

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

Title (Provisional)

Barriers and Facilitators to Improved Sedentary Behavior in Coronary Heart Disease Patients: A Scoping Review

Authors

Yang, Yuting; yuan, qiao; Wu, Chen; Yang, Lili

VERSION 1 - REVIEW

Reviewer	1
Name	Bandre, Gulshan
Affiliation	Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Microbiology
Date	14-May-2024
COI	Nil

The article provides valuable insights into the barriers and facilitators affecting sedentary behavior among CHD patients. Identifying key factors such as physical capability, psychological capability, social opportunity, physical opportunity, automatic motivation, and reflective motivation provides a comprehensive framework for understanding this complex issue. Understanding these dynamics is essential for developing targeted interventions that can effectively promote physical activity and reduce sedentary behavior in this population.

Reviewer	2
Name	Lavie, Carl
Affiliation	The University of Queensland School of Medicine
Date	06-Jun-2024
COI	None

The study is solid and publishable but I doubt that it will generate significant interest or be well cited . In the abstract and text , they could abbreviate sedentary behavior (SB) the first time and thereafter and same for physical activity (PA) and cardiac rehabilitation (CR) in the

text. They could include major State of the Arts on these topics on SB and CR (Fletcher GF et al. JACC 2018; 72: 1622-1639; Lavie CJ et al. Circ Res 2019; 124: 799-815; Chindhy S et al. Ercvt 2020; 18: 777-789.)

Reviewer	3
Name	Gray, Emily
Affiliation	University of Otago, School of Physiotherapy
Date	26-Aug-2024
COI	No competing interests

Thank you for the opportunity to review this manuscript. The topic is important and the authors clearly state the need for research and patient-centered and behavior theory-informed interventions in this area.

Abstract:

Would be good if the results section of the abstract reflected/referred to the COM-B categories in some way.

Introduction:

Would be helpful to include a definition of sedentary behaviour at/near the start of the second paragraph.

Methods:

The methods are generally sound, however there are several things to potentially address/clarify to improve the reporting of the methods used.

The authors stated using the framework by Arksey & O'Malley to inform the scoping review method. Suggest reporting the methods under the five headings of this framework to better show how the framework was utilized/applied.

Pg 7, line 153: It states that two authors entered barriers and facilitators into Excel and coded the data. Was this undertaken together or separately? How were disagreements for this stage resolved?

Page 8 – coding framework using the COM-B model. Please state how the code definitions for each of the COM-B headings were developed. Were they informed by standardised definitions in the literature/by the original authors?

Please describe how the data was analyzed/synthesized after coding?

Results:

Under the headings 'barriers' and 'facilitators' it would be helpful to have a brief summary/overview of the findings in these sections before reporting the findings for the specific COM-B headings.

Pg 10, line 216: 'Exercise fear' is listed as a psychological capability related barrier, whereas it may be more appropriate to categorize under automatic motivation? The reason for suggesting is this is that the Theoretical Domains Framework (which can be utilized alongside the COM-B model) has a category 'Emotions' which (when combined with the COM-B model) comes under the heading Automatic Motivation. It may be helpful to refer to the study by Cane et al (2012) that reports how the TDF domains were developed and also how they can be categorized under the COM-B model. The TDF domains give good insight into what can be included within the various COM-B headings and may be helpful to check that the codes used to identify the various barriers and facilitators in this review have been applied in the most accurate way. Reference: Cane et al. Validation of the theoretical domains framework for use in behaviour change and implementation research. 2012; 7, Article number 37.

Also for exercise fear, for clarification it would be helpful to describe/state what they were fearful of.

Facilitators – Physical Capability pg 11 line 237: 'Cardiac rehabilitation' is stated as a physical facilitator. However while cardiac rehabilitation typically involves exercise training, it also includes education/self-management support, which could be considered under psychological capability. People also access support from health professionals and peers at cardiac rehabilitation and so could be considered under social opportunity. Therefore please check the reasoning for including cardiac rehabilitation under 'physical capability'. If it is specifically the exercise training component, or perhaps an increase in cardiorespiratory fitness and/or strength through cardiac rehabilitation that were the facilitators then it may be appropriate for it to come only under this category.

Physical capability – line 237 "Many patients suggested that physical activity was important to them" – this would perhaps be better placed under the heading reflective motivation?

Line 238 "during cardiac rehabilitation, the patient's cardiorespiratory fitness and skills improved" – was this increase in fitness shown to be associated with an improvement in sedentary behavior?

Facilitator – psychological capability, line 242 'improving understanding of sedentary behavior and monitoring were identified as psychological capability related factors' – would be helpful to state what specific aspects of sedentary behavior related knowledge and what types of monitoring were shown to be beneficial.

Facilitator – social opportunity – line 245. 'perceived social support ...' – would be helpful to know whose support was reported to be helpful e.g. family, peers, health professionals.

