PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Compliant Flooring to Prevent Fall-Related Injuries: A Scoping Review Protocol
AUTHORS	Lachance, Chantelle; Jurkowski, Michal; Dymarz, Ania; Mackey, Dawn

VERSION 1 - REVIEW

REVIEWER	Amy Drahota University of Portsmouth, UK None declared. I am a researcher in this field, so am interested in seeing this work undertaken, and would like it to be conducted to a high standard.
REVIEW RETURNED	01-Apr-2016

GENERAL COMMENTS	I think this study is a worthwhile exercise and will generate a useful overview of literature relevant to an important and growing area of research. The protocol has detailed what appears to be a thorough search strategy, and processes for screening and collecting data. I appreciate that this plan is for a scoping study (and not a systematic review), and a number of my comments are related to remaining sensitive to the limits/scope of the study in terms of how the research is to be framed, presented and interpreted. 1) There is a general emphasis throughout (e.g. abstract, background, participants – pg.9) on LTC environments, whilst it is acknowledged that the study will be useful to other environments too (e.g. hospitals, assisted living environments, etc.). Given the broadness of the inclusion criteria and question, I wonder if it would be worth reframing this emphasis to make it sound more balanced across the wide range of environments to which it is relevant, so all the potential end-users will identify with the applicability of the study, and hence improve its potential reach and significance? 2) There is a minor disconnect between the databases listed in the abstract and those listed in the main body of the report (e.g. EBM Reviews vs. CDSR only listed in the abstract). 3) Pg.5, line 20: I would like to suggest you reconsider the wording of the research question, to amend the words “what is known” to something more along the lines of “what is presented”. My rationale for this suggestion is because the word “known” has synonyms such as ’certain’, implying ‘conclusive’, ‘reliable’, and ‘trustworthy’, but since you are not planning to undertake any form of risk of bias assessment, I do not feel your study will be able to answer this question as it is currently stated. I think some alternative wording such as “what is presented” will also be much more in line with your

specific objectives.

4) Pg.5, line 40: I am not convinced by the argument that a paucity of RCTs means a systematic review is not feasible, and worry that this may propagate an out-of-date view that systematic reviews should be limited to RCT evidence. Many systematic reviews set non-randomised study designs as part of their inclusion criteria; the rationale for this can be due to an awareness of a paucity of RCTs in the field and the desire to summarise the 'best available' evidence, or because it is acknowledged that RCTs can be logistically challenging or an inappropriate study design for certain questions. Even if RCT was the most suitable and only eligible study design set for a systematic review, many 'empty' systematic reviews exist which highlight the lack of RCT evidence and provide a rationale for further primary research – these systematic reviews were still feasible (albeit if a meta-analysis was not – but meta-analyses and systematic reviews are not synonymous).

5) Pg.5, line 45: Whilst traditionally systematic reviews have revolved around questions of effectiveness, you will now find many reviews (and associated developments in methodologies) answering a range of other types of questions, so I'm not sure how robust this part of the rationale is either.

6) In relation to the above two points, I'd suggest you perhaps consider focussing your rationale for the study instead on the fact that you are interested in addressing a broad range of topics in relation to compliant flooring (rather than having a focussed question) – perhaps drawing more on the definitions outlined in Arksey and O'Malley.

7) Page 6, key concepts: I would like to suggest you perhaps consider explicitly incorporating the influence of compliant flooring on falls as well as falls-injury, as part of the clinical and cost-effectiveness – it is alluded to in biomechanical efficacy in balance and mobility, but this would make it more explicit that a potential adverse effect of softer floors could be an increase in falls, and your study should present a balanced view. Also in the definition of flooring systems, perhaps another example worth considering is acoustic flooring, since these may also potentially offer some additional degree of shock absorbency.

8) Pg.9, line 23, Study designs: I wonder if it might be worth defining the inclusion criteria a bit more with words such as 'empirical research' and 'primary studies' (and 'secondary research'? - I note you will be searching for reviews, but wonder if you will be more interested in their reference lists to avoid double counting studies, or how you will be handling these?). I note your data extraction form includes items such as 'opinion pieces' – does this mean it is your intention to include any literature related to the topic, regardless of whether it is informed by a piece of empirical research?

9) I think the exclusion of marketing materials (whilst I feel justifiable) also throws up interesting arguments, since you are not planning on critically appraising the research you include, and this might be biased in a variety of ways. Presumably the marketing materials will not be the primary reports of research studies, so perhaps by offering a clearer definition of what is included (as suggested above), this might help eliminate these documents anyway (depending on your criteria). If you take this stance on marketing

	materials, will you be checking the conflict of interest statements of papers you do include to see if authors are affiliated with the flooring industry – how will you handle these? 10) Pg 9, line 46: See earlier point on considering including acoustic flooring systems. 11) Pg.10, line 26: I do not understand the rationale behind excluding records focussing solely on falls risk. Is this because you are not interested in comparisons of slip resistant flooring surfaces? I think it is important to consider the increase in falls risk that softer surfaces may pose (due to any potential influences on balance/mobility in older people with frailty) as part of weighing up the potential benefits and risks of these floors. 12) Pg.15. You have an admirable dissemination plan, and I agree that decision-makers currently struggle to make informed decisions due to the lack of evidence-informed guidelines in this area; likewise I think the flooring industry is struggling to innovate in this area due to the lack of evidence-informed specification documents. My concerns always come back to the lack of risk of bias assessment incorporated into your study, and so for end users to make truly informed decisions, they will need to understand how trustworthy the evidence is that you will be presenting. Along with the positive contribution that this study will make, will your dissemination materials also make explicit the limitations of your study? Currently this section makes statements such as the study will "help decision makers understand the evidence base" and it "responds to the information needs" - I feel there are some caveats to these claims if you consider the lack of risk of bias assessments. 13) My suspicion is that you will only find a handful of studies each addressing clinical and cost effectiveness of compliant floors, and so I wonder if it would not be worth stating that if you have the time/resource remaining, you will seek to undertake a risk of bias assessment of these studies to help further inform decision-makers? You could potentially generate more capacity for this by considering how far back your search strategy goes – I suspect for example searching electronic literature from the 1800s and early 1900s is unlikely to yield anything of much use and may take up more time than it is worth. I hope these suggestions are of some use, and wish you all the best with your study. I am pleased to see a team like yourselves take this project on.

