your patient guidance.

15. Line 46: “an average age of 40 to 71” – this is unclear as an age range is provided rather than an average.

Responds: We are so grateful for your comments. We have revised as “a mean age ranging from 40 to 71”. on page 11 from line 18 to line 21 in the revised manuscript. We appreciate for your warm work earnestly.

16. Main effects of framing: it would be helpful here to include in the text what diseases and behaviours are involved in each of the studies – while I appreciate that the review only includes 11 studies, so not enough to draw firm conclusions about the impact of these factors on the results, as previous literature has highlighted that gain- and loss-framed messages will likely have different impacts depending on the behaviour in question, it would be helpful to comment on this.

Responds: We are so appreciated for your valuable suggestions. According to your suggestions, we have revised this section as follow, “Several studies reported significant main or interactive effects of framing. Among the included studies, five studies mainly explored the influence of educational intervention based on message framing on self-management behavior and related cognitive variables of patients with chronic disease. [23 32-34 40] Three of the five studies showed the advantage of loss framing messages. [32 33 40] Two studies found that loss-framed message was superior to gain-framed for improving the scores of intention, attitude, and knowledge of self-management behavior in patients with diabetes. However, the increase in intention and knowledge scores did not meet the criteria for statistical difference. [32 33] One study found that loss-framed messages contributed more knowledge gain than gain-framed patients with chronic pain. [40] On the other hand, one study found that a gain-framed was slightly superior to a loss-framed message in sustaining long-term foot care behavior change. [23] Anthor study of patients with psoriasis found that when messages focused on long-term health risk, loss-framed messages were more persuasive to improving in reducing alcohol intake intention, while messages focused on short-term health risk, gain-framed messages were more persuasive than loss-framed messages. [34]

Four studies mainly explored the influence of educational intervention based on message framing on physical activity and related cognitive variables in patients with chronic disease. [35-37 41] Three of the four studies showed the advantage of loss framing messages. [35-37] One study found that loss-framed messages contributed more physical activity gain than gain-framed in patients with diabetes. [35] Furthermore, one study found that in patients with spinal cord injury, the loss-framed group increased their physical activity intention than the gain-framed group and the usual care group, while there was

no significant difference between the physical activity intention in the gain-frame group and the usual care group. [37] One study reported that both gain and loss-framed messages resulted in more physical activity than at baseline, and increased more in the loss-framed group, but the difference between the two groups did not reach statistical significance; neither gain nor loss-framing elicited higher physical activity intention or attitude. [36] In contrast, one study found that a gain-framed was slightly superior to a loss-framed message in improving exercise adherence among patients with cardiovascular disease. [41]

Two studies primarily explored the influence of educational intervention based on message framing on adherence to medicine and treatment therapy and related cognitive variables in patients with chronic disease. [38 39] One study reported that loss-framed messages increased adherence to treatment therapy and self-efficacy more than gain-framed in patients with cardiovascular disease. [39] Another study found that when compared to the usual care group, both gain- and loss-framed messages lead to higher medicine adherence intention and attitude, but without a difference between the two conditions. [38]", from page 12 line 40 to page 13 line 59 in the revised manuscript. Many thanks for your detailed advice.

Moderator and mediator variables:

17. Lines 19-27 – could more detail be given on the nature of these indirect effects? E.g., what attitudes or control beliefs were associated with positive or negative outcomes?

Responds: Thank you very much for your thoughtful advice. We have revised this section on page 14 from line 12 to line 19 in the revised manuscript. Many thanks for your detailed advice.

18. Line 27 – HBM needs to defined

Responds: We really appreciate your thoughtful comments. We have defined the HBM as "health belief model" on page 14 from line 19 to line 21 in the revised manuscript. We sincerely thank you for your comments.

Discussion

19. P13, line 56: "without changing the content" – for accuracy, consider changing to "without changing the meaning of the content".

