PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Characteristics and outcomes of physical activity interventions for individuals with mild traumatic brain injury: a scoping review protocol
AUTHORS	Alarie, Christophe; Gagnon, Isabelle; Quilico, Enrico; Swaine, Bonnie

VERSION 1 - REVIEW

REVIEWER	Eirik Vikane Department of Physical Medicine and Rehabilitation Haukeland University Hospital
REVIEW RETURNED	17-Nov-2018

GENERAL COMMENTS	It's a well-written protocol following a standardised method with an abstract containing 299 words and the text approximately 2500 words. The research question is interesting and important. Page 5, line 20, consider to have some references for mild traumatic brain injury, not only concussion (International Collaboration on Mild Traumatic Brain Injury Prognosis (ICoMP)). Page 7, line 18, is the clinical team a multidisciplinary team, if so consider use multidisciplinary team?

REVIEWER	Jessica Kersey University of Pittsburgh Pittsburgh, PA, USA
REVIEW RETURNED	20-Nov-2018

GENERAL COMMENTS	This scoping review protocol describes an important contribution that will aid in interpretation and implementation of clinical practice guidelines for physical activity after concussion. It aims to clarify the parameters of physical activity interventions so clinicians have more specific guidance for use of evidence-based practice. This is important work that will address a significant implementation problem. The manuscript could be strengthened by clarification of data extraction and interpretation methods, and further consideration of the definition of physical activity and the breadth of interventions that will be considered. Strengths:

	1) The lack of clarity in current guidelines is a critical problem and is clearly justified in the introduction. The importance and relevance of this work is evident. 2) The incorporation of clinical consultants into the research team will ensure that the results are useful and understandable to the key stakeholders. 3) The protocol details a rigorous process for ensuring consistency in study selection and data extraction. 4) The broad search strategy is likely to provide a thorough sampling of relevant interventions. Limitations: 1) The broad definition of physical activity will lead to an equally broad range of interventions. While this may serve to identify all relevant literature, it may also make interpretation of findings more challenging. “PA is defined as any bodily movement produced by skeletal muscles that requires energy expenditure.” This definition could arguably apply to any movement throughout the day, including eating or using a remote to change a TV channel. Somewhere a line needs to be drawn to determine what is considered a physical activity intervention. More specificity may help the authors narrow the focus to true physical activity interventions which are implied by the clinical practice guidelines. The authors may consider reviewing the guidelines cited in the introduction and reflect the definition of physical activity found within those guidelines. 2) The primary objective is clearly important and relevant. However, the means for data extraction are unclear. The section identifying methods for charting of data specify how rigor of data extraction will be ensured, but not what data will be extracted. How will interventions be characterized or described? The authors later reference quantitative and qualitative data, but these are not specified as they relate to characterizing the interventions. 3) The authors list secondary objectives of documenting outcomes, and documenting measurement tools found in the literature. Again, the methods of the secondary objectives are not clear. How will these data be interpreted and communicated? It is also not clear how these data contribute to the overall problem of non-specificity in clinical practice guidelines. A more explicit explanation will add clarity.

REVIEWER	Dr Nicola Saywell Auckland University of Technology, New Zealand
REVIEW RETURNED	23-Nov-2018

GENERAL COMMENTS	I really like the concept of this paper and think it represents the start of some important work in the area of mTBI and the small but significant minority of people who have persistent distressing symptoms. I have included a few questions and concerns on your manuscript. Many thanks for undertaking an important scoping review, i look forward to the results. The reviewer provided a marked copy with additional comments. Please contact the publisher for full details.

VERSION 1 – AUTHOR RESPONSE

2. Considering to have some references for mild traumatic brain injury and not only concussion (page 5, line 20).

Response: We agree and added additional references on page 5.

3. Removing a sentence in the objectives paragraph.

Response: We accepted the suggestion to remove the sentence on page 5.

4. Clarifying if we are reporting intervention's effectiveness to support clinical decision-making:

''I accept that your primary objective is to identify characteristics of interventions designed to improve PA but you have stated in an earlier section that you will not be able to comment on effectiveness of each intervention. The intent to improve PA is very different from demonstrating effectiveness of an intervention. How will you decide on the PA parameters to recommend for clinical practice from the wide range of interventions you are likely to find? I am sure you have thought about this, it just needs to be more clearly articulated in the manuscript. If you are simply gathering data about PA intervention parameters and outcome measures then I think the suggestion that this may assist clinical experts is a bit of a stretch, if no adjudication of relative effectiveness is undertaken.''

