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# BMJ Open

## Determinants of seat belt use behavior: a protocol for systematic review

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# Determinants of seat belt use behavior: a protocol for a systematic review

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**Abstract:**

**Introduction** The use of a seat belt prevents severe accident damage and keeps passengers safe from injuries, for example, from being thrown out of the vehicle. The aim of this systematic review is to identify the determinants of seat belt usage behavior.

**Methods and Analysis:** We will include qualitative, quantitative and mixed-methods studies that report data on people older than 12 years of age as passengers, and commercial or personal vehicles will be included. MEDLINE/PubMed, Scopus, Web of Science, Embase and the Cochrane Database of Systematic Reviews will be investigated in the study. Articles will be evaluated according to their title and abstract. Papers that have inclusion criteria will be ordered for a complete review. In the third step for eligibility, the full text of the remaining articles will be studied independently by two authors for eligibility criteria. The quality of the selected studies will be assessed with appropriate tools. Based on data extraction, the type of determinant of seat belt use will be classified.

**Ethics and dissemination** Ethics approval is not required because this is a protocol for a systematic review and no primary data will be collected. We will try to maintain the rights of the authors of this article and the included articles in this systematic review. The findings of this review will be published in a related peer-reviewed journal.

**PROSPRO registration number:** This systematic review protocol is registered in the PROSPERO International Prospective Register of Systematic Reviews, registration number CRD420170675.

**Key words:** Determinant, seat belt, protocol

**Strengths and limitation of this study**

- The protocol following the PRISMA-P guidelines was written.
- This study will contribute to strengthening the evidence based on effective interventions for improving seat belt use.
- Study screening, data extraction, and risk of bias assessment of the current study will be independently conducted by two researchers.
- Heterogeneity between studies might be an obstacle for performing meta-analyses.

## Introduction

The World Health Organization has called for paying more attention to the prevention of traffic injuries for its member countries. In addition, in 2008, a meeting of the United Nations General Assembly emphasized prevention of road accidents and an increase in the safety of roads.<sup>1</sup> Most of the road traffic deaths, more than 90%, occur in low- and middle-income countries. The African region is the region in which the most of the road traffic deaths occur, and people with lower incomes, although from high-income countries, are more likely to be involved in road traffic crashes.<sup>2</sup> Road traffic injuries have considerable influences on the economy of a society, individuals and their families. Significant costs may be associated with the treatment of the injured and the disabled, and the lives of family members of those who die are affected by accidents. Three percent of the gross domestic product of countries in the world is dedicated to road traffic crashes.<sup>3</sup>

The factors that affect road traffic accidents can be classified into 3 classes: human, environmental and vehicle-related factors.<sup>4</sup> Human factors such as the non-use of a seat belt and helmet, ignoring regulations, speeding, drug use, a lack of knowledge and skills and driving while intoxicated are among the most important behavioral factors that may expose a person to risks.<sup>5-7</sup>

The World Bank's Global Report considers actions such as the use of a seat belt to be the safest way to reduce the burden of road accidents in industrialized countries, saving many lives.<sup>5</sup> Studies have proven that the use of a seat belt prevents severe accident damage and keeps passengers safe from injuries, for example, from being thrown out of the vehicle.<sup>8-10</sup>

Based on a meta-analysis that was conducted recently, passengers who do not use a seat belt are more likely to become injured in car accidents than those who use it, and using a seat belt may

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2  
3 reduce front-seat fatalities by 60%.<sup>11</sup> Seat location, environmental conditions, the vehicle type,  
4 demographic factors, psychological factors, law enforcement and public education programs are  
5 the factors that affect seat belt behavior.<sup>12-13</sup>  
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10 For the calculation of a nationally representative estimation of consistent seat belt usage in each  
11 region, a behavioral risk factor surveillance system was used in a study in 2012; the study  
12 indicated that the use of seat belts differs based on the region where people live.<sup>14</sup> Another study  
13 demonstrated that elderly drivers and people with a higher education often use their seat belts  
14 more than others.<sup>15</sup>  
15  
16

17 The reasons for not using a seat belt are strongly related to the situation, not believing in its  
18 effectiveness and discomfort to use it. In both low- and high-risk traveling conditions, safety is  
19 the most important predictor of reported seat belt usage. To create habits of using a seat belt and  
20 emphasizing its safety, creating seat belt campaigns may be effective.<sup>16</sup>  
21  
22

23 Since no previous systematic review has identified the determinants of seat belt behavior, before  
24 any interventions for increasing the use of seat belts, the determinants of why people use/do not  
25 use seat belts should be identified. The aim of this systematic review is to identify the  
26 determinants of seat belt usage behavior. This study will be performed with the following two  
27 questions in mind:  
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42 What determinants are being indicated in the literature for seat belt usage?

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45 What are the individual and non-individual reasons for seat belt usage?  
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## 50 **Objectives**

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52 The objectives of this study are as follows:  
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- 54 1. To identify the determinants of seat belt usage; and  
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3 2. To find potential sources of heterogeneity in primary studies.  
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## 8 **Methods & Analysis**

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10 The study protocol was registered in PROSPERO. After completing each stage, the status of the  
11 project was tracked and dated in PROSPERO.  
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### 15 **Study Eligibility criteria**

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17 Studies will be selected according to the criteria outlined below:  
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#### 20 -Population

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22 In this systematic review, only studies reporting data about seat belts in commercial or personal  
23 vehicles (both driver or passenger/front or rear) and people older than 12 years of age as  
24 passengers will be included because the use of seat belts is recommended for this age range, and  
25 for those lower than this age range, child restraints should be used.<sup>17</sup> Studies on special  
26 populations such as pregnant women and people with health problems (e.g., abdominal surgery)  
27 who have limitations on seat belt usage will also be included but will be applied separately in the  
28 results.  
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#### 40 -Exposure