Responds: Thank you for reading our manuscript carefully. We are sorry for our unclear statement. We have reorganized this section, reported as follow, "Message framing, as an effective message tailoring strategy, provides a new perspective for achieving this goal by increasing the persuasiveness in promotion of healthy behaviors." on page 14 from line 45 to line 50 in the revised manuscript. Thank you for the kind suggestion.

20. P13, lines 56-57: “However, there has not been sufficient research on integrating message framing into educational details” – I was not sure what this meant, could the authors clarify?

Responds: Thank you for your valuable comments. We have deleted this sentence. We are so appreciated for your careful work.

21. P15, lines 26-30: “chronic disease patients usually have a longer duration of disease, more severe illness, and may have lower health awareness” – these propositions need to be supported with reference to the literature.

Responds: Thank you for pointing this out. We have revised the sentence as follow, “Many patients with chronic disease may have low health awareness and health literacy. [42 43]”, on page 15 from line 17 to line 21 in the revised manuscript. We are so appreciated for your patient work.

22. Limitations: I think the authors need to comment on the heterogeneity of the studies they included in the review – was it appropriate to combine findings across different patient samples and health messages? This would seem to strongly limit the strength of their conclusions.

Responds: We are so appreciated for your instructive suggestions. We have revised Limitations section as follow, “In the analysis, heterogeneity of different patient samples and health messages, and the diversity of outcome measurements did not permit a quantitative analysis, limiting the reliability of conclusions.” on page 16 from line 24 to line 31 in the revised manuscript. Thank you for your detailed comments.

23. P17, lines 4-6: Again reconsider the focus on Asian studies if this is for an international audience.

Responds: We really appreciate for your kind advice. We have deleted this sentence. Thank you for your careful reading of our manuscript and your patient guidance.

Conclusion

24. “Message framing is an effective strategy for health communication” – this seems too broad, can the authors be more specific, e.g. ‘message framing can be an effective tool when providing health promotion information in order to…’?

Responds: We are so appreciated for your instructive suggestions. According to your suggestion, we have revised the statement as follow, “Message framing can be an effective tool for encouraging health promotion information to promote health behaviors and beliefs in patients with chronic diseases.” on page 17 from line 34 to line 37 in the revised manuscript. We sincerely thank you for your comments.

Reviewer: 2

Dr. Arsenio Paez, Northeastern University Bouve College of Health Sciences, University of Oxford Department of Primary Care Health Sciences

Comments to the Author:

Dear authors,

This is a very interesting systematic review. I have some questions and concerns about the methods and believe the paper would be improved by clarification of key points. Please see my comments and queries, below:

Responds: We are so appreciated for your detailed comments. We have provided detailed information in the methodology section. We have carefully considered your comments and carefully highlighted changes in the revised manuscript. Thank you so much for your thoughtful suggestions.

Page 6

1. Line 43: These are important statistics, giving a sense of the scale of the issue. However, how do these indicate that the trend will increase? The statistics tell you what is, not what will be. Suggest starting another sentence, with a reason why this trend will continue or increase (ex: aging populations, lifestyle factors influencing disease….).

Responds: Thank you very much for your thoughtful advice. We have revised the sentence as “An aging population, lifestyle factors influencing diseases such as high-fat diets and low levels of physical activity indicate that this trend will continue to increase. [3]”, on page 7 from line 10 to line 15 in the revised manuscript. We have learnt more knowledge from your comments.

2. Lines 49-52: This is an important section, but it is difficult to understand it as written. It needs editing for grammar and syntax.

Responds: Thank you for reading our manuscript carefully. We are sorry for our unclear statement. We have revised this section as follow: “The rising burden of various diseases has increased medical expenses; for example, diabetes, a common chronic disease, according to the International Diabetes Federation, diabetes-related direct medical expenditures amounted to approximately $25 billion in China in 2017. [5]”, on page 7 from line 15 to line 23 in the revised manuscript. We sincerely thank you for your comments.

Page 7

3. Line 20: This would benefit from a citation.

Responds: Thank you for your patient guidance. We have added the citation. on page 7 line 44 in the revised manuscript.