REVIEWER	Matthias Hoben University of Alberta, Faculty of Nursing, Edmonton, Alberta, Canada
REVIEW RETURNED	01-May-2016

GENERAL COMMENTS	Thank you very much for allowing me to review this manuscript. Dear Dr. Lachance and co-authors, Thank you for this well written scoping review protocol. A scoping review synthesizing the evidence on the biomechanical efficacy, clinical effectiveness, cost-effectiveness, and workplace safety

associated with compliant flooring systems that aim to prevent fall-related injuries is timely and highly needed. The review methods are robust and are described comprehensively. There are, however, some issues that I would like the authors to address:

Major concerns:

1. Quality assessment of included studies. The authors state that they do not intend to assess risk of bias in the included studies, as this is not applicable to scoping studies and it is consistent with the scoping review framework not to assess study quality. While in their early paper Arksey and O'Malley indeed make this statement, the authors explicitly cite more recent elaborations on Arksey and O'Malley's approach (specifically, Levac et al. 2010 and Daut. et al. 2013). Those later references explicitly make a case for including risk of bias assessments in scoping reviews as this will facilitate interpretation of study results. This is particularly critical in light of the authors' aim to assist health care decision makers with the decision whether to implement compliant flooring or not. This decision not only requires a summary of the available evidence, but also an assessment of the credibility and validity of the available evidence. I therefore ask the authors to include a risk of bias assessment of included studies into their scoping review. (See the following reference for an example: http://www.degruyter.com/view/j/ijhp.2014.1.issue-1/ijhp-2014-0002/ijhp-2014-0002.xml)

2. The authors do not define 'fall-related injuries'. It is not entirely clear if they only include fractures and traumatic brain injuries or if this term also encompasses bruises, haematomas, sprains, etc. (The search strategy seems to reflect a broad definition including all those terms and many more, but a clear definition in the inclusion/exclusion criteria is needed.)

3. In order to decide whether to implement compliant flooring or not, decision makers not only need to know about clinical effectiveness (i.e., potential to prevent fall-related injuries), but also about potential adverse effects of this flooring on residents. For example, while these floorings may prevent fall-related injuries, they may not necessarily prevent falls. In fact they may even increase falls risk. A fall cannot only affect residents physically. Each fall increases the fear of falling - which is one of the major risk factors for future falls and a major contributor to residents' immobility. Another potential risk factor could be that these floorings limit residents' mobility due to affecting their balance or ability to use their walking aide without assistance. These adverse effects need to be balance against the benefits of injury prevention. Therefore I suggest that the authors include this focus into their search strategy.

4. The authors should describe if and according to which criteria they will stratify their analysis of the papers. For example, effectiveness of a certain type of compliant flooring may be quite different in older adults than in adults aged 20-30, or different types of flooring may prevent different types of injuries while others still may occur.

5. Charting the data (data extraction): It is critical that the authors not only describe numbers and characteristics of the participant samples included in the studies, but also number and characteristics of the settings (i.e., number of nursing homes, hospitals, households, etc.;

	size, operator model, specialization, etc. of these settings). Minor concerns: 1. In the abstract the authors state that they include the Cochrane Data Base of Systematic Reviews as one of the data bases. In the methods they state that they include the EBM reviews data base - of which the Cochrane Data Base of Systematic Reviews is just one data base among others. Please be consistent here. 2. Definitions of compliant flooring, biomechanical efficacy, clinical/cost-effectiveness, and workplace safety are not given before the methods section. I was looking for those definitions in the background when those terms were mentioned the first time. Maybe refer to the methods section (table 1), when first mentioning these terms in the background. 3. Please clarify the following sentence: "Records that do not consider actual flooring systems (e.g., records looking exclusively at how foam thickness affects force attenuation) will be included only if the authors believe they contributed substantially to the body of knowledge about compliant flooring systems." Which authors does this sentence refer to? Authors of the paper screened for eligibility or authors of this scoping review? 4. Please give some more examples of other possible comparators (i.e., other than conventional flooring). I could think of different age groups (young adults vs. older adults), settings (home care vs. nursing home) or flooring materials. 5. As children and adolescents <18 years are explicitly excluded, pediatric acute care settings should be excluded too.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name: Amy Drahota
Institution and Country: University of Portsmouth, UK
Competing Interests: None declared. I am a researcher in this field, so am interested in seeing this work undertaken, and would like it to be conducted to a high standard.

I think this study is a worthwhile exercise and will generate a useful overview of literature relevant to an important and growing area of research. The protocol has detailed what appears to be a thorough search strategy, and processes for screening and collecting data. I appreciate that this plan is for a scoping study (and not a systematic review), and a number of my comments are related to remaining sensitive to the limits/scope of the study in terms of how the research is to be framed, presented and interpreted.
Authors' Response: Thank you, Dr. Drahota, for reviewing our manuscript. We believe the revised manuscript makes a stronger contribution to the journal and hope that our revisions to the manuscript satisfy your requests.

1) There is a general emphasis throughout (e.g. abstract, background, participants – pg.9) on LTC environments, whilst it is acknowledged that the study will be useful to other environments too (e.g. hospitals, assisted living environments, etc.). Given the broadness of the inclusion criteria and question, I wonder if it would be worth reframing this emphasis to make it sound more balanced across the wide range of environments to which it is relevant, so all the potential end-users will

identify with the applicability of the study, and hence improve its potential reach and significance?

Authors' Response: We have carefully considered your point of broadening our emphasis from LTC to more general 'healthcare settings.' Our inclusion criteria are intentionally broad to ensure that we capture all literature that examined compliant flooring and at least one of our four themes (biomechanical efficacy, clinical effectiveness, cost effectiveness, workplace safety). This also suggests that we will capture records from multiple settings including, but not limited to, acute care, assisted living, community, long-term care, and laboratory settings. We believe the questions we intend to answer with this scoping review will be applicable, to some extent, to healthcare settings other than LTC. Thus, per your suggestion to increase reach and significance, we removed emphasis on LTC in our abstract and kept statements like, "Results will be especially useful in long-term care, but also applicable in acute care, assisted living, and home care" throughout our manuscript. (p. 2, lines 39 - 40).