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42 We will consider studies that influence consumption, such as those addressing the determinants  
43 of seat belt usage.  
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#### 47 - Comparators

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49 The use of seat belts compared with the non-use of seat belts.  
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#### 52 -study design

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3 We will include qualitative, quantitative and mixed-methods studies in which the determinants of  
4 seat belt behavior are defined. Animal studies will not be considered.  
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### 7 -Determinants

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10 Genetic factors, income, poverty, environmental factors, political situations, unemployment and  
11 homelessness, education, social and economic circumstances including social exclusion and  
12 deprivation, workplace stress, established customs, and activities are the determinants that  
13 significantly influence the health status of people and society.<sup>18</sup>  
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19 The meaning of determinants is the personal and impersonal factors that affect the use of seat  
20 belts. Personal determinants, such as age, sex, education, knowledge, and attitude, and  
21 impersonal determinants, such as the type of seat belt law, day and night, the location of  
22 passengers, and geographic region, will be included in this study. These determinants are not  
23 exhaustive; additional determinants of seat belt usage will be included and classified in this  
24 systematic review.  
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### 33 -Outcome

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36 The results will be used to distinguish all possible elements that determine the reasons, times,  
37 conditions, and ways in which individuals wear or do not wear seat belts, in addition to the  
38 frequency of wearing a seat belt, either using self-report or measured objectively, and seat belt  
39 usage depending on the type of vehicle, seat location and type of seat belt.  
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### 46 -Language

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48 A comprehensive search of several databases will be conducted without language restrictions.  
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### 51 -Setting

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54 There will be no restrictions by type of setting.  
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## Search Methods for Identification of Studies

### Electronic searches

In this systematic review, we will develop a comprehensive search strategy for finding articles in the following databases:

- MEDLINE/PubMed,
- Scopus,
- Web of Science,
- Embase
- Cochrane Database of Systematic Reviews.

### PubMed search strategy

The PubMed database search syntax are presented in supplementary appendix 1. This syntax is a combination of MeSH terms, key words and tags and will be adopted for other databases. We will use PubMed's email alert service for identification of newly published. If we identify additional relevant keywords during any of the electronic or other searches, we will modify the electronic search strategies to incorporate these terms and document the changes.

### Searching other resources

We will search in the Google Scholar search engine and check the reference lists of relevant reviews and previous similar systematic reviews. Gray literature, including published abstracts, conference proceedings, reports, theses, and dissertations, will be searched using sources such as ProQuest Dissertations and Theses, NHS Evidence, OpenGrey, WHO, CDC and Transportation

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3 research centers. Key journals are the other resources that will be searched. Finally, we will  
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5 supplement our search by hand searching in Google.  
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8 In studies that seems to match our objectives, we will contact the corresponding author(s) for  
9  
10 more information. At beginning we will send an email to the corresponding author(s) and  
11  
12 request data. If we do not receive a response after three emails, we will exclude the research.  
13

14  
15 Three groups of search terms related to the population (occupant), the outcome (seat belt use)  
16  
17 and terms related to determinants (determinants OR factor OR predictor) will be used. We will  
18  
19 include articles available between 2000 (January) and 2017(January-December), and we will use  
20  
21 the NNR (number needed to read) index for assessing the sufficiency of the number of articles.  
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23 All identified articles will be imported into EndNote software. This protocol follows the  
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25 PRISMA-P (preferred reporting items for systematic review and meta-analysis) checklist and  
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27 will report the review article according to the PRISMA statement.<sup>19</sup>  
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## 33 **Data collection and analysis**

### 34 **Study selection**

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36 In the first step, two reviewers (JH, MG) will test the screening questions based on the inclusion  
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38 and exclusion criteria; then, the results of the search method will be screened for possible  
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40 duplications, which will then be removed. In the next step, the same two reviewer independently  
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42 will be evaluated the articles according to their title and abstract. Conflicts will be resolved by  
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44 discussion to reach consensus. When consensus is not reached, a third reviewer (BA) will act as  
45  
46 an arbitrator. The inclusion criteria include articles published between 2000 and 2017, and  
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48 people travelling in passenger or commercial vehicles (both drivers and passengers) will be  
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50 included. We will exclude studies that investigated booster seats or child restraints.  
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3 Papers that have inclusion criteria will be ordered for a full review. In the third step, for  
4 eligibility, the full text of the remaining articles will be studied independently by two authors  
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6 (JH, MG) for eligibility criteria. (Figure 1)  
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### 11 **Data extraction**