Table 2. As a small suggestion, to reduce the number of rows and allow more room for the final column, could include country in the first column with author and date. And could use abbreviations e.g for USA and UK.

In the table, the findings of the study by Song 2022, self-efficacy is reported as being associated with sedentary behavior, however self-efficacy was not mentioned in any of the codes/categories. Could these findings about self-efficacy fit within one of the codes/categories?

Discussion:

It would be good to include in the discussion if there were any gaps in the literature (as this is often a purpose of conducting scoping reviews). For example, in the conclusion it is stated that future research should focus on increasing facilitators and reducing barriers, but do the authors think there is enough known about what these facilitators and barriers are yet? Would the current amount of information in the literature be sufficient to apply the Behaviour Change Wheel to develop a behavior and theory-informed intervention?

VERSION 1 - AUTHOR RESPONSE

Reviewer 1	Responses
The article provides valuable insights into the barriers and facilitators affecting sedentary behavior among CHD patients. Identifying key factors such as physical capability, psychological capability, social opportunity, physical opportunity, automatic motivation, and reflective motivation provides a comprehensive framework for understanding this complex issue. Understanding these dynamics is essential for developing targeted interventions that can effectively promote physical activity and reduce sedentary behavior in this population.	Thanks for your kind comments.
Reviewer 2	Responses
The study is solid and publishable but I doubt that it will generate significant interest or be well cited. In the abstract and text , they could abbreviate sedentary behavior (SB) the first time and thereafter and same for physical activity (PA) and cardiac rehabilitation (CR) in the text. They could include major State of the Arts on these topics on SB and CR (Fletcher GF et al. JACC 2018; 72: 1622-1639; Lavie CJ et al. Circ Res 2019; 124: 799-815; Chindhy S et al. Ercvt 2020; 18: 777-789.)	Thank you so much for your concern about the citation rate. SB is a popular topic, and health professionals have increasingly recognized its damage to human health. The facilitators and barriers must be known before developing intervention strategies. Thus, we thought a review was really needed. The findings yielded will serve several purposes, including 1.synthesizing the knowledge about the facilitators and barriers to SB reduction, 2.a reference to develop the intervention strategies to reduce SB, 3.a reference for future research about the facilitators and barriers of SB reduction. We are more than happy to get more advice on generating significant interest or increasing the citation rate.

	We appreciate your suggestion regarding the use of abbreviations. As recommended, we have used "sedentary behavior (SB)", "physical activity (PA)", and "cardiac rehabilitation (CR)" upon their first mention in both the abstract and text and continued to use these abbreviations thereafter.
Reviewer 3	Responses
1.Thank you for the opportunity to review this manuscript. The topic is important and the authors clearly state the need for research and patient-centered and behavior theory-informed interventions in this area.	Thanks for your compliments.
2.Abstract: Would be good if the results section of the abstract reflected/referred to the COM-B categories in some way.	We revised this section as you suggested.
3.Introduction: Would be helpful to include a definition of sedentary behaviour at/near the start of the second paragraph.	Thanks for the suggestion. We have added a definition of sedentary behavior and a reference starting in the second paragraph of the "Introduction". For details, see page 4, lines 72-74.
4.Methods: The methods are generally sound, however there are several things to potentially address/clarify to improve the reporting of the methods used. The authors stated using the framework by Arksey & O'Malley to inform the scoping review method. Suggest reporting the methods under the five headings of this framework to better show how the framework was utilized/applied.	Thanks for your suggestions. In the section "MATERIALS AND METHODS", we showed how to conduct this review based on the five steps of the Arksey & O'Malley framework.
5.Pg 7, line 153: It states that two authors entered barriers and facilitators into Excel and coded the data. Was this undertaken together or separately? How were disagreements for this stage resolved?	Two authors(YTY and CW) independently entered barriers and facilitators from each study into Excel and coded the factors according to the theme. The themes were reviewed by all team members and all disagreements were resolved through discussions between the entire team.
6.Page 8-coding framework using the COM-B model. Please state how the code definitions for each of the COM-B headings were developed. Were they informed by standardised definitions in the literature/by the original authors?	Based on the book by Michie (2014), we have added to the text a standardized definition of COM-B and its understanding in the context of sedentary behavior. We amend on pages 8-9, lines 165-187.
7.Please describe how the data was analyzed/synthesized after coding?	These codes were subsequently categorized into barriers and facilitators within the COM-B framework adopting the method of thematic analysis (Braun V and Clarke V, 2006).
8.Results: Under the headings 'barriers' and 'facilitators' it would be helpful to have a brief summary/overview of the findings in these sections before reporting the findings for the specific COM-B headings.	We revised this section as you suggested. For details, see page 11, lines 233-239; pages 13, lines 269-272.
9.Pg 10, line 216: 'Exercise fear' is listed as a psychological capability related barrier, whereas it	Thanks for pointing this problem out. We have revisited the definitions of automatic