We elected, however, to maintain LTC as our key target healthcare setting. Our decision was twofold: (1) We do not want to overstate the study's applicability to other settings given that our scoping review protocol has been driven by the consultations with our Research Advisory Panel. This Panel was initially recruited based on their interest in reducing fall-related injuries in LTC and many of its members are involved primarily in LTC: two Managers of fall and injury prevention for local health authorities, two Directors of Care at LTC sites, a physiotherapist at a LTC site, and two representatives from Lower Mainland Facilities Management, which manages all infrastructure projects for the four Lower Mainland health authorities in British Columbia. Thus, their consultations have already and will continue to involve discussions with our research team based on their experience with LTC, which may not be directly transferable to other healthcare settings with different physical environments and patient and staff needs; (2) This scoping study has been approved and funded by the Canadian Institute for Health Research as a Knowledge Synthesis Grant under the assumption that our primary focus would be the LTC setting. Consistent with the current protocol manuscript under review, our CIHR grant application emphasized that the results will be especially useful in LTC, but also applicable in acute care, assisted living, and home care.

2) There is a minor disconnect between the databases listed in the abstract and those listed in the main body of the report (e.g. EBM Reviews vs. CDSR only listed in the abstract).

Authors' Response: This was an oversight. Among the other 6 academic databases we are searching (i.e., AgeLine, CINAHL, MEDLINE, SportDiscus, Web of Science), we are also using EBM Reviews to retrieve relevant records. EBM Reviews includes ACP Journal Club (ACP), Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews (CDSR), Cochrane Methodology Register, Database of Abstracts of Reviews of Effectiveness (DARE), Health Technology Assessment, and NHS Economic Evaluation Database. Therefore, we modified our abstract to state: "We will conduct a comprehensive and systematic literature search of academic databases (AgeLine, CINAHL, EBM Reviews, MEDLINE, SportDiscus, and Web of Science) and grey literature (clinical trial registries, theses/dissertations, abstracts/conference proceedings, and relevant websites)" (p. 2, lines 29 - 32).

3) Pg.5, line 20: I would like to suggest you reconsider the wording of the research question, to amend the words "what is known" to something more along the lines of "what is presented". My rationale for this suggestion is because the word "known" has synonyms such as 'certain', implying 'conclusive', 'reliable', and 'trustworthy', but since you are not planning to undertake any form of risk of bias assessment, I do not feel your study will be able to answer this question as it is currently stated. I think some alternative wording such as "what is presented" will also be much more in line with your specific objectives.

Authors' Response: We appreciate this insightful comment and have modified our text accordingly. Our research question now reads, "what is presented in the scientific literature about the biomechanical efficacy, clinical- and cost-effectiveness, and workplace safety associated with compliant flooring systems that aim to prevent fall-related injuries?" This was modified in the abstract (p. 2, lines 27 - 29) and methods section (p. 5, lines 92-94).

4) Pg.5, line 40: I am not convinced by the argument that a paucity of RCTs means a systematic review is not feasible, and worry that this may propagate an out-of-date view that systematic reviews should be limited to RCT evidence. Many systematic reviews set non-randomised study designs as part of their inclusion criteria; the rationale for this can be due to an awareness of a paucity of RCTs in the field and the desire to summarise the 'best available' evidence, or because it is acknowledged that RCTs can be logistically challenging or an inappropriate study design for certain questions. Even if RCT was the most suitable and only eligible study design set for a systematic review, many 'empty' systematic reviews exist which highlight the lack of RCT evidence and provide a rationale for further primary research – these systematic reviews were still feasible (albeit if a meta-analysis was not – but meta-analyses and systematic reviews are not synonymous).

Authors' Response: We agree that systematic reviews need not be limited to RCT evidence, and we have modified the description of our rationale for conducting a scoping review accordingly. It now reads, "The scoping review methodology is particularly well-matched to the research question because the use of compliant flooring for fall-related injury prevention is an emerging research area, the study objectives are defined broadly and exploratory in nature, and relevant evidence originates from published and unpublished sources from a variety of disciplines (e.g., biomedical engineering, epidemiology, health economics, ergonomics) and study designs in both published and grey literature. [27, 28] Accordingly, we will follow the 6-stage scoping review framework of Arksey and O'Malley[29] and incorporate published amendments to it.[27-28, 30-31]" (p. 5, lines 98 - 104).

Our rationale for conducting a scoping review was based largely on the heavily cited paper by Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: advancing the methodology. Implement Sci, 5(1), 1-9 (613 citations as of 2016-05-11). Levac and colleagues stated, "Scoping studies may be particularly relevant to disciplines with emerging evidence, such as rehabilitation science, in which the paucity of randomized controlled trials makes it difficult for researchers to undertake systematic reviews. In these situations, scoping studies are ideal because researchers can incorporate a range of study designs in both published and grey literature, address questions beyond those related to intervention effectiveness, and generate findings that can complement the findings of clinical trials." While some parts of Levac et al.'s rationale may be outdated (e.g., paucity of RCTS makes it difficult to conduct systematic reviews), recent review articles on the conduct of scoping reviews generally support Levac et al.'s rationale (Pham et al. 2014; Peters et al. 2015; Tricco et al. 2016). Specifically, they point to the usefulness of scoping studies when a body of literature has not be comprehensively reviewed and the heterogeneous nature of evidence in an area does not lend itself to the precise, rigid nature of a systematic review.

5) Pg.5, line 45: Whilst traditionally systematic reviews have revolved around questions of effectiveness, you will now find many reviews (and associated developments in methodologies) answering a range of other types of questions, so I'm not sure how robust this part of the rationale is either.

Authors' Response: Our response to Reviewer 1, Question #4 addresses this concern.

6) In relation to the above two points, I'd suggest you perhaps consider focussing your rationale for the study instead on the fact that you are interested in addressing a broad range of topics in relation to compliant flooring (rather than having a focussed question) – perhaps drawing more on the

definitions outlined in Arksey and O'Malley.