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14 The specific data of the studies will be performed independently by two reviewers (JH, BA),  
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16 using a quantitative data extraction form.  
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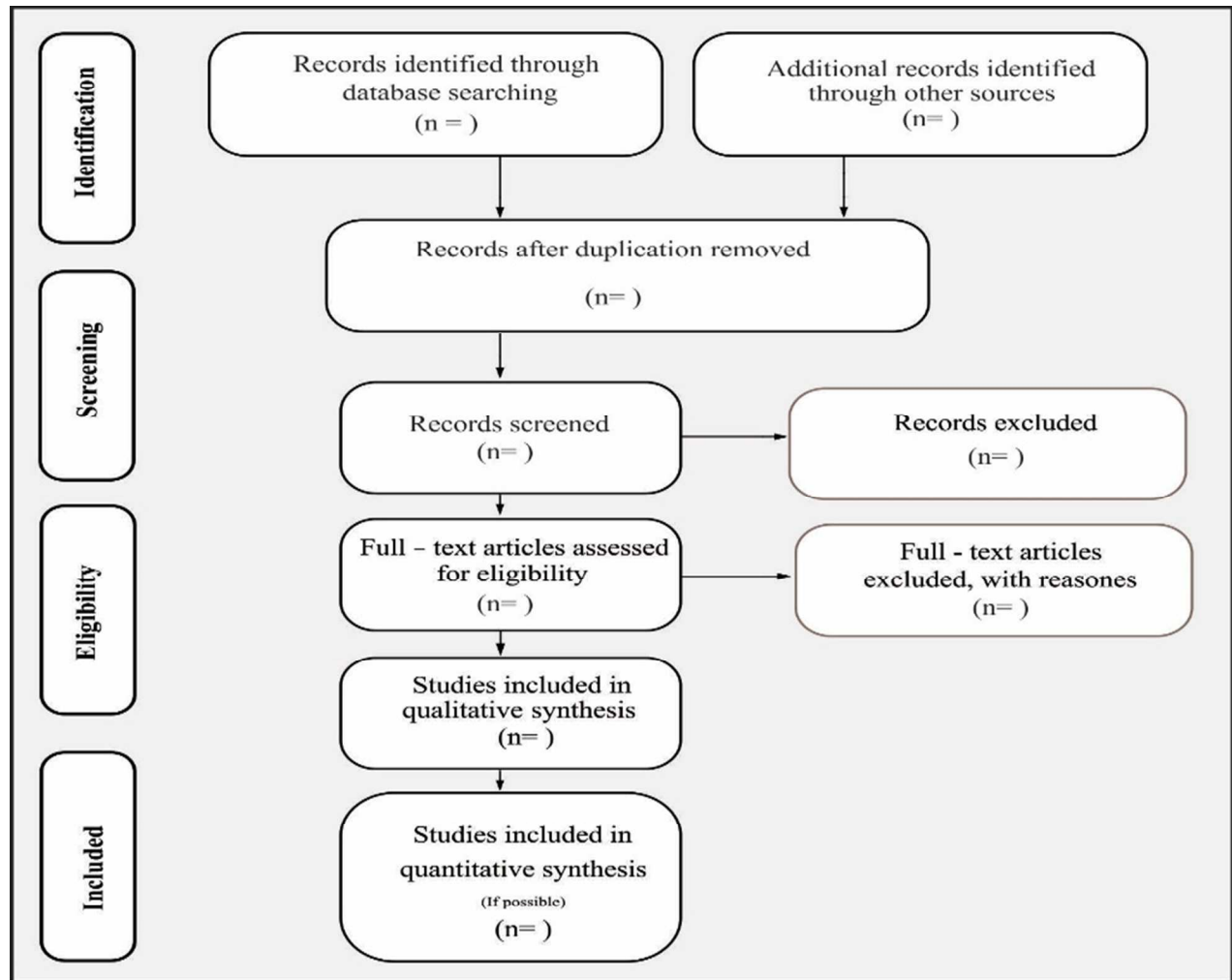
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19 Any disagreement will be resolved by consensus between the two reviewers (JH, MG) and, when  
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21 consensus is not reached, a third reviewer (BA) will act as an arbitrator and make a decision on  
22  
23 the data entered.  
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25  
26 The specific data of the studies such as the study population, study design, study country,  
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28 outcomes and other necessary data will be extracted by using a standard form. Based on data  
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30 extraction, the type of determinant of seat belt usage will be classified. (Figure 1)  
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### 35 **Assessment of risk of bias of included studies**

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37 Assessment of the risk of bias and methodological quality within the included studies will be  
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39 implemented by two reviewers (JH, SR) independently considering the items according to the Effective  
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41 Public Health Practice Project (EPHPP) Quality Assessment tool for the assessment of  
42  
43 quantitative studies,<sup>20</sup> the Newcastle-Ottawa Scale (NOS) for assessing the quality of  
44  
45 nonrandomized studies in this review<sup>21</sup> and the Joanna Briggs checklist for qualitative research  
46  
47 for qualitative studies.<sup>22</sup> According to the scores, the studies will be divided into 'high quality',  
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49 'fair quality' and 'poor quality' categories.  
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25 **Figure 1:** Flowchart presenting an overview of the search results.  
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### Assessment of publication bias

To explore the possibility of small study bias, we will assess funnel plots (ie, plots of study results against precision) and Begg's and Egger's tests, when there are 10 or more included studies.<sup>23</sup>

## Data Synthesis

### Descriptive analysis

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3 We will use the narrative analysis method<sup>24</sup>, and the results of the study will be descriptively  
4 reported in a summery table that presents information on the study population, study design,  
5 sitting, quality of the study, behavioral measures and the results of seat belt usage.  
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10 We expect that in this systematic review, articles will be included from different study designs  
11 that are not suitable for lumping together in analysis; thus, it may not be possible to analyze the  
12 data using meta-analysis. It should be noted that in case of the existence of conditions, we will  
13 use meta-analysis, and subgroup analyses will be used to explore any possible sources of  
14 heterogeneity based on driver versus passenger, passenger location (front seat versus back seat),  
15 commercial versus passenger (personal) vehicles, and males versus females.  
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### 26 **Summary of findings**

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28 We will systematically and comprehensively describe the results of each study, highlighting the  
29 important characteristics of the study where relevant, such as important similarities or  
30 differences (for example, the study design, population, intervention or other elements); then,  
31 patterns in the data will be explored. The reasons for both the similarities and differences in the  
32 findings will also be systematically explored, and possible explanations for the pattern of results  
33 will be considered in a logical manner for each of the included studies.  
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42 We will use the guidelines of Cochrane narrative synthesis as the framework for findings. These  
43 guidelines describe the following four major steps for narrative synthesis:  
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45

- 46 1. Developing a theory of how the intervention (exposer) works, why and for whom
- 47 2. Developing a preliminary synthesis of the findings of the included studies
- 48 3. Exploring relationships in the data within and between studies
- 49 4. Assessing the robustness of the synthesis.<sup>25</sup>
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## Ethics and Dissemination

Ethics approval is not required because this is a protocol for a systematic review and no primary data will be collected. The researchers will conduct a full and comprehensive search in electronic databases; additionally, study selection and data extraction will be performed. In the strategy noted in the method and analysis section performed by two independent reviewers, we will try to maintain the rights of the authors of this article and the included articles in this systematic review. The findings of this review will be published in a related peer-reviewed journal.