4. Line 31: I don't quite understand how the message presented is different than the content presented. Does this mean that the overall message implied by the content is more important than the content? This is part of your reason for doing the review, and it is important for it to be clear to the reader.

Responds: We are so appreciated for your instructive suggestions. We have revised this sentence as follow, "The effectiveness of educational messages in promoting behavior change may depend on how the message is presented rather than the meaning of the content itself." on page 7 from line 52 to line 55 in the revised manuscript. Many thanks for your detailed advice.

5. Line 45-46: When you say, "the previous study," this is unclear. What previous study is that? Would be more clear to say something like: In (fill in name)'s study of ……. " It's just not clear what study you are referring to here.

Responds: Thank you for pointing this out. We have revised the sentence as follow, "In O'Keefe and Jensen's reviews, they found that positive frames were slighter better for disease prevention. However, when they classified disease prevention behaviors, only a slight advantage of positive framing was showed in dental hygiene behavior, while there was no difference between the two frames for other disease prevention behaviors such as diet/nutrition behaviors, or exercise behaviors.[15 16.]", on page 8 from line 11 to line 22 in the revised manuscript. We are so appreciated for your patient work.

6. Line 50-51: Effect sizes for what effect? Please add more information about this. As written, this is unclear, and it detract from an important part of your introduction. Also, why might this have been the case (only small effect sizes for whatever the effect was)?

Responds: Thank you for pointing this out. We have revised the sentence as follow, "In O'Keefe and Jensen's reviews, they found that positive frames were slighter better for disease prevention. However, when they classified disease prevention behaviors, only a slight advantage of positive framing was showed in dental hygiene behavior, while there was no difference between the two frames for other disease prevention behaviors such as diet/nutrition behaviors, or exercise behaviors.[15 16.]", on page 8 from line 11 to line 22 in the revised manuscript. Many thanks again for your patient work.

Page 8

7. Line 4: are involved would be better if replaced by “are examined in…”

Responds: Thank you for your kind suggestions. We have replaced “are involved in” by “are examined in” on page 8 from line 27 to line 28 in the revised manuscript. We sincerely thank you for your comments.

8. Line 10: Rather than impact, it seems like you are implying that the effects of message framing.

Responds: Thank you very much for your thoughtful advice. We have revised “the impact of ” as “the effects of” on page 8 from line 33 to line 34 in the revised manuscript. We sincerely thank you for your comments.

9. Line 20: These may be influenced by cultural factors. There is a great deal of evidence for cultural preferences or differences influencing patients (or participants, or groups) viewpoints and response to healthcare options. Could this be the case here? If so, please describe and cite.

Responds: We are so appreciated for your instructive suggestions. We have revised this section as follow, “At the same time, the effects of message framing on chronic disease education are inconsistent. For example, Grady et al. found that a gain-framed foot care message was more effective in changing foot care behavior in patients with diabetes. [23] In contrast, Lee and Gu’s study showed that loss-framed foot care message was more effective in activating attitudes and intentions to conduct foot care in patients with diabetes. [24]”, on page 8 from line 33 to line 44 in the revised manuscript. Many thanks for your detailed advice.

10. Line 22-23: Why? I agree, of course, but why is this the case? The reader may not know. It is always helpful to assume the reader doesn’t have the perspective or experience you have, and describe concepts explicitly, with citations where possible.

Responds: Thank you for your valuable comments. We have revised this section, “There are many opportunities in nursing to provide patient health information in various settings, ranging from the distribution of written materials to teaching chronic disease self-management skills. [12] Meanwhile, patients feel more open and free to communicate with nurses. [11] Thus, nurses have significant opportunities to use message framing to provide health information.”, on page 8 from line 45 to line 55 in the revised manuscript. We are so appreciated for your careful work.

11. Lines 28-30: This purpose statement begins well, but becomes difficult to understand. The second section: “to introduce an innovative view in delivering health-related information.” would be better expressed as either a second sentence, or linked with a phrase like “and to…”

Responds: Thank you very much for pointing out vague information. We have changed the statement as follow, “The primary purpose of this study was to review the impact of message framing educational interventions on the health behaviors and beliefs of patients with chronic disease, and to inform the design of future health information interventions.”, from page 8 line 57 to page 9 line 4 in the revised manuscript. Thank you for the kind suggestion.