Authors' Response: Our revised rationale focuses more on our interest in addressing a broad range of topics in relation to compliant flooring (p. 5, lines 98 - 104) and our specific objectives correspond with Arksey and O'Malley's reasons for why a scoping study might be conducted (p. 5, lines 94 - 96): to examine the extent, range, and nature of research activity; to summarize and disseminate research findings; and to identify research gaps in existing literature. We did not include to determine the value of undertaking a full systematic review as this was not a research goal/objective for our review.

7) Page 6, key concepts: I would like to suggest you perhaps consider explicitly incorporating the influence of compliant flooring on falls as well as falls-injury, as part of the clinical and cost-effectiveness – it is alluded to in biomechanical efficacy in balance and mobility, but this would make it more explicit that a potential adverse effect of softer floors could be an increase in falls, and your study should present a balanced view. Also in the definition of flooring systems, perhaps another example worth considering is acoustic flooring, since these may also potentially offer some additional degree of shock absorbency.

Authors' Response: We agree and our existing search strategy will identify records that examine the influence of compliant flooring on falls. Therefore, we have now explicitly included falls and fall-related injury in the definition of our clinical and cost-effectiveness themes (p. 6, line 114, Table 1).
Based on our broad search and inclusion criteria, our systematic searches would have captured records that examined acoustic flooring. To better highlight this, we added the example of acoustic flooring to the definition of compliant flooring systems (p. 6, line 114, Table 1).

8) Pg.9, line 23, Study designs: I wonder if it might be worth defining the inclusion criteria a bit more with words such as 'empirical research' and 'primary studies' (and 'secondary research'? - I note you will be searching for reviews, but wonder if you will be more interested in their reference lists to avoid double counting studies, or how you will be handling these?). I note your data extraction form includes items such as 'opinion pieces' – does this mean it is your intention to include any literature related to the topic, regardless of whether it is informed by a piece of empirical research?

Authors' Response: We believe including the terms primary and secondary research would improve clarity in this section. Therefore, the revised sections read, "Designs. Consistent with scoping review methodology, we will consider all methodological designs (i.e., primary and secondary research), including published and unpublished records of quantitative, qualitative, or mixed-methods research design. We will exclude marketing materials from flooring manufacturers, such as product guides, which may present biased information (p. 9, lines 170-171).

As secondary research (e.g. literature reviews) may include records that are already accounted for by primary research records, many of the secondary research records will be included for descriptive purposes only (i.e., they will be included in the total number of records that discuss compliant flooring, but results of specific studies contained in them will not be charted if they are also presented in a primary research record). Reviewers will meet on a regular basis, throughout the data charting process, and data entry will be compared after the completion of charting each theme to determine where there are inconsistencies; discrepancies will be resolved by consensus or a third party adjudication[35] (p. 12, lines 243 - 250).

We intend to include any literature related to the topic, regardless of whether it is informed by a piece of empirical research. Key points taken from these types of records will be reported separately from those supported by empirical research and with less emphasis.

9) I think the exclusion of marketing materials (whilst I feel justifiable) also throws up interesting

arguments, since you are not planning on critically appraising the research you include, and this might be biased in a variety of ways. Presumably the marketing materials will not be the primary reports of research studies, so perhaps by offering a clearer definition of what is included (as suggested above), this might help eliminate these documents anyway (depending on your criteria). If you take this stance on marketing materials, will you be checking the conflict of interest statements of papers you do include to see if authors are affiliated with the flooring industry – how will you handle these?

Authors' Response: To add to our previous response (question #8), we intend to include any literature related to the topic, regardless of whether it is informed by a piece of empirical research, but non-empirical research will be charted and presented differently in the results section. We intend to highlight/showcase the original ('primary research') studies in our narrative analysis and will descriptively mention non-empirical studies. We don't want to disregard non-empirical studies all together, but we appreciate that they should not be reported in the same way.

Additionally, we will be checking the conflict of interest statements of the records we include and these will be acknowledged in the results manuscript (pg 13-14, line 260, Table 3).

10) Pg 9, line 46: See earlier point on considering including acoustic flooring systems.

Authors' Response: We added the example of acoustic flooring (p. 6, line 114, Table 1 and p. 9, lines 166-167).

11) Pg.10, line 26: I do not understand the rationale behind excluding records focussing solely on falls risk. Is this because you are not interested in comparisons of slip resistant flooring surfaces? I think it is important to consider the increase in falls risk that softer surfaces may pose (due to any potential influences on balance/mobility in older people with frailty) as part of weighing up the potential benefits and risks of these floors.

Authors' Response: We acknowledge the importance of considering the potential increase of falls risk on softer surfaces and have revised our inclusion criteria to reflect this (p. 6, line 114, Table 1 and p. 10, lines 178 - 183).

12) Pg.15. You have an admirable dissemination plan, and I agree that decision-makers currently struggle to make informed decisions due to the lack of evidence-informed guidelines in this area; likewise I think the flooring industry is struggling to innovate in this area due to the lack of evidence-informed specification documents. My concerns always come back to the lack of risk of bias assessment incorporated into your study, and so for end users to make truly informed decisions, they will need to understand how trustworthy the evidence is that you will be presenting. Along with the positive contribution that this study will make, will your dissemination materials also make explicit the limitations of your study? Currently this section makes statements such as the study will "help decision makers understand the evidence base" and it "responds to the information needs" - I feel there are some caveats to these claims if you consider the lack of risk of bias assessments.

Authors' Response: Thank you for your positive feedback on our dissemination plan, which we believe will help to further increase awareness about the topic of compliant flooring.

Consistent with our scoping review approach, our study is not designed to present conclusive results or to cause policy change by itself. Rather, the goal of the study is to provide a broad overview of the available evidence related to compliant flooring. We do intend to explicitly state the limitations of our study in the dissemination materials. For instance, we will describe strengths and limitations of the evidence available within each of the four thematic areas and point to where there are important gaps in knowledge where further research is needed. In our revised manuscript, we highlighted the

limitation that study quality will not be assessed: “Study quality will not be assessed in this scoping review, consistent with guidance on scoping review conduct [28, 36-37]; results from studies that lack quality may introduce bias in our study’s findings.[27]” (p. 14-15, lines 277-279).