may be more appropriate to categorize under automatic motivation? The reason for suggesting is this is that the Theoretical Domains Framework (which can be utilized alongside the COM-B model) has a category 'Emotions' which (when combined with the COM-B model) comes under the heading Automatic Motivation. It may be helpful to refer to the study by Cane et al (2012) that reports how the TDF domains were developed and also how they can be categorized under the COM-B model. The TDF domains give good insight into what can be included within the various COM-B headings and may be helpful to check that the codes used to identify the various barriers and facilitators in this review have been applied in the most accurate way. Reference: Cane et al. Validation of the theoretical domains framework for use in behaviour change and implementation research. 2012; 7, Article number 37.	motivation in the literature and 'Emotions' in the TDF, and we agree that your proposed 'Exercise fear' should be categorized into automatic motivation. Therefore, we have revised it.
10.Also for exercise fear, for clarification it would be helpful to describe/state what they were fearful of.	Thanks for the suggestion. We amended on pages 17-18, lines 374-379.
11. Facilitators-Physical Capability pg 11 line 237: 'Cardiac rehabilitation' is stated as a physical facilitator. However while cardiac rehabilitation typically involves exercise training, it also includes education/self-management support, which could be considered under psychological capability. People also access support from health professionals and peers at cardiac rehabilitation and so could be considered under social opportunity. Therefore please check the reasoning for including cardiac rehabilitation under 'physical capability'. If it is specifically the exercise training component, or perhaps an increase in cardiorespiratory fitness and/or strength through cardiac rehabilitation that were the facilitators then it may be appropriate for it to come only under this category.	Yes, as you said, cardiac rehabilitation includes many components. However, in the studies that we included, the focus of the intervention was mainly reflected in the implementation of the exercise session, with strength and aerobic program, for the patients. Therefore, we modified the facilitator "cardiac rehabilitation" to "exercise training".
12.Physical capability-line 237 "Many patients suggested that physical activity was important to them"-this would perhaps be better placed under the heading reflective motivation?	Thank you for your advice. "Many patients suggested that physical activity was important to them" reflects the patients' emphasis on and value judgment of physical activity, which indeed belongs to reflective motivation. After we checked it over again, we thought that such a statement was not appropriate under the category of "Physical Capability", so we have removed this sentence.
13.Line 238 "during cardiac rehabilitation, the patient's cardiorespiratory fitness and skills improved"-was this increase in fitness shown to be associated with an improvement in sedentary behavior?	Thank you for your comment. The sentence "during cardiac rehabilitation, the patient's cardiorespiratory fitness and skills improved" was originally intended to convey the positive effects of cardiac rehabilitation. However, upon further consideration, we realized that this information might not be best placed under the "Physical Capability" section. Additionally, as you pointed out, the potential relationship between

	improvements in fitness and changes in sedentary behavior was not clearly established. Therefore, we have decided to remove this sentence.
14.Facilitator-psychological capability, line 242 'improving understanding of sedentary behavior and monitoring were identified as psychological capability related factors'-would be helpful to state what specific aspects of sedentary behavior related knowledge and what types of monitoring were shown to be beneficial.	Thank you for your suggestions. We amended on pages 15-16, lines 326-337.
15.Facilitator-social opportunity-line 245. 'perceived social support ...'-would be helpful to know whose support was reported to be helpful e.g. family, peers, health professionals.	Thank you for your suggestion. In the included studies, the specific sources of social support were not reported. Therefore, In the discussion section, we provided our discussion and pointed out for future research to be conducted. Please see lines 347-355 on page 16-17.
16.Table 2. As a small suggestion, to reduce the number of rows and allow more room for the final column, could include country in the first column with author and date. And could use abbreviations e.g for USA and UK.	Thanks to your suggestion, we have merged the first and second columns in Table 2.
17.In the table, the findings of the study by Song 2022, self-efficacy is reported as being associated with sedentary behavior, however self-efficacy was not mentioned in any of the codes/categories. Could these findings about self-efficacy fit within one of the codes/categories?	In the qualitative study conducted by Song, she categorized the influences on sedentary behavior change in community-dwelling elderly patients with coronary heart disease into three themes and nine sub-themes, in which the theme of low self-efficacy contained three sub-themes of insufficient perceptions of sedentary behavior, limitations of poor health, and impaired beliefs about activity. Therefore, we mapped each of these three sub-themes into the COM-B.
18.Discussion: It would be good to include in the discussion if there were any gaps in the literature (as this is often a purpose of conducting scoping reviews). For example, in the conclusion it is stated that future research should focus on increasing facilitators and reducing barriers, but do the authors think there is enough known about what these facilitators and barriers are yet? Would the current amount of information in the literature be sufficient to apply the Behaviour Change Wheel to develop a behavior and theory-informed intervention?	Thank you for your suggestions. The existing literature is not yet sufficient to directly apply the Behavior Change Wheel to the development of interventions, and more research is needed to clarify barriers and facilitators and to better define them to drive intervention design. We revised the sections of "Discussion" and "Conclusion".