Page 9

12. Study selection section: Why only in English, and not also in Chinese, for example? This limitation would potentially have limited your results unnecessarily, and reduced the generalizability of your results.

Responds: Thank you for your kind suggestions. Considering that articles published in English are more similar in expression habits, we only included articles published in English. However, this is a limitation of our study, it may result in some studies being excluded. We have discussed language limitation in the discussion section. We are appreciated for your advice.

13. Also, how do you define diseases as being chronic. It is important to be explicit with these descriptions to support reproducibility of your methods.

Responds: Thank you very much for your thoughtful advice. According to your suggestions, we have described the definition of chronic diseases in this study on page 9 from line 40 to line 45 in the revised manuscript. Our sincere thanks to you for patient guidance.

14. Line 51-52: was this statistical heterogeneity, clinical heterogeneity, or both?

Responds: Thank you very much for your thoughtful advice. We have revised as “large statistical and clinical heterogeneity of the literature” on page 10 from line 28 to line 32 in the revised manuscript. Our sincere thanks to you for patient guidance.

15. Line 58: This is unclear. Revman doesn’t do quality assessment (please let me know if I am mistaken). Rather, quality assessment would be undertaken with a tool like the ROB-2, and the results inputed into Revman. What tool did you use for quality assessment? If the Cochrane risk of bias, which version?

Responds: Thank you for pointing this out. We have revised the sentence as “Two independent researchers (RG, MS) completed the quality assessment of the included articles using Cochrane Collaboration Risk of Bias I. [29]” on page 10 from line 38 to line 39 in the revised manuscript. We are so appreciated for your patient work.

Page 9

16. Lines 10-12: Please explain why this was the case. Again, it may not be as clear to readers.

Responds: Thank you for your valuable comments. We have revised the sentence as follow, “For quasi-experimental studies without randomization, the item of random sequence generation of selection bias was automatically identified as high risk. [30 31]” on page 10 from line 42 to line 45 in the revised manuscript. We are so appreciated for your careful work.

17. Lines 40-48. This may reflect a limitation of your search strategy. Would studies in Asian countries only be published in English, and not Chinese, Japanese, Malay, etc?

Responds: We really appreciate for your instructive suggestions. We have revised the sentence as follow, “The included studies were published between 2004 and 2020 and came from Korea, Philippines, the United Kingdom, China, the United States and Canada.” on page 11 from line 14 to line 18 in the revised manuscript. Thank you for your careful reading of our manuscript and your patient guidance.

18. Line 50 through Page 10 Line 22: Please provide citations in these statements that reflect which studies belong in these results.

Responds: Thank you very much for your thoughtful advice. We have added citations in this section on page 11 from line 23 to line 48 in the revised manuscript.

Page 10

19. Line 24, overall, what was the quality of the evidence, as a whole? How many at low risk of bias, unclear, or high risk as overall judgements?

Responds: We really appreciate for your valuable and thoughtful comments. We have revised this section, and the modified content was as follows, “Regarding selection bias, two RCT described adequate random sequence generation [32 37] and other eight RCT reported randomization but did not report a specific method. [23 34-36 38-41] One quasi-experimental study, non-randomized sampling was used; participants were just assigned to different groups in separate days for a single time, identified as high risk. [33] Only one studies reported adequate allocation concealment, [32] and the other ten were rated as having an unclear risk of bias due to insufficient information.[23 33-41] Only two studies showed a low risk of performance bias. [33 39] The risk of detection bias was rated as unclear risk as none of the eleven articles indicated whether the blind method was applied to the outcome assessment.[23 32-41] Regarding attrition bias, eleven studies were rated as low risk bias. [23 32-41] The report and other sources bias of the eleven studies were rated as having an unclear risk of bias due to insufficient information. [23 32-41] Figures 2 and 3 summarize the quality assessment of the included studies.” The modified portion has been marked in red in revised manuscript text from page 11 line 49 to page 12 line 20. Thank you for your patient guidance.