Response: We agree we did not specify in the proposed protocol that we were planning to report the effectiveness of interventions. However, we now feel it is important and have made the following modification to the text on page 5 (and in the abstract) about the primary objective: ''The primary objective of this scoping review is to identify characteristics of PA-based interventions available in the scientific and grey literature designed to improve health-related outcomes in adults with persistent symptoms of a mTBI and report on the intervention's effectiveness, if available.''

5. Clarifying that our clinical team is multidisciplinary.

''Page 7, line 18, is the clinical team a multidisciplinary team, if so consider use multidisciplinary team?''

Response: Yes, it is and we modified the text on page 6.

6. Clarifying our definition of physical activity to help select pertinent intervention.

''The broad definition of physical activity will lead to an equally broad range of interventions. While this may serve to identify all relevant literature, it may also make interpretation of findings more challenging. "PA is defined as any bodily movement produced by skeletal muscles that requires energy expenditure." This definition could arguably apply to any movement throughout the day, including eating or using a remote to change a TV channel. Somewhere a line needs to be drawn to determine what is considered a physical activity intervention. More specificity may help the authors narrow the focus to true physical activity interventions which are implied by the clinical practice guidelines. The authors may consider reviewing the guidelines cited in the introduction and reflect the definition of physical activity found within those guidelines.''

Response: We agree that a line must be drawn to help determine which intervention will be included in the scoping review. We now provide a more precise definition based on 2 definitions. This is the text we propose adding to pages 6 and 7:

In the context of this review, we define PA based on a combination of two definitions. The World Health Organization (2018) defines PA ''as any bodily movement produced by skeletal muscles that requires energy expenditure'' and the 2007 Oxford dictionary's definition adds: ''Any form of body movement that has a significant metabolic demand. Thus, physical activities include training for and

participation in athletic competitions, the performance of strenuous occupations, doing household chores, and non-sporting leisure activities that involve physical effort.''(17,18). This definition would thus refer to different types of activities involving a physical effort, ranging from recreation activities such as walking slowly to high-intensity aerobic training. Knitting in a chair, would not be considered a PA in the scoping review. The research question is subject to change during the process as new questions and reflections might emerge during each iterative step of the scoping review.

7. Clarifying the means for data extraction.

''The primary objective is clearly important and relevant. However, the means for data extraction are unclear. The section identifying methods for charting of data specify how rigor of data extraction will be ensured, but not what data will be extracted.'' How will interventions be characterized or described? The authors later reference quantitative and qualitative data, but these are not specified as they relate to characterizing the interventions.

Response: We agree that the means for data extraction could be improved. Therefore, we provide in the text on page 10 more concrete examples of quantitative and qualitative data that will be extracted from selected articles based on CERT and TIDIER's items.

Descriptive quantitative data about the number, age and gender of participants with an mTBI included in each article will be extracted. More qualitative information related to each item of the extraction form will be extracted from each selected article. For example, all information related to the type of exercise equipment (CERT Item 1), a home-program (CERT Item 8), description of the exercise intervention (CERT Item 13), the setting in which the exercises are performed (CERT Item 12) or about the extent to which the intervention was delivered as planned (CERT Item 16) will be extracted. If no information was provided about a specific item in an article, it will also be noted and compiled. CERT was designed to be used in conjunction with the TIDieR Checklist. Due to the overlap of items from both checklist information, only 2 items from the TIDIER will be included in the data extraction form (Item 1 : Name of the intervention; Item 2 : Rationale, theory or goals of the intervention).

8. Clarifying why we aim to document outcomes and measurement tools found in the literature and how they will be interpreted and communicated.

''(…) the methods of the secondary objectives are not clear :

How will these data be interpreted and communicated?

It is also not clear how these data contribute to the overall problem of non-specificity in clinical practice guidelines. A more explicit explanation will add clarity.''

Response: We think that extracting, interpreting and reporting information about outcomes and measurement tools could help health-care providers and clinicians select more appropriate tools and outcomes when designing a physical activity program. This need was expressed by our clinical partner during preliminary consultations. Based on your comment, we modified the text on pages 5 and 6 as follows:

The secondary objectives are to document the health-related outcomes and the measurement tools related to PA interventions found in the literature. ADDED TEXT: This information could help researchers, health care-providers and clinicians select appropriate outcomes and outcome measurement tools for future research or PA program design and implementation.

9. Clarifying how we will present qualitative data graphically:

''I am not clear how you will present qualitative results graphically. You need to make this clearer as it is not a well-recognized way to present qualitative data.''

Response: We modified the text to clarify that the qualitative data may be presented narratively and/or in tables (page 11).