## Discussion

The use of seat belts is the best way to reduce accident related deaths and injuries<sup>26</sup>. Although a seat belt is not able to prevent accidents, it has an influential role in reducing damage.<sup>8</sup>

Seat belt use by front-seat occupants reduced the risk of death in a crash by about 61%, which is greater than the effectiveness of air bags<sup>27</sup>.

To date, few systematic reviews, Meta - analysis and protocol have been published about seat belts<sup>11, 28-29</sup>. However, none of them comprehensively investigated determinants of seat belt usage behavior. Only one Meta –analysis found by researchers that reviewed factors influence seat belt usage rates in the United States<sup>30</sup>. Hence, a systematic review is needed to comprehensively identify the determinants of of seat belt usage.

This study will clarify unknown aspects of the reasons why some people use or do not use seat belts. Investigating the determinants of seat belt behavior can help identify which determinants contribute most to seat belt use in car occupants and provide a comprehensive framework of factors that affect this behavior. Additionally, this study will provide important information for researchers, stakeholders in public health, and policy makers and for designing intervention

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3 programs for increasing seat belt use. Also implications for future research can be drawn from  
4  
5 the results of this study.  
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### 10 **Contributorship statement**

11  
12 MGh is the guarantor. JH and BA drafted the manuscript. SR and JH contributed to the  
13  
14 development of the selection criteria. MGh and OS reviewed and commented on this protocol.  
15  
16 MGh and SR developed the risk of bias assessment strategy and data extraction criteria. JH and  
17  
18 BA developed the search strategy. OS provided feedback and approved the final manuscript.  
19  
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### 22 **Competing interests**

23  
24 All authors have no conflicts of interest to be declared.  
25  
26

### 27 **Funding**

28  
29 No funding to declare  
30  
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### 33 **Data sharing statement**

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35 To gain access to the data, researchers must submit a detailed description of their projects, as  
36  
37 well as personal identification and institutional affiliation, and a complete list of data requested.  
38  
39 All applicants will be required to sign an agreement of confidentiality that states that data will  
40  
41 not be transferred without permission and that no attempts will be made to identify participants.  
42  
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48  
49 developing this protocol. We also particularly thank the reviewers for their valuable comments,  
50  
51 which helped considerably to improve the quality of the manuscript.  
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3 **Contributors** JH, M GH, BA, SR, O-SH, YM and HS conceived and designed the study. JH, M  
4 GH, BA and SR developed the search strategies. JH, BA and M GH were responsible for the  
5 initial drafting, edited the manuscript and approved the manuscript for submission. O-SH, HS  
6 and YM revised the manuscript. JH and M GH will also screen potential studies, extract data and  
7 assess their quality. Any discrepancies will be resolved by consensus between JH and M GH.  
8 When consensus is not reached, BA will act as arbitrator.  
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20 **Amendments of previously completed protocol (bmjopen-2017-018913)**

- 21  
22 1\_ Edit English by American Journal Experts.  
23  
24 2\_ Correction inclusion and exclusion criteria applied;  
25  
26 3\_ Add a flow diagram depicting the flow of information through the different phases of  
27 systematic review  
28  
29 4\_ Expression the risk of reporting bias assessment  
30  
31 5\_ PRISMA-P checklist Completed and included in submission  
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**APPENDIX 1: Search strategy for MEDLINE via PubMed**

- 1. “Determinant Factor”**
- 2. Correlate**
- 3. Contributor**
- 4. Predictor**
- 5. Factor**
- 6. Determinant\***
- 7. 1 OR 2 OR 3 OR 4 OR 5 OR 6**
- 8. Seatbelt**
- 9. “Safety belt”**
- 10. “Belt seat”**
- 11. “Seat belt”**
- 12. 8 OR 9 OR 10 OR 11**
- 13-(2000/01/01:2017/12/31[dp])**
- 14. 7 AND 12 AND 13**

**PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol\***

Section and topic	Item No	Checklist item	Reported On page
<b>ADMINISTRATIVE INFORMATION</b>			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	P:1 line:1,2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	NA*
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	P:2 line 44
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	P:1 line 6-20
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	P:14 line 291-296
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	P:14 line:298-304
Support:			
Sources	5a	Indicate sources of financial or other support for the review	NA
Sponsor	5b	Provide name for the review funder and/or sponsor	NA
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	NA
<b>INTRODUCTION</b>			
Rationale	6	Describe the rationale for the review in the context of what is already known	P:3,4 line:50-88
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	P:4,5,6 line 90_134
<b>METHODS</b>			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	P:6
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	P: 6,7,8
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	P:10



Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	P:10,11
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	P:8,9,10
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	P:8,9
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	P:5,6
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	P:6
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	P:9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	P:11
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as $I^2$ , Kendall's $\tau$ )	NA
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	P:11
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	P:10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	NR

\* NA: Not Applicable    NR: Not Reporting

# BMJ Open

## Determinants of seat belt use behavior: a protocol for a systematic review

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2017-020348.R1
Article Type:	Protocol
Date Submitted by the Author:	06-Jan-2018
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<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Health policy
Keywords:	Determinant, seat belt, protocol

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# Determinants of seat belt use behavior: a protocol for a systematic review

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**Abstract:**

**Introduction** The use of a seat belt prevents severe accident damage and keeps passengers safe from injuries, for example, from being thrown out of the vehicle. The aim of this systematic review is to identify the determinants of seat belt usage behavior.