20. Lines 54-55: What is meant by assessed “intentions?” Intentions of for what?

Responds: Thank you for pointing this out. We have revised the results section and define intention, from page 12 line 40 to page 13 line 59 in the revised manuscript. We are so appreciated for your patient work.

Page 11

21. Line 29: Please define intention somewhere in the paper.

Responds: Thank you very much for your thoughtful advice. We have revised the results and discussion section and define intention. Thanks again for your patient work.

Page 12

22. Lines 10-13: Would framing have influenced patients' behaviours, which would then have influenced these outcomes?

Responds: We are so appreciated for your instructive suggestions. We have deleted this section. Thank you for your detailed comments.

23. Lines 17-22: This relates to, and may answer, my question about lines 10-13.

Responds: Thank you for your patience and suggestions. We have changed the statement on page 14 from line 8 to line 13 in the revised manuscript. We sincerely thank you for your comments.

24. Lines 25-27: How would, or might, they be predictors of the behaviours?

Responds: Thank you very much for your thoughtful advice. We have revised this section on page 14 from line 12 to line 19 in the revised manuscript. Many thanks for your detailed advice.

25. Line 57: Why would this be of benefit (presenting information in different frames without changing content)?

Responds: Thank you for your careful reading of our manuscript and your patient guidance. We have reorganized this section, reported as follow, "Message framing, as an effective message tailoring strategy, provides a new perspective for achieving this goal by increasing the persuasiveness in promotion of healthy behaviors." on page 14 from line 45 to line 50 in the revised manuscript. We really appreciate for your instructive suggestions.

Page 13

26. Line 6: By saying "the cognition," you are implying the cognitive abilities or participants, though I believe you mean the thinking or the perspectives of participants, not their cognitive abilities.

Responds: Thank you for pointing this out. We are sorry for this misunderstanding. We have revised this sentence as follow, "Hence, we summarized the research on the influence of educational interventions based on message framing on health behavior and related cognitive variables in

patients with long-term illnesses." on page 14 from line 49 to line 56 in the revised manuscript. We are so appreciated for your patient work.

27. Line 18-22: Why even more effective? I may have missed this from you results section. Also, given that you only reviewed papers written in English, is this likely true? Could papers in Mandarin, Cantonese, Japanese, or other languages have offered different results or more results, and might these have influenced your findings?

Responds: Thank you for your patience and suggestions. We have changed the statement as follow, "Many of the studies we included in this review showed the advantage of loss framing messages, but due to the limited number of included articles and lack of quantitative analysis, this result should be interpreted with caution." on page 15 from line 9 to line 14 in the revised manuscript. We sincerely thank you for your comments.

28. Line 30: As persons with chronic diseases may likely have more interactions with healthcare than "healthy" persons, wouldn't they have more health awareness, not less? Please explain what you mean here and how you arrived at it?

Responds: Thank you for pointing this out. We have revised the sentence as follow, "Many patients with chronic disease may have low health awareness and health literacy. [42 43]", on page 15 from line 17 to line 21 in the revised manuscript. We are so appreciated for your patient work.

29. Lines 43-44: This would greatly benefit from citation, if available, to back up these points.

Responds: Thank you for your valuable comments. We have added the citation on page 15 from line 33 to line 34. We are so appreciated for your careful work.

Page 14

30. Limitations: Many, many of these limitations may result from your only having included papers written in English. This is an important limitation that should be included and acknowledged. Language limits are also associated with bias in systematic reviews. This needs to be considered in this limitations section. This is striking in light of your statement that few studies were from Asia. It seems likely that you found few from Asia because you only included papers published in English.

Responds: We really appreciate for your kind suggestions. We have revised the limitation section about the language limits on page 16 from line 30 to line 35 in the revised manuscript. And we have deleted the sentence focused on Asia. Thank you for your careful reading of our manuscript and your patient guidance.