Quantitative results may be presented graphically (e.g. number of PA interventions per study per year, % of types of interventions) and qualitative results may be presented narratively and/or in tables. The different PA characteristics and key PA principles will be summarized and reported in multiple matrices. Outcome constructs and measurement tools will be reported and summarized in tables. Measurements tools used in the different studies/articles will also aggregated into categories and summarized in tables.

10. Considering to involve people who have had a mTBI, or their family or friends.

''Have you considered consulting with people who have had a mTBI, or their family or friends? That may add an interesting and important perspective to the review.''

Response: Although we believe that including multiple perspectives could improve the interpretation of the results of most scoping reviews, we think that the involvement of clinical experts will be sufficient to provide critical insight useful for other clinicians. The research question we are trying to answer was formulated by and for clinical experts who provide rehabilitation services for people who have had a mTBI, thus having an important perspective on the clinical needs of this population. Moreover, individuals who have had a mTBI may only have had one experience with physical activity following their mTBI and thus have limited experience in interpreting the results that aims to be utilized by clinical experts. However, there is no doubt that health service providers and clinical experts must consider the needs and preferences of individuals who have had a mTBI when designing a physical activity intervention. Consideration of the patient preferences is included in other components of our research program.

VERSION 2 – REVIEW

REVIEWER	Jessica Kersey University of Pittsburgh Pittsburgh, PA, USA
REVIEW RETURNED	23-Jan-2019

GENERAL COMMENTS	This is a much improved manuscript with stronger reporting of methods. The definition of physical activity and scope of included interventions is now clearer. However, the authors may still want to think about leisure interventions. Some studies allow participants to identify their own valued leisure activities. In this case, there could be significant variability in how the intervention looks among participants. Some may fall under the scope of physical activity while others do not. The purpose and methods for the secondary research question are now clearer. Additionally, the methods for data extraction and analysis are clearer. However, I'm curious as to why the CERT items were prioritized over the TIDIER items. The CERT is limited to exercise interventions, yet the authors are planning to include occupation-based interventions as well. The TIDIER items may be more

	relevant and useful across interventions. The authors may consider prioritizing the TIDIER items and adding CERT items as needed.

REVIEWER	Nicola Saywell Auckland University of Technology, New Zealand
REVIEW RETURNED	21-Jan-2019

GENERAL COMMENTS	I really like this paper and agree that the changes you have made have clarified the minor concerns I had. Thank you.

VERSION 2 – AUTHOR RESPONSE

2. Response to reviewer 2:

''This is a much improved manuscript with stronger reporting of methods. The definition of physical activity and scope of included interventions is now clearer. However, the authors may still want to think about leisure interventions. Some studies allow participants to identify their own valued leisure activities. In this case, there could be significant variability in how the intervention looks among participants. Some may fall under the scope of physical activity while others do not.''

Response: We believe the criteria and the search strategy are flexible enough to include this kind of intervention. In fact, we think the protocol does not exclude leisure-based interventions, but requires that the leisure interventions be physical activity-oriented. If the valued activities are not related to physical activity, the article will not be included. The first sentence of the paragraph describing Step-2 was changed to better reflect this (please see p.7). Another scoping review on the topic of leisure-oriented interventions, using a similar approach, could be envisaged and would definitely be important.

''The purpose and methods for the secondary research question are now clearer.

Additionally, the methods for data extraction and analysis are clearer. However, I'm curious as to why the CERT items were prioritized over the TIDIER items. The CERT is limited to exercise interventions, yet the authors are planning to include occupation-based interventions as well. The TIDIER items may be more relevant and useful across interventions. The authors may consider prioritizing the TIDIER items and adding CERT items as needed.''

Response: We decided to select the CERT checklist as a basis for our extraction sheet because we felt it was linked to the specific aim of our study (physical activity interventions). We feel the content of CERT overlaps with that of the TIDIER, and added only 2 items from the TIDIER to our extraction sheet.

Exercise refers to physical activity that is planned, repeated and structured with the aim to improve physical fitness or health-related outcomes. We think that this checklist is also applicable for less structured physical activity or occupation-based physical activity-oriented interventions not considered as exercise.

Moreover, our choice to use the CERT was based on our clinical partner's needs; they need more details about physical activity and exercise parameters that are typically lacking from clinical practice guidelines. Items in the CERT checklist enables documentation of this information. Although at this stage we prioritize the CERT, we will consult clinicians during Step 4 of the scoping review to validate the extraction grid and may adjust the extraction sheet based on their needs during the iterative process.