**Methods and Analysis:** We will include qualitative, quantitative and mixed-methods studies that report data on people older than 12 years as passengers as well as commercial or personal vehicles. MEDLINE/PubMed, Scopus, Web of Science, Embase and the Cochrane Database of Systematic Reviews will be investigated in the study. Articles will be evaluated according to the titles and abstract. Papers conforming to the inclusion criteria will be ordered for a complete review. In the next step for eligibility, the full texts of the remaining articles will be studied independently by two authors. The quality of the selected studies will be assessed with appropriate tools. Based on data extraction, the type of determinant of seat belt use will be classified.

**Ethics and dissemination:** Ethics approval is not required because this is a protocol for a systematic review and no primary data will be collected. We will try to maintain the rights of the authors of this article and the included articles in this systematic review. The findings of this review will be published in a related peer-reviewed journal.

**PROSPRO registration number:** International Prospective Register for Systematic Reviews (PROSPERO) registration number: CRD42017067511.

**Key words:** Determinant, Seat belt, Protocol

**Strengths and limitations of the study**

- The protocol following the PRISMA-P guidelines was written.
- We will use the NNR (number needed to read) index for assessing the sufficiency of the number of articles.
- Study screening, data extraction, and risk of bias assessment of the current study will be independently conducted by two researchers.
- Heterogeneity between studies might be an obstacle to perform meta-analyses.

## Introduction

The World Health Organization (WHO) called for paying more attention to the prevention of traffic injuries for its member countries. In addition, in 2008, a meeting of the United Nations General Assembly emphasized on the prevention of road accidents and an increase in the safety of roads.<sup>1</sup> Most of the road traffic deaths, more than 90%, occur in low- and middle-income countries.<sup>2</sup> Road traffic injuries have considerable influences on the economy of a society, individuals, and their families. Significant costs may be associated with the treatments of the injured, and the disabled, and the lives of the family members of the dead are also affected by collisions. Three percents of the gross domestic product of countries in the world is dedicated to road traffic crashes.<sup>3</sup>

The factors that affect road traffic collisions can be classified into 3 classes: Human, environmental, and vehicle-related factors.<sup>4</sup> Human factors such as the non-use of a seat belt and helmet, ignoring regulations, speeding, drug use, lack of knowledge and skills, and driving while intoxicated, are among the most important behavioral factors that may expose a person to risks.<sup>5-</sup>

The World Bank Global Report considers actions such as the use of a seat belt, as the safest way to reduce the burden of road collisions in the industrialized countries, and saving many lives.<sup>5</sup> Studies proved that the use of seat belt prevents severe collision damages and keeps passengers safe from injuries, such as, being thrown out of the vehicle.<sup>8-10</sup>

Based on a meta-analysis that was conducted recently, passengers who do not use a seat belts are more likely to become injured in car collisions than the ones who do, and using seat belts may reduce front-seat fatalities by 60%.<sup>11</sup> Seat location, environmental conditions, the vehicle type,

1  
2  
3 demographic factors, psychological factors, law enforcement and public education programs are  
4 the factors that affect seat belt use behavior.<sup>12-13</sup>  
5  
6

7  
8 To calculate a nationally representative estimation of consistent seat belt usage in each region, a  
9 behavioral risk factor surveillance system was used in a study in 2012; the study indicated that  
10 the use of seat belts differed based on the region where people lived.<sup>14</sup> Another study  
11 demonstrated that elderly drivers and highly educated people often use seat belts more than  
12 others.<sup>15</sup>  
13  
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19 The reasons for not using a seat belt are strongly related to the situations, not believing in its  
20 effectiveness and, discomfort to use it. In both low- and high-risk traveling conditions, safety is  
21 the most important predictor of reported seat belt usage. To create habits of using a seat belt and  
22 emphasizing on its safety, creating seat belt campaigns may be effective.<sup>16</sup>  
23  
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28 Since no previous systematic review has identified the determinants of seat belts behavior, and  
29 prior to conducting interventions for promoting the use of seat belts, the determinants of why  
30 people use/do not use seat belts should be identified. The aim of this systematic review is to  
31 identify the determinants of seat belt usage behavior. The current study will be performed based  
32 on the following 2 questions in mind:  
33  
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39  
40 What determinants are being indicated in the literature for seat belt use?  
41

42  
43 What are the individual and non-individual reasons for seat belt use?  
44

## 45 **Objectives**

46  
47 The objectives of this study are as follows:  
48

- 49 1. To identify the determinants of seat belt use
- 50 2. To find potential sources of heterogeneity in primary studies.  
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## Methods & Analysis

The study protocol was registered in PROSPERO. After completing each stage, the status of the project will be tracked and dated in PROSPERO.

### Study Eligibility criteria

Studies will be selected according to the following criteria:

#### -Population

In this systematic review, only studies reporting data about seat belts in commercial or personal vehicles (both driver or passenger/front or rear) and people older than 12 years as passengers will be included because the use of seat belts is recommended for this age range, and for those lower than this age range, child restraints should be used.<sup>17</sup> Studies on special populations such as pregnant women and people with health problems (e g, abdominal surgery) and limitations on seat belt usage will also be included but will be applied separately in the results.

#### -Exposure

We will consider studies that influence consumption, such as those addressing the determinants of seat belt usage.