Page 34

31. Figure 1: Why were 152 studies excluded before duplicates removed? for what reason(s)? Please include that on the flow diagram.

Responds: Thank you for your advice. We have revised the Figure 1. Thank you for your valuable and thoughtful comments.

VERSION 2 – REVIEW

REVIEWER	Elisabeth Grey University of Bath, Department for Health
REVIEW RETURNED	07-Dec-2021

GENERAL COMMENTS	The authors have made many good changes in response to the reviewer comments. However, there are still many places throughout the entire manuscript where the wording or grammatical errors make the meaning unclear, at least to me. I appreciate that the authors have sought help on English language editing but perhaps this is something that the BMJOpen could provide further support with? A few more minor points in relation to some of the comments/responses: Strengths and limitations It is unclear what “guiding significance of practice” means Study selection “intervention contents involved in the application of message framing” – this revised phrasing is also a bit unclear to me, does it mean “involving a comparison of a message framing intervention with either a control intervention or other message frames”? Results Literature search It would be better to change “2253 pieces of literature” to “2253 articles”, to be consistent. Figure 1 There is still no reference to PRISMA.

REVIEWER	Arsenio Paez Northeastern University Bouve College of Health Sciences
REVIEW RETURNED	26-Nov-2021

GENERAL COMMENTS	Dear authors, thank you for your very thoughtful responses to my questions and comments from the first draft of this review. The manuscript is much improved and has addressed my concerns. It would benefit from editorial review for a few minor grammatical and syntax errors, but I believe will be of great interests to readers.

VERSION 2 – AUTHOR RESPONSE

Reviewer: 2

Dr. Arsenio Paez, Northeastern University Bouve College of Health Sciences, University of Oxford Department of Primary Care Health Sciences

Comments to the Author:

Dear authors, thank you for your very thoughtful responses to my questions and comments from the first draft of this review. The manuscript is much improved and has addressed my concerns. It would benefit from editorial review for a few minor grammatical and syntax errors, but I believe will be of great interests to readers.

Responds: We are so appreciated for your instructive suggestions, and giving us such a precious opportunity to reply to the comments. We have learnt more knowledge from your comments. We sincerely thank you for your contribution.

Reviewer: 1

Dr. Elisabeth Grey, University of Bath

Comments to the Author:

The authors have made many good changes in response to the reviewer comments. However, there are still many places throughout the entire manuscript where the wording or grammatical errors make the meaning unclear, at least to me. I appreciate that the authors have sought help on English language editing but perhaps this is something that BMJ Open could provide further support with?

Responds: We are so appreciated for your detailed comments. According to your valuable advice, we have carefully revised and highlighted changes in the revised manuscript, also further polished the language of this article. Thank you so much for your thoughtful suggestions.

A few more minor points in relation to some of the comments/responses:

Strengths and limitations

It is unclear what “guiding significance of practice” means

Responds: Thank you very much for pointing out ambiguous information. We have changed the statement as follow, “This systematic review has extracted evidence from interventional studies, which provided a theoretical and evidence base for practice.”. Thank you for your detailed comments.

Study selection

“intervention contents involved in the application of message framing” – this revised phrasing is also a bit unclear to me, does it mean “involving a comparison of a message framing intervention with either a control intervention or other message frames”?

Responds: We are so appreciated for your instructive suggestions. We have revised the sentence as “intervention contents involved in the application of message framing, including involving a comparison of a message framing intervention with either a control intervention or other message frames”. We sincerely thank you for your advice.

Results

Literature search

It would be better to change “2253 pieces of literature” to “2253 articles”, to be consistent.

Responds: Thank you for pointing this out. According to your suggestion, we have revised “2253 pieces of literature” to “2253 articles” in the revised manuscript. We are so appreciated for your careful work.

Figure 1

There is still no reference to PRISMA.

Responds: Thank you for your patient guidance. We have added the citation. Our sincere thanks to your valuable and thoughtful comments