PEER REVIEW HISTORY

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

ARTICLE DETAILS

TITLE (PROVISIONAL)	Health assets in older age: a systematic review
AUTHORS	Hornby-Turner, Yvonne; Peel, Nancye; Hubbard, Ruth

VERSION 1 - REVIEW

REVIEWER	Cornelia Ruland Center for shared decision making and collaborative care research, Oslo University Hospital, Oslo, Norway
REVIEW RETURNED	26-Sep-2016

GENERAL COMMENTS	This is a well and clearly written paper, summarizing the evidence on health assets that contribute to successful aging. While a number of studies have identified what health assets healthy people or people with various illnesses use to manage health challenges, this is to my knowledge the first systematic review that links health assets to specific health outcomes, namely, successful aging in this review. Thus this paper makes an important contribution to the literature on health assets. Some minor clarifications would strengthen the paper: The authors make a point of using a health asset model, focusing on positive factors that contribute to health and wellness, in contrast to a more common health deficit model, focusing on risk factors. Therefore it is unclear why the review includes 7 of the 27 studies where frailty rather than successful aging is the primary outcome, and that address risk factors for frailty. Isn't that self-contradictory? In the inclusion criteria it says that outcomes measures should be " health status…composite of physical, mental and social well-being. Either the review should be "clean" in terms of focusing on positive assets, or a justification is needed why deficit outcomes such as frailty and risk factors are included. The terms health status, health outcomes and health are used interchangeably, sometimes being a predictor and sometimes an outcome. How would you distinguish between health and health outcomes? This would be helpful to the reader to clarify. E.g Under determinants of health status page 7, line 52, it reads on page 8, line 5-6: … health status is stated as a predictor of successful aging. In the discussion section page 10 line 16 it says that health as an asset may prevent adverse health outcomes. And later, line 39, … examine why individuals with similar health status have different health outcomes. Page 8 line 39-40. What are core-city men vs not college men? A little explanation such as core-city men meaning… and not college men, meaning … would be helpful. Page 7 line 27. Isn't UK part of Europe? Why the distinction?

Page 10 line 31. The authors refer to the theoretical framework underpinning health assets. Which theoretical framework? A definition of health assets is cited page 4 but not a theoretical framework. Or does this refer to the WHO framework on determinants of healthy aging? But this is not a framework of health assets. This part is not clear. Therefore, saying that " the framework underpinning health assets is similar to that of health deficits may well be plausible, but is not justified based on what is the text with a reference to a theoretical framework that is unclear. It would be helpful with a little more elaboration here.

Finally, page 11, line 19: Implications of findings: Given that the review focuses on people above age 65, it seems not quite justified to say that …. It provides evidence that can be applied across the life course…, as earlier life years are not addressed in this review. Health assets in earlier years may be important for successful aging in later years, which would be an important topic for future research. I would say something like this, as part of suggestions for future research.

Nice work!

REVIEWER	Jean Woo The Chinese University of Hong Kong, Hong Kong
REVIEW RETURNED	29-Sep-2016

GENERAL COMMENTS	The review is timely, as it emphasizes that outcomes are a result of a balance between enabling and risk factors. The approach should be promoted extensively in the care of older people, as distinct from the single disease/investigation/pharmaceutical model

REVIEWER	Milena Pavlova Maastricht University, The Netherlands
REVIEW RETURNED	30-Oct-2016

GENERAL COMMENTS	This a relevant topic, which was the reason for me to agree to comment on this review, but the paper is not well framed and the conclusions are too superficial. Below, I provide a bit more detailed suggestions for improvements. The abstract is not specific, for example it is not clear from the abstract what geographical region is covered in the review, and which countries show the results reported. Therefore it is not surprising that the conclusions in the abstract are also very general and overreaching in that sense. A bit more explanation on the motivation for this review needs to be provided in the introduction section and this should be supported with references. Has this topic not been reviewed yet? What is the contribution of this review? Why is it relevant for researchers and decision-makers? I would like to bring to the attention of the authors the following papers, which could be helpful to formulate the motivation: - Mariusz Duplaga, Marcin Grysztar, Marcin Rodzinka and