#### - Comparators

The use of seat belts compared with the non-use of seat belts.

#### -study design

We will include qualitative, quantitative and mixed-methods studies in which the determinants of seat belt behavior are defined. Animal studies will not be considered.

#### -Determinants

1  
2  
3 Genetic factors, income, poverty, environmental factors, political situations, unemployment and  
4 homelessness, education, social and economic class including social exclusion and deprivation,  
5 workplace stress, established customs, and activities are the determinants that significantly  
6 influenced the health status of people and society.<sup>18</sup>  
7  
8  
9

10  
11  
12 The meaning of determinants is the personal and impersonal factors that affect the use of seat  
13 belts. Personal determinants, such as age, gender, education, knowledge, and attitude, and  
14 impersonal determinants, such as the type of seat belt law, day and night, the location of  
15 passengers, and geographic region, will be considered in the current study. These determinants  
16 are not exhaustive; additional determinants of seat belt usage will be included and classified in  
17 this systematic review.  
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### 26 27 -Outcome

28  
29 The results will be used to distinguish all possible elements that determine the reasons, times,  
30 conditions, and ways in which individuals wear or do not wear seat belts; in addition to the  
31 frequency of wearing a seat belt, either using self-report or measured objectively, and seat belt  
32 usage depending on the type of vehicle, seat location and type of seat belt.  
33  
34  
35  
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### 39 -Language

40  
41 A comprehensive search of several databases will be conducted without language restrictions.  
42  
43

### 44 -Setting

45  
46 There will be no restrictions by the type of setting.  
47  
48

## 49 **Search Methods for Identification of Studies**

### 50 **Electronic searches**



1  
2  
3 In this systematic review, we will develop a comprehensive search strategy for finding articles in  
4 the following databases:

- 5  
6  
7 - MEDLINE/PubMed,  
8  
9  
10 - Scopus,  
11  
12 - Web of Science,  
13  
14 - Embase,  
15  
16  
17 - Cochrane Database of Systematic Reviews.  
18  
19  
20

### 21 **PubMed search strategy**

22  
23 The PubMed database search syntax are presented in supplementary appendix 1. This syntax is a  
24 combination of MeSH terms, key words and tags and will be adopted for other databases. We  
25 will use PubMed's email alert service for identification of newly published. If we identify  
26 additional relevant keywords during any of the electronic or other searches, we will modify the  
27 electronic search strategies to incorporate these terms and document the changes.  
28  
29  
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### 35 **Searching other resources**

36  
37 We will search in the Google Scholar search engine and check the reference lists of relevant  
38 reviews and previous similar systematic reviews. Gray literature, including published abstracts,  
39 conference proceedings, reports, theses, and dissertations, will be searched using sources such as  
40 ProQuest Dissertations and Theses, NHS Evidence, OpenGrey, WHO, Center for Disease  
41 Control and Prevention (CDC) and transportation research centers. Key journals are the other  
42 resources that will be searched. Finally, we will supplement our search by manual searching in  
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51 Google.  
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3 In studies that seems to match our objectives, we will contact the corresponding author(s) for  
4 more information. At beginning we will send an email to the corresponding author(s) and  
5 request data. If we do not receive a response after three emails, we will exclude the research.  
6  
7

8  
9  
10 Three groups of search terms related to the population (occupant), the outcome (seat belt use)  
11 and terms related to determinants (determinants OR factor OR predictor) will be used. We will  
12 include articles available between 1990 (January) and 2017(January-December), and we will use  
13 the NNR (number needed to read) index for assessing the sufficiency of the number of articles<sup>19</sup>.  
14  
15 All identified articles will be imported into EndNote software. This protocol follows the  
16 PRISMA-P (preferred reporting items for systematic review and meta-analysis) checklist and  
17 will report the review article according to the PRISMA statement.<sup>20</sup>  
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## 28 **Data collection and analysis**

### 29 **Study selection**

30  
31 In the first step, two reviewers (JH, MG) will test the screening questions based on the inclusion  
32 and exclusion criteria; then, the results of the search method will be screened for possible  
33 duplications, which will then be removed. In the next step, the same two reviewer independently  
34 will be evaluated the articles according to their titles and abstracts. Conflicts will be resolved by  
35 discussion to reach consensus. When consensus is not reached, a third reviewer (BA) will act as  
36 an arbitrator. The inclusion criteria include articles published between 1990 and 2017, and  
37 people travelling in passenger or commercial vehicles (both drivers and passengers) will be  
38 included. Studies on booster seats or child restraints will exclude.  
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3 Papers that have inclusion criteria will be ordered for a full review. In the third step, for  
4 eligibility criteria, the full texts of the remaining articles will be studied independently by two  
5  
6 authors (JH, MG). (Figure 1)  
7  
8

### 9 10 **Data extraction**

11  
12 The specific data of the studies such as the study population, study design, study country,  
13  
14 outcomes and other necessary data will be extracted independently by two reviewers (JH, BA),  
15  
16 using a quantitative data extraction form. Based on data extraction, the type of determinant of  
17  
18 seat belt usage will be classified. (Figure 1)  
19

20  
21 Any disagreement will be resolved by consensus between the two reviewers (JH, BA) and, when  
22  
23 consensus is not reached, a third reviewer (MG) will act as an arbitrator and make a decision on  
24  
25 the data entered.  
26  
27

### 28 **Assessment of risk of bias of included studies**

29  
30 Assessment of the risk of bias and methodological quality within the included studies will be  
31  
32 implemented by two reviewers (JH, SR) independently considering the items according to the Effective  
33  
34 Public Health Practice Project (EPHPP) Quality Assessment tool for the assessment of  
35  
36 quantitative studies,<sup>21</sup> the Newcastle-Ottawa Scale (NOS) for assessing the quality of  
37  
38 nonrandomized studies in this review<sup>22</sup> and the Joanna Briggs checklist for qualitative research  
39  
40 for qualitative studies.<sup>23</sup> According to the scores, the studies will be divided into 'high quality',  
41  
42 'fair quality' and 'poor quality' categories.  
43  
44  
45

### 46 **Assessment of publication bias**

47  
48 To explore the possibility of small study bias, we will assess funnel plots (ie, plots of study  
49  
50 results against precision) and Begg's and Egger's tests, when there are 10 or more included  
51  
52 studies.<sup>24</sup>  
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## Data Synthesis

### Descriptive analysis

We will use the narrative analysis method<sup>25</sup>, and the results of the study will be descriptively reported in a summery table that presents information on the study population, study design, sitting, quality of the study, behavioral measures and the results of seat belt usage.

We expect that in this systematic review, articles will be included from different study designs that are not suitable for lumping together in the analysis; thus, it may not be possible to analyze the data using meta-analysis. It should be noted that in case of the existence of conditions, we will use meta-analysis, and subgroup analyses will be used to explore any possible sources of heterogeneity based on driver versus passenger, passenger location (front seat versus back seat), commercial versus passenger (personal) vehicles, and males versus females.

### Summary of findings

We will systematically and comprehensively describe the results of each study, highlighting the important characteristics of the study where relevant, such as important similarities or differences (for example, the study design, population, intervention or other elements); then, patterns in the data will be explored. The reasons for both the similarities and differences in the findings also will be systematically explored, and possible explanations for the pattern of results will be considered in a logical manner for each of the included studies.

The guidelines of Cochrane narrative synthesis will be employed as the framework for data synthesis. These guidelines describe the following four major steps for narrative synthesis:

1. Developing a theory of how the intervention (exposer) works, why and for whom
2. Developing a preliminary synthesis of the findings of the included studies
3. Exploring relationships in the data within and between the studies

1  
2  
3 4. Assessing the robustness of the synthesis.<sup>26</sup>  
4  
5  
6  
7

## 8 **Ethics and Dissemination**

9

10 Since no primary data will be collected, adherence to formal ethical guidelines in the current  
11 study is not a requirement. The researchers will conduct a full and comprehensive search in  
12 electronic databases; additionally, study selection and data extraction will be performed. In the  
13 strategy noted in the method and analysis section performed by two independent reviewers, we  
14 will try to maintain the rights of the authors of this article and the included articles in this  
15 systematic review. The findings of this review will be published in a related peer-reviewed  
16 journal.  
17  
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## 26 **Discussion**

27

28 The use of seat belts is the best way to reduce collision related deaths and injuries<sup>27</sup>. Although a  
29 seat belt is not able to prevent collisions, it has an influential role in reducing damage.<sup>8</sup>  
30  
31

32 Seat belt use by front-seat occupants reduced the risk of death in a crash by about 61%, which is  
33 greater than the effectiveness of air bags<sup>28</sup>.  
34  
35

36 To date, few systematic reviews, Meta - analysis and protocol have been published about seat  
37 belts<sup>11, 29-230</sup>. However, none of them comprehensively investigated determinants of seat belt  
38 usage behavior. Only one Meta –analysis found by researchers that reviewed factors influence  
39 seat belt usage rates in the United States<sup>31</sup>. Hence, a systematic review is needed to  
40 comprehensively identify the determinants of of seat belt usage.  
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49 This study will clarify unknown aspects of the reasons why some people use or do not use seat  
50 belts. Investigating the determinants of seat belt use behavior can help to identify which  
51 determinants contribute most to seat belt use in car occupants and provide a comprehensive  
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3 framework of factors that affect this behavior. Additionally, this study will provide important  
4 information for researchers, stakeholders in public health, and policy makers and for designing  
5 intervention programs for increasing seat belt use. Also implications for future research can be  
6 drawn from the results of this study.  
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14  
15 **Contributors** JH, M GH, BA, SR, O-SH, YM and HS conceived and designed the study. JH, M  
16 GH, BA and SR developed the search strategies. JH, BA and M GH were responsible for the  
17 initial drafting, edited the manuscript and approved the manuscript for submission. O-SH, HS  
18 and YM revised the manuscript. JH and M GH will also screen potential studies, extract data and  
19 assess their quality. Any discrepancies will be resolved by consensus between JH and M GH.  
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21 When consensus is not reached, BA will act as arbitrator.  
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### 30 **Competing interests**

31  
32 Authors declared no conflicts of interest.  
33

### 34 **Funding**

35  
36 No funding to declare.  
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### 39 **Data sharing statement**

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41 To gain access to the data, researchers should submit a detailed description of their projects, as  
42 well as personal identification and institutional affiliation, and a complete list of data requested.  
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44 All applicants will be required to sign an agreement of confidentiality that states that data will  
45 not be transferred without permission and that no attempts will be made to identify participants.  
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4  
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7 for their valuable comments, which helped considerably to improve the quality of the  
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9 manuscript.  
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18 **Amendments of previously completed protocol (bmjopen-2017-018913)**

- 19  
20 1\_ Edit English by American Journal Experts.  
21  
22 2\_ Correction inclusion and exclusion criteria applied;  
23  
24 3\_ Add a flow diagram depicting the flow of information through the different phases of  
25  
26 systematic review  
27  
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29 4\_ Expression the risk of reporting bias assessment  
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31 5\_ PRISMA-P checklist Completed and included in submission  
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9 **Open Access**