We also modified the following text from “The study’s findings and outputs will help decision makers understand the evidence base on compliant flooring to prevent fall-related injuries to support their decisions related to fall injury prevention and the design of safer environments for vulnerable older adults” to “The review’s findings and outputs will be a first step to help decision makers understand the current evidence base on compliant flooring to prevent fall-related injuries.”(p. 16, lines 310-311).

The authors believe that the scoping review still responds to the information needs of healthcare decision makers tasked with preventing fall-related injuries by synthesizing the available evidence about compliant flooring as a potential intervention for preventing fall-related injuries in older adults as well as identify gaps in evidence and new avenues for research. Therefore, we only modified this sentence slightly. (p.16, lines 312-316).

We also added the sentence, “We will also describe strengths and limitations of the available evidence available within each theme” in the collating, summarizing and reporting the results section to highlight that we will describe the strengths as well as limitations (p.14 lines 272 -273).

13) My suspicion is that you will only find a handful of studies each addressing clinical and cost effectiveness of compliant floors, and so I wonder if it would not be worth stating that if you have the time/resource remaining, you will seek to undertake a risk of bias assessment of these studies to help further inform decision-makers? You could potentially generate more capacity for this by considering how far back your search strategy goes – I suspect for example searching electronic literature from the 1800s and early 1900s is unlikely to yield anything of much use and may take up more time than it is worth.

Authors’ Response: We appreciate the academic debate that continues regarding the inclusion of quality assessment and/or risk of bias assessment in scoping reviews. Scoping reviews are designed to provide a broad overview and complete map of the existing evidence base related to a topic, regardless of quality (Pham et al. 2014; Peters et al. 2015; Tricco et al. 2016). Three recent reviews about the conduct of scoping reviews (Pham et al. 2014; Peters et al. 2015; and Tricco et al. 2016) asserted that assessment of methodological quality/risk of bias is not consistent with current guidelines for the conduct of scoping reviews or with the primary purpose of scoping reviews. We agree with this position and have elected not to undertake a risk of bias assessment for studies addressing clinical and cost-effectiveness of compliant flooring. If a future systematic review were conducted to address clinical or cost-effectiveness of compliant flooring, quality assessment would be essential.

We do plan to describe strengths and limitations of the available evidence base within each of the 4 thematic areas, which will help to further inform decision makers. We added a sentence to indicate this in the revised manuscript in the section Collating, Summarizing, and Reporting the Results: “Study quality will not be assessed in this scoping review, consistent with guidance on scoping review conduct [28, 36-37]; results from studies that lack quality may introduce bias in our study’s findings.[27]” (p. 14-15, lines 277 – 279)

Reviewer comment: I hope these suggestions are of some use, and wish you all the best with your study. I am pleased to see a team like yourselves take this project on.

Authors’ Response: Thank you for your very helpful feedback Dr. Drahota.

Responses to Reviewer 2:
Reviewer: 2
Reviewer Name: Matthias Hoben
Institution and Country: University of Alberta, Faculty of Nursing, Edmonton, Alberta, Canada
Competing Interests: None declared

Dear Dr. Lachance and co-authors,

Thank you for this well written scoping review protocol. A scoping review synthesizing the evidence on the biomechanical efficacy, clinical effectiveness, cost-effectiveness, and workplace safety associated with compliant flooring systems that aim to prevent fall-related injuries is timely and highly needed. The review methods are robust and are described comprehensively. There are, however, some issues that I would like the authors to address:

Authors' Response: Thank you, Dr. Hoben, for your constructive feedback on our protocol. We believe the revised manuscript is a stronger contribution to the journal and readership.

Major concerns:

1. Quality assessment of included studies. The authors state that they do not intend to assess risk of bias in the included studies, as this is not applicable to scoping studies and it is consistent with the scoping review framework not to assess study quality. While in their early paper Arksey and O'Malley indeed make this statement, the authors explicitly cite more recent elaborations on Arksey and O'Malley's approach (specifically, Levac et al. 2010 and Daut. et al. 2013). Those later references explicitly make a case for including risk of bias assessments in scoping reviews as this will facilitate interpretation of study results. This is particularly critical in light of the authors' aim to assist healthcare decision makers with the decision whether to implement compliant flooring or not. This decision not only requires a summary of the available evidence, but also an assessment of the credibility and validity of the available evidence. I therefore ask the authors to include a risk of bias assessment of included studies into their scoping review. (See the following reference for an example:http://www.degruyter.com/view/j/ijhp.2014.1.issue-1/ijhp-2014-0002/ijhp-2014-0002.xml)

Authors' Response: We appreciate the academic debate that continues regarding the inclusion of quality assessment and/or risk of bias assessment in scoping reviews. We note that Levac et al. (2010) did not take a position on the matter of quality assessment of included studies; rather, they recommended that the debate on the need for quality assessment continue. While some authors of scoping studies conduct a quality assessment of included studies, as the authors of the linked article did, quality assessment is not generally performed for scoping review (JBI Reviewer's Manual). We agree with the position taken by three recent reviews about the conduct of scoping reviews (Pham et al. 2014; Peters et al. 2015; and Tricco et al. 2016), which asserted that assessment of methodological quality/risk of bias is not consistent with current guidelines for the conduct of scoping reviews or with the primary purpose of scoping reviews, which is to provide a broad and complete overview of the existing evidence base related to a topic, regardless of quality. As scoping reviews do not seek to answer a specific question related to policy or practice, it is not necessary to identify only the 'best available evidence' within a scoping review. We have added citations to these three reviews in our revised manuscript.

There are also important logistical challenges to consider related to quality assessment of included studies in scoping reviews. For our scoping review, it would not be feasible to propose quality assessment for all included records due to the large volume of records and diversity of study designs that we expect to uncover. For some included records, especially the experimental laboratory studies that we anticipate will dominate the research activity under biomechanical efficacy of compliant

flooring, there may not be an appropriate and validated quality assessment tool to use, which would preclude a complete assessment of quality among included records.