Agnieszka Kopec. Scoping review of health promotion and disease prevention interventions addressed to elderly people. BMC Health Services Research 2016 16(Suppl 5):278.
- Andrea Poscia, Umberto Moscato, Daniele Ignazio La Milia, Sonja Milovanovic, Jovana Stojanovic, Alice Borghini, Agnese Collamati, Walter Ricciardi and Nicola Magnavita. Workplace health promotion for older workers: a systematic literature review. BMC Health Services Research 2016 16(Suppl 5):329
- Agnieszka Sowa, Beata Tobiasz-Adamczyk, Roman Topór-Mądry, Andrea Poscia and Daniele Ignazio la Milia. Predictors of healthy ageing: public health policy targets. BMC Health Services Research 2016 16(Suppl 5):289.
Please also see the reference lists of these publications for more literature on the topic.

The research aim should be explicitly stated. Please reformulate the last sentence in the introduction, and please state the geographical region and period covered in the review.

In the methods section, I could not find the exact timing of the review. When were databases searched?

In my opinion, the first part of the chain of search terms presented in table 1, is incomplete. Terms like old, seniors and elderly, and related terms, should be also included in the search. It could be that the authors have missed an important part of the literature because these terms were not included.

Also, I was wondering why for example the paper of Sowa et al (2016) (see above) has not been included in the review. If because too recent, perhaps the authors could at least acknowledge this and other similar new papers in the discussion.

Regarding table 2: As shown in this table, papers focused on behavior and lifestyle factors excluded because they were the subject of another review. These are personal factors and they have an important influence on older persons' health, and if they are excluded, the aim of the paper cannot be fully achieved because a major part of the relevant literature is missing. The authors should either include these papers as well, or should adjust the aim of this review so that it is clear that the behavioral/lifestyle papers are not related to the subject of this review.

Regarding data extraction: Please explain the standardized instrument mentioned.

Please also indicate at the end of the methods section that you have demonstrated the quality of your review by providing an appendix with the PRISMA 2009 checklist for your review.

The same as for the abstract, the geographical diversity of the reviewed studies should be reflected both in the results and discussion section. Because the authors only focus on common points in the papers reviewed, their conclusions are only general and bringing no new messages expect what is already largely known. To make their paper more challenging and relevant to the readers, I suggest the authors to reflect the countries where different results are observed, and to emphasize the differences across the countries. This is especially important because countries with diverse political and economic context are included. The contextual

differences in the results should be also discussed to be able to make more concrete conclusions relevant to decision-makers. The current message is to implement interventions while it is well known that an intervention that works well in one country does not necessarily work well even in a neighboring country.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Comment 1.1: This is a well and clearly written paper, summarizing the evidence on health assets that contribute to successful aging. While a number of studies have identified what health assets healthy people or people with various illnesses use to manage health challenges, this is to my knowledge the first systematic review that links health assets to specific health outcomes, namely, successful aging in this review. Thus this paper makes an important contribution to the literature on health assets. Some minor clarifications would strengthen the paper:
Response 1.1: We thank the reviewer for these positive comments.

Comment 1.2: The authors make a point of using a health asset model, focusing on positive factors that contribute to health and wellness, in contrast to a more common health deficit model, focusing on risk factors. Therefore it is unclear why the review includes 7 of the 27 studies where frailty rather than successful aging is the primary outcome, and that address risk factors for frailty. Isn't that self-contradictory? In the inclusion criteria it says that outcomes measures should be "health status…composite of physical, mental and social well-being. Either the review should be "clean" in terms of focusing on positive assets, or a justification is needed why deficit outcomes such as frailty and risk factors are included.
Response 1.2: We originally included frailty as it measures health on a continuum from fit to frail. However, upon receiving this comment we recognise that most significant factors were associated with the less healthy end of this scale and therefore contradictory to the purpose of this review. Therefore a decision has been made to remove all studies with the health outcome frailty to provide a clearer focus on positive health assets.