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**Figure Legends**

**Figure 1:** Flowchart presenting an overview of the search results.

For peer review only

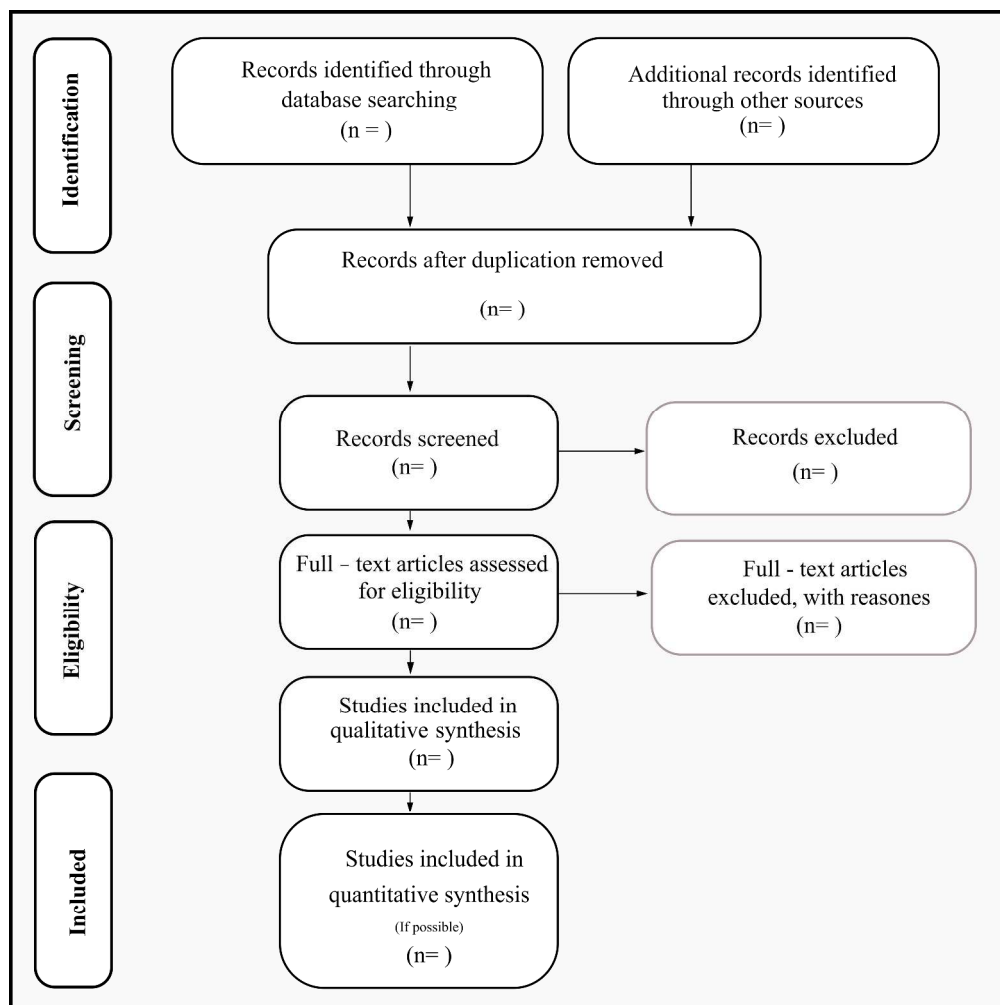


Figure 1: Flowchart presenting an overview of the search results

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**APPENDIX 1: Search strategy for MEDLINE via PubMed**

- 1. “Determinant Factor”**
- 2. Correlate**
- 3. Contributor**
- 4. Predictor**
- 5. Factor**
- 6. Determinant\***
- 7. 1 OR 2 OR 3 OR 4 OR 5 OR 6**
- 8. Seatbelt**
- 9. “Safety belt”**
- 10. “Belt seat”**
- 11. “Seat belt”**
- 12. “Road safety”**
- 13. 8 OR 9 OR 10 OR 11 OR 12**
- 14-(1990/01/01:2017/12/31[dp])**
- 14 – 7 AND 13 AND 14**

**PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol\***

Section and topic	Item No	Checklist item	Reported On page
<b>ADMINISTRATIVE INFORMATION</b>			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	P:1 line:1,2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	NA*
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	P:2 line 44
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	P:1 line 6-20
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	P:14 line 291-296
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	P:14 line:298-304
Support:			
Sources	5a	Indicate sources of financial or other support for the review	NA
Sponsor	5b	Provide name for the review funder and/or sponsor	NA
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	NA
<b>INTRODUCTION</b>			
Rationale	6	Describe the rationale for the review in the context of what is already known	P:3,4 line:50-88
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	P:4,5,6 line 90_134
<b>METHODS</b>			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	P:6
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	P: 6,7,8
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	P:10



Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	P:10,11
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	P:8,9,10
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	P:8,9
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	P:5,6
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	P:6
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	P:9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	P:11
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as $I^2$ , Kendall's $\tau$ )	NA
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	P:11
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	P:10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	NR

\* NA: Not Applicable    NR: Not Reporting

# BMJ Open

## Determinants of seatbelt use behavior: a protocol for a systematic review

Journal:	<i>BMJ Open</i>
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<b>Primary Subject Heading</b>:	Public health
Secondary Subject Heading:	Health policy
Keywords:	Determinant, Seatbelt, Protocol

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Manuscripts

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## Determinants of seatbelt use behavior: a protocol for a systematic review

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## Abstract

### Introduction

The use of seatbelt may prevent of severe accident damages and keep passengers safe against hard injuries, for instance, it may prevent of getting thrown out of the vehicles. The current systematic review will be identification and analyzing of the determinants of seatbelt usage behavior.

### Methods and Analysis

We will include qualitative, quantitative and mixed-method studies reporting the