Since we are not performing a quality assessment of included studies, we recognize that implications for policy and practice will be limited. Accordingly, we modified the following text from “The study’s findings and outputs will help decision makers understand the evidence base on compliant flooring to prevent fall-related injuries to support their decisions related to fall injury prevention and the design of safer environments for vulnerable older adults” to “The review’s findings and outputs will be a first step to help decision makers understand the current evidence base on compliant flooring to prevent fall-related injuries.”(p. 16, lines 310 - 311).

We have also noted lack of quality assessment as a limitation of our study in the revised protocol: Study quality will not be assessed in this scoping review; results from studies that lack quality may introduce bias in our study’s findings [27]. (p. 14-15, lines 277-280). In our results manuscript, we will also include this limitation.

2. The authors do not define 'fall-related injuries'. It is not entirely clear if they only include fractures and traumatic brain injuries or if this term also encompasses bruises, haematomas, sprains, etc. (The search strategy seems to reflect a broad definition including all those terms and many more, but a clear definition in the inclusion/exclusion criteria is needed.)

Authors’ Response: To address this concern, we have added a definition for “fall-related injury” in Table 1: “Broadly defined fractures or soft tissue injuries (hematoma, traumatic brain injury, dislocation, laceration/cut, sprain/strain, contusion/bruise, swelling, pain) as a direct result from a fall”. We have kept this definition intentionally broad to accommodate the wide variety of definitions presented in the reviewed literature. (p. 6, line 114)

3. In order to decide whether to implement compliant flooring or not, decision makers not only need to know about clinical effectiveness (i.e., potential to prevent fall-related injuries), but also about potential adverse effects of this flooring on residents. For example, while these floorings may prevent fall-related injuries, they may not necessarily prevent falls. In fact, they may even increase falls risk. A fall cannot only affect residents physically. Each fall increases the fear of falling - which is one of the major risk factors for future falls and a major contributor to residents' immobility. Another potential risk factor could be that these floorings limit residents' mobility due to affecting their balance or ability to use their walking aide without assistance. These adverse effects need to be balance against the benefits of injury prevention. Therefore I suggest that the authors include this focus into their search strategy.

Authors’ Response: Compliant flooring is a technology that has been developed to reduce the impact forces on the body during falls and thereby reduce risk for injury in the event of a fall. As you mentioned, because compliant floors are softer than standard floors, they may cause an increase in falls risk or effect balance and walking ability of residents. We believe we are addressing these concerns in our revised manuscript. Firstly, our revised definition of clinical effectiveness is intentionally broad to capture both the advantages, concerns, and/or neutral effects of compliant flooring on clinical effectiveness. Specifically, our search strategy is set up to identify if compliant flooring affects the incidence of fall-related injuries, severity of fall-related injuries, and/or incidence of falls. The search strategy is not specifically looking at positive effects but any evidence from research involving human participants and measurement of how compliant flooring systems affect falls and fall-related injuries. (p.6, line 114, Table 1) Secondly, our search strategy for all 4 themes is set up in a way that will look at all effects (positive, negative, neutral) of flooring within the areas of biomechanical efficacy, clinical effectiveness, cost effectiveness and workplace safety. Thus, we intend to report on any adverse events that are reported with compliant flooring.

4. The authors should describe if and according to which criteria they will stratify their analysis of the papers. For example, effectiveness of a certain type of compliant flooring may be quite different in older adults than in adults aged 20-30, or different types of flooring may prevent different types of injuries while others still may occur.

Authors' Response: When reporting our results, we plan to stratify our results first in accordance with the theme they relate to (biomechanical efficacy, clinical effectiveness, cost effectiveness, workplace safety). We will then further categorize our results within the specific questions that the Research Advisory Panel requested we answer. When describing original research studies, we will describe the study in terms of study setting, study duration, study design, etc. to inform the readers about important details of study methodology, to aid in interpretation.

"Our thematic analysis will produce a narrative summary of the existing records related to compliant flooring systems for fall injury prevention in older adults within each of the four themes. Within each theme, we will synthesize the evidence according to questions the Research Advisory Panel deems pivotal to aid in decision making. We will also describe strengths and limitations of the available evidence available within each theme." (p. 14, lines 268-273).

5. Charting the data (data extraction): It is critical that the authors not only describe numbers and characteristics of the participant samples included in the studies, but also number and characteristics of the settings (i.e., number of nursing homes, hospitals, households, etc.; size, operator model, specialization, etc. of these settings).

Authors' Response: Agreed. When we extract the data, we will be charting numbers and characteristics of the participant samples and also the number and characteristics of the settings. Our revised Table 3 better reflects this.
Revised text: Setting (type: laboratory, community, acute care/hospital, assisted living, long-term care, other; description of setting: size, specialization) (p. 13-14, line 260, Table 3).

Minor concerns:

1. In the abstract the authors state that they include the Cochrane Data Base of Systematic Reviews as one of the data bases. In the methods they state that they include the EBM reviews data base - of which the Cochrane Data Base of Systematic Reviews is just one data base among others. Please be consistent here.

Authors' Response: Consistent with our response to Reviewer 1's Question #2; we corrected our abstract to state "EBM Reviews" instead of "Cochrane Data Base of Systematic Reviews." Among the other 6 academic databases we are searching (i.e., AgeLine, CINAHL, MEDLINE, SportDiscus, Web of Science), we are also using EBM Reviews to retrieve relevant records. EBM Reviews includes ACP Journal Club (ACP), Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews (CDSR), Cochrane Methodology Register, Database of Abstracts of Reviews of Effectiveness (DARE), Health Technology Assessment, and NHS Economic Evaluation Database. Therefore, we modified our abstract to state: We will conduct a comprehensive and systematic literature search of academic databases (AgeLine, CINAHL, EBM Reviews, MEDLINE, SportDiscus, and Web of Science) and grey literature (clinical trial registries, theses/dissertations, abstracts/conference proceedings, and relevant websites). (p. 2, lines 29-32)

2. Definitions of compliant flooring, biomechanical efficacy, clinical/cost-effectiveness, and workplace safety are not given before the methods section. I was looking for those definitions in the background when those terms were mentioned the first time. Maybe refer to the methods section (table 1), when

first mentioning these terms in the background.

Authors' Response: We have now referenced Table 1 in the background section (p. 5, lines 91-94).

3. Please clarify the following sentence: "Records that do not consider actual flooring systems (e.g., records looking exclusively at how foam thickness affects force attenuation) will be included only if the authors believe they contributed substantially to the body of knowledge about compliant flooring systems." Which authors does this sentence refer to? Authors of the paper screened for eligibility or authors of this scoping review?

Authors' Response: Our revised manuscript has removed this sentence all together, as our research team and Research Advisory Panel expressed that they would no longer be interested in study results that examine foam.

4. Please give some more examples of other possible comparators (i.e., other than conventional flooring). I could think of different age groups (young adults vs. older adults), settings (home care vs. nursing home) or flooring materials.

Authors' Response: Our guiding research question is "what is presented in the scientific literature about the biomechanical efficacy, clinical- and cost-effectiveness, and workplace safety associated with compliant flooring systems (Table 1) that aim to prevent fall-related injuries?" As our focus is on the intervention of compliant flooring, we regard comparisons between compliant flooring and other flooring types of primary importance. We will consider other comparators (e.g. younger adults vs. older adults) when these comparators statistically interact with our main comparator, flooring. The research team plans to extract these other comparators at the data charting stage and has modified the text to reflect this, "We will consider other comparators (e.g. age group, setting type, BMI) when these comparators statistically interact with our main comparator, flooring." (p. 10, lines 170-171).

5. As children and adolescents <18 years are explicitly excluded, pediatric acute care settings should be excluded too.
Authors' Response: To address this, we added pediatric acute care to our exclusion criteria: "Consistent with our population exclusion criteria, we will exclude records if the research was conducted within a sporting, playground, school, or pediatric acute care setting." (p. 10, lines 191-193).

The authors made a few other changes to the protocol that were not specifically requested by the reviewers:
1. We elected to change the term 'scoping study' to 'scoping review' throughout our manuscript, since this is the most common term used to describe scoping reviews. Reference: Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K., Colquhoun, H., Kastner, M., ... & Kenny, M. (2016). A scoping review on the conduct and reporting of scoping reviews. BMC medical research methodology, 16(1), 1.

2. After meeting with our Research Advisory Panel of key stakeholders in Spring 2016, we decided to removed foam, falls mats, and safety mats from our definition of compliant flooring systems. Our rationale is as follows: flooring is something that is permanently affixed to the ground; it is installed. We do not want to regard foam fall mats as flooring because they do not provide universal coverage or protection, and falls mats are considered programmatic equipment not flooring.

References:
1. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. International journal of social research methodology 2005;8:19-32.
2. Colquhoun HL, Levac D, O'Brien KK, et al. Scoping reviews: time for clarity in definition, methods,

and reporting. J Clin Epidemiol 2014;67:1291-4 doi:10.1016/j.jclinepi.2014.03.013.
3. Daudt HM, van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. BMC Med Res Methodol 2013;13:48,2288-13-48 doi:10.1186/1471-2288-13-48.
4. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. Implement Sci 2010;5:1-
5. Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. Int J Evid Based Healthc. 2015;13(3):141–6
6. Pham MT, Rajić A, Greig JD, Sargeant JM, Papadopoulos A, McEwen SA. A scoping review of scoping reviews: advancing the approach and enhancing the consistency. Res Synth Methods 2014;5(4):371-85.
7. The Joanna Briggs Institute Reviewers' Manual 2015: Methodology for JBI Scoping Reviews: http://joannabriggs.org/assets/docs/sumari/Reviewers-Manual_Methodology-for-JBI-Scoping-Reviews_2015_v2.pdf.
8. Tricco AC, Lillie E, Zarin W, O'Brien K, Colquhoun H, Kastner M, Levac D, Ng C, Sharpe JP, Wilson K, Kenny M. A scoping review on the conduct and reporting of scoping reviews. BMC Med Res Methodol 2016;16(1):1.

VERSION 2 – REVIEW

REVIEWER	Amy Drahota University of Portsmouth, UK.
REVIEW RETURNED	18-Jun-2016

GENERAL COMMENTS	Thank you for your considered response to my initial feedback. I feel like you have done a good job of addressing the points I raised, and whilst the exclusion of any risk of bias assessment will remain a contentious issue, I feel we can agree to disagree on this since you have justified your stance and been transparent about the limitations this presents to the study. I have picked up a few additional points however for you to consider, based on the amendments you have made, described below: Pg. 9, line 55 - I think the additional "comparators" listed (age, setting, BMI), would be better described as 'sub-groups' or 'effect modifiers'. I think the 'comparison' will always involve one type of floor versus another floor if you are looking for interactions between these other variables and flooring (i.e. it wouldn't make sense to compare fall-related injuries in care homes versus hospitals which had the same sort of floor, as this would tell you nothing about the effect of the floor). I do worry about the introduction of reporting bias into your review however, based on the statement that you will only consider these variables when they statistically interact with your main comparator – flooring (non-significant findings can be just as informative). It would be more robust to specify which of these variables you are interested to consider in advance, based on a clinical or methodological rationale – or perhaps in the case of a scoping review you might be interested in reporting on any effect modifiers that were measured in the primary studies (as opposed to just those that were reported as statistically significant). The statement also implies that you might be doing some statistical analysis across studies (e.g. to statistically compare results of studies undertaken on different floors in one setting against studies on different floors in an alternative setting), is this your intention? Or do you only mean to describe these additional variables if they have been explored by the primary studies?

	Reading onwards in your protocol to the section on collating, summarizing and reporting results, I'm no longer clear about your 'numerical analysis' intentions. My first interpretation of your plan to numerically map the data was that you plan to tabulate or plot the information using descriptive statistics (e.g. counts of the number of studies meeting certain criteria). But the new statement that your synthesis will be influenced by consultations implies that anything might be possible, and perhaps you may undertake some statistical analyses (your PRISMA-P checklist suggests otherwise). I think statistical synthesis (e.g. meta-analysis; meta-regression) would be dangerous territory given the lack of risk of bias assessment. I appreciate that it is tricky to specify everything in advance, when you do not know what the scoping review may unveil, however I think it could still be possible here to offer a little more clarity, e.g. around the limits you are prepared to go to and any suggestions that your advisory panel have already given you. The new wording in this section also implies that the Research Advisory Panel has yet to inform you (e.g. "will be influenced" as opposed to "has been influenced" or "will continue to be influenced"), but I assume from your acknowledgements that the panel have already informed your protocol and that you have some ideas around the questions they deem important and what they would find valuable? Table 3 – You still have 'fall mat' included here as a data extraction item, and in your search strategy (supplementary file) however I understood your intention was to exclude these interventions from the scoping review based on your response to the first round of peer review? I think your protocol would benefit from explicitly stating your intention to exclude these interventions and why, as it remains unclear in the manuscript. Best of luck with the scoping review, and I hope you find these comments helpful.

REVIEWER	Matthias Hoben University of Alberta, Edmonton, Alberta, Canada
REVIEW RETURNED	05-Jun-2016

GENERAL COMMENTS	Thank you for your responsiveness to each of the concerns raised. I recommend to accept the manuscript in its revised form and look forward to the results of the review.

VERSION 2 – AUTHOR RESPONSE

Responses to Reviewer 1:
Reviewer: 1
Reviewer Name: Amy Drahota
Institution and Country: University of Portsmouth, UK.
Competing Interests: None declared.

Please leave your comments for the authors below

Thank you for your considered response to my initial feedback. I feel like you have done a good job of addressing the points I raised, and whilst the exclusion of any risk of bias assessment will remain a contentious issue, I feel we can agree to disagree on this since you have justified your stance and

been transparent about the limitations this presents to the study. I have picked up a few additional points however for you to consider, based on the amendments you have made, described below:

Authors' Response: Thank you, Dr. Drahota, for continued review of our manuscript. We appreciate all of the suggestions you made and believe that our changes have produced a stronger contribution to BMJ Open.

(1) Pg. 9, line 55 - I think the additional "comparators" listed (age, setting, BMI), would be better described as 'sub-groups' or 'effect modifiers'. I think the 'comparison' will always involve one type of floor versus another floor if you are looking for interactions between these other variables and flooring (i.e. it wouldn't make sense to compare fall-related injuries in care homes versus hospitals which had the same sort of floor, as this would tell you nothing about the effect of the floor). I do worry about the introduction of reporting bias into your review however, based on the statement that you will only consider these variables when they statistically interact with your main comparator – flooring (non-significant findings can be just as informative). It would be more robust to specify which of these variables you are interested to consider in advance, based on a clinical or methodological rationale – or perhaps in the case of a scoping review you might be interested in reporting on any effect modifiers that were measured in the primary studies (as opposed to just those that were reported as statistically significant). The statement also implies that you might be doing some statistical analysis across studies (e.g. to statistically compare results of studies undertaken on different floors in one setting against studies on different floors in an alternative setting), is this your intention? Or do you only mean to describe these additional variables if they have been explored by the primary studies?

Authors' Response: Thank you for this feedback. Our intention is to describe, not statistically compare, other effect modifiers based on Reviewer 2's previous suggestion. We agree with you that this would be better termed 'effect modifiers' versus comparators. We have revised the manuscript to now read, "In addition, we will describe other effect modifiers (e.g. age group, setting type, BMI) that were measured in the primary studies." (p.10, line 3)

(2) Reading onwards in your protocol to the section on collating, summarizing and reporting results, I'm no longer clear about your 'numerical analysis' intentions. My first interpretation of your plan to numerically map the data was that you plan to tabulate or plot the information using descriptive statistics (e.g. counts of the number of studies meeting certain criteria). But the new statement that your synthesis will be influenced by consultations implies that anything might be possible, and perhaps you may undertake some statistical analyses (your PRISMA-P checklist suggests otherwise). I think statistical synthesis (e.g. meta-analysis; meta-regression) would be dangerous territory given the lack of risk of bias assessment. I appreciate that it is tricky to specify everything in advance, when you do not know what the scoping review may unveil, however I think it could still be possible here to offer a little more clarity, e.g. around the limits you are prepared to go to and any suggestions that your advisory panel have already given you. The new wording in this section also implies that the Research Advisory Panel has yet to inform you (e.g. "will be influenced" as opposed to "has been influenced" or "will continue to be influenced"), but I assume from your acknowledgements that the panel have already informed your protocol and that you have some ideas around the questions they deem important and what they would find valuable?

Authors' Response: We appreciate this insightful comment. The numerical analysis will indeed map that data using descriptive statistics (e.g., frequencies) and will not involve any statistical analyses or syntheses. We plan to seek input from our Research Advisory Panel on the narrative analysis section only, in order to help to understand what is valuable to them. Thus, we removed the first sentence from this section ("Data synthesis will be largely influence by consultations with our Research Advisory Panel to ensure that we summarize the available evidence in a way that key stakeholders find valuable") as it did not accurately describe our plans. By removing this sentence, it also removed

the ‘will be influenced’ issue.

(3) Table 3 – You still have ‘fall mat’ included here as a data extraction item, and in your search strategy (supplementary file) however I understood your intention was to exclude these interventions from the scoping review based on your response to the first round of peer review? I think your protocol would benefit from explicitly stating your intention to exclude these interventions and why, as it remains unclear in the manuscript

Authors’ Response: Thank you for drawing our attention to this oversight. We have removed ‘fall mat’ from Table 3 and our syntax (see revised supplementary file). We have also included the following text to better explain why we excluded fall mats from our scoping review, “Fall mats will not be considered a compliant flooring system for several reasons: they are not permanently affixed to the floor; they do not provide universal coverage or protection; and they are considered to be programmatic equipment. Thus, studies reporting exclusively on fall mats will not eligible.”

Best of luck with the scoping review, and I hope you find these comments helpful.

Reviewer: 2
Reviewer Name: Matthias Hoben
Institution and Country: University of Alberta, Edmonton, Alberta, Canada
Competing Interests: None declared

Dear Dr. Lachance and co-¬authors,

Thank you for your responsiveness to each of the concerns raised. I recommend to accept the manuscript in its revised form and look forward to the results of the review.

Authors’ Response: Thank you Dr. Hoben. We appreciate all of your suggestions throughout the review process.