Comment 1.3: The terms health status, health outcomes and health are used interchangeably, sometimes being a predictor and sometimes an outcome. How would you distinguish between health and health outcomes? This would be helpful to the reader to clarify. E.g Under determinants of health status page 7, line 52, it reads on page 8, line 5-6: … health status is stated as a predictor of successful aging. In the discussion section page 10 line 16 it says that health as an asset may prevent adverse health outcomes. And later, line 39, … examine why individuals with similar health status have different health outcomes.

Response 1.3:
Our intention was to select studies where the outcome measure (dependent variable) was a measure of "health status" as a composite measure across multi-domains of physical, mental and social well-being (Table 2). In view of Comment 1.2, we have amended the search terms (Table 1) and Outcome measure (Table 2) so that the dependent variable should reflect a measure of ageing well (rather than frailty).
We also recognise that in some cases study factors (independent variables) such as self-reported health and life satisfaction may be predictors of health status in some studies and part of the multi-domain health status outcome measure in other studies. In the Determinants of Health Status the studies reported in the review as measuring self-rated health and life satisfaction as associated with successful ageing did not use these variables as part of their successful ageing composite measure. To avoid confusion of terms we have used the term "health status" rather than "health outcome" throughout the document.

Comment 1.4: Page 8 line 39-40. What are core-city men vs not college men? A little explanation such as core-city men meaning…and not college men, meaning … would be helpful.

Response 1.4: The text has been altered to provide a more coherent explanation around these two cohorts. The text now reads:

A longitudinal study, of two cohorts of adolescent boys (college students and core-city youth) in the USA, investigated marriage stability and its ability to predict health status in later life. [32] For the core city cohort, having a stable marriage in mid-life was a predictor for successful ageing in later life. This factor did not influence health status in the college cohort.

Comment1.5: Page 7 line 27. Isn't UK part of Europe? Why the distinction?

Response 1.5: The two studies examining data from the UK used frailty as the health status measure, and have since been removed from this review in order to provide a clear focus on factors associated with positive health assets in older age.

Comment 1.6: Page 10 line 31. The authors refer to the theoretical framework underpinning health assets. Which theoretical framework? A definition of health assets is cited page 4 but not a theoretical framework. Or does this refer to the WHO framework on determinants of healthy aging? But this is not a framework of health assets. This part is not clear. Therefore, saying that "the framework underpinning health assets is similar to that of health deficits may well be plausible, but is not justified based on what is the text with a reference to a theoretical framework that is unclear. It would be helpful with a little more elaboration here.

Response1.6: The authors acknowledge that the use of the term "theoretical framework" is not appropriate in this context and have amended the sentences to:

"The rationale underpinning the study of 'health assets' is similar to that of 'health deficits'; both measure an accumulation of factors across multiple domains that predict health status. While an accumulation of deficits predicts ill health, and accumulation of health assets may mitigate risk and promote good health."

Reviewer: 2

Comment 2.1: The review is timely, as it emphasizes that outcomes are a result of a balance between enabling and risk factors. The approach should be promoted extensively in the care of older people, as distinct from the single disease/investigation/pharmaceutical model.

Response 2.1: The authors thank you for your positive feedback.

Reviewer: 3

Comment 3.1: The abstract is not specific, for example it is not clear from the abstract what geographical region is covered in the review, and which countries show the results reported. Therefore it is not surprising that the conclusions in the abstract are also very general and overreaching in that sense.

Response 3.1:

The abstract for this review has been rewritten, taking into account the geographical location of the studies included in this review (E.g. Twenty-three publications, including 78,422 participants, with data from more than thirteen countries were identified). Only including papers published in English has also been acknowledged as a limitation of the review, affecting generalisation of results.

Comment 3.2: A bit more explanation on the motivation for this review needs to be provided in the introduction section and this should be supported with references.

Has this topic not been reviewed yet?

What is the contribution of this review?

Why is it relevant for researchers and decision-makers?

I would like to bring to the attention of the authors the following papers, which could be helpful to

formulate the motivation:

Mariusz Duplaga, Marcin Grysztar, Marcin Rodzinka and Agnieszka Kopec. Scoping review of health promotion and disease prevention interventions addressed to elderly people. BMC Health Services Research 2016 16(Suppl 5):278.

Andrea Poscia, Umberto Moscato, Daniele Ignazio La Milia, Sonja Milovanovic, Jovana Stojanovic, Alice Borghini, Agnese Collamati, Walter Ricciardi and Nicola Magnavita. Workplace health promotion for older workers: a systematic literature review. BMC Health Services Research 2016 16(Suppl 5):329

Agnieszka Sowa, Beata Tobiasz-Adamczyk, Roman Topór-M□dry, Andrea Poscia and Daniele Ignazio la Milia. Predictors of healthy ageing: public health policy targets. BMC Health Services Research 2016 16(Suppl 5):289.

Please also see the reference lists of these publications for more literature on the topic.

Response 3.2: The suggested literature has been consulted and the motivation for this review has been framed more appropriately. The introduction now includes information on other similar review articles, the contribution of this review and its relevance to research and policy makers.

Comment 3.3: The research aim should be explicitly stated. Please reformulate the last sentence in the introduction, and please state the geographical region and period covered in the review.
Response 3.3: The last sentence of the introduction has been reformulated to clearly state the aim, and include the geographical region and period covered. It now reads:
The aim of this review was to conduct a narrative summary and appraisal of the global evidence, published in the year 2000 onwards, for factors that have potential to act as health assets and promote health in older age. Based on the WHO active ageing policy framework, factors will be within the personal, environmental, economic, and social domains, and focus only on those that are protective of health in older age and are amendable to change through policy or intervention.

Comment 3.4: In the methods section, I could not find the exact timing of the review. When were databases searched?
Response 3.4: The month and year that the databases were searched were included in Table 1: Search Criteria under filters applied in the search. They are now also included the methods section, under the subheading literature search.

Comment 3.5: In my opinion, the first part of the chain of search terms presented in table 1, is incomplete. Terms like old, seniors and elderly, and related terms, should be also included in the search. It could be that the authors have missed an important part of the literature because these terms were not included.
Response 3.5: Under the Search Criteria in Table 1, the filters applied specified populations "aged" or "aged 65 and older"

Comment 3.6: Also, I was wondering why for example the paper of Sowa et al (2016) (see above) has not been included in the review. If because too recent, perhaps the authors could at least acknowledge this and other similar new papers in the discussion.
Response 3.6: The paper by Sowa was not included in the initial search due its publication after the initial searches were conducted. An updated search of the databases has been performed and this paper has now been included in this review.

Comment 3.7: Regarding table 2: As shown in this table, papers focused on behavior and lifestyle factors excluded because they were the subject of another review. These are personal factors and they have an important influence on older persons' health, and if they are excluded, the aim of the paper cannot be fully achieved because a major part of the relevant literature is missing. The authors should either include these papers as well, or should adjust the aim of this review so that it is clear that the behavioral/lifestyle papers are not related to the subject of this review.

Response 3.7: Whilst the authors recognise that behavioural and lifestyle factors are an important influence on older people's health, a systematic review covering this domain has been published and referenced in this review. The aim of this review was to focus on aspects in the personal (beliefs and attitudes), social, economic and environmental domains that have been little studied in the past in relation to ageing well.

Comment 3.8: Regarding data extraction: Please explain the standardized instrument mentioned.
Response 3.8: Further explanation around the data extraction process has been added to the methods section, under the subheading data extraction. This now reads as follows:
Two authors (YHT and NMP) independently extracted the data on study population, study design, measures of health status, all modifiable social, personal, economic and environmental factors, analyses, and results using a standardised spreadsheet.

Comment 3.9: Please also indicate at the end of the methods section that you have demonstrated the quality of your review by providing an appendix with the PRISMA 2009 checklist for your review.
Response 3.9: The authors have indicated the quality of this review by including at the end of the methods section reference to the use of the PRISMA checklist which can be located in supplementary material and that this review is registered with PROSPERO.

Comment 3.10: The same as for the abstract, the geographical diversity of the reviewed studies should be reflected both in the results and discussion section. Because the authors only focus on common points in the papers reviewed, their conclusions are only general and bringing no new messages expect what is already largely known. To make their paper more challenging and relevant to the readers, I suggest the authors to reflect the countries where different results are observed, and to emphasize the differences across the countries. This is especially important because countries with diverse political and economic context are included. The contextual differences in the results should be also discussed to be able to make more concrete conclusions relevant to decision-makers. The current message is to implement interventions while it is well known that an intervention that works well in one country does not necessarily work well even in a neighboring country.
Response 3.10:
Reference has been made to specific geographical locations of the studies in the results and a section relating to their relevance to the key findings has now been included in the discussion section.

VERSION 2 – REVIEW

REVIEWER	Cornelia Ruland University of Oslo, Norway
REVIEW RETURNED	22-Feb-2017

GENERAL COMMENTS	The authors have addressed all issues in the previous review appropriately and I have nothing more to add. Nice paper !

REVIEWER	Milena Pavlova Maastricht University, Netherlands
REVIEW RETURNED	19-Feb-2017

GENERAL COMMENTS	The paper is substantially improved and most of my initial comments were well addressed. However, I the following requires the authors' attention: In the introduction, the authors should state clearly that

| | behavioral/lifestyle papers are excluded from this review.

I understand that the 'aged' is used in the search terms but not its synonyms like old and seniors. The authors need to check if the inclusion of synonyms could lead to the identification of other relevant publications.

The geographical diversity is still not well reflected in the results and discussion section. The country differences are important for the proper presentation of the results and their interpretation. |
|---|---|

VERSION 2 – AUTHOR RESPONSE

Reviewer: 1
Comment: The authors have addressed all issues in the previous review appropriately and I have nothing more to add. Nice paper!
Response 1.1: The authors thank you for your time spent reviewing this paper and positive feedback.

Reviewer: 3
The paper is substantially improved and most of my initial comments were well addressed. However, the following requires the authors' attention:

The authors thank you for your time spent reviewing this paper and feedback.
Comment 3.1: In the introduction, the authors should state clearly that behavioral/lifestyle papers are excluded from this review.
Response 3.1: The introduction now includes the following: Behavioural and lifestyle factors were excluded from this review as they have been the subject of a previous systematic review. [10]
Comment 3.2: I understand that the 'aged' is used in the search terms but not its synonyms like old and seniors. The authors need to check if the inclusion of synonyms could lead to the identification of other relevant publications.
Response 3.2: The authors performed a title and abstract search in PubMed (15/03/2017) using the following: ((senior[Title/Abstract] AND health status[Title/Abstract])) AND (Factors[Text Word] OR determinant[Text Word] OR predictor[Text Word]) including the filters outlined in table 1. This produced 63 results; however none met the selection criteria outlined in table 2. Other searches including seniors and all search terms relating to healthy ageing did not lead to identification of any other relevant articles.
Furthermore we feel using 'old' as a search term is not specific enough to identify the population we were seeking to study (that is being ≥65 years old, as outlined in the selection criteria).
Comment 3.3: The geographical diversity is still not well reflected in the results and discussion section. The country differences are important for the proper presentation of the results and their interpretation.
Response 3.3: The authors have responded to this comment by including in the discussion section the following: This study was unable to identify any specific trends in health assets that were attributable to geographical diversity. However, we recognise that differences in access to resources and health care services can vary significantly by geographical location and consequently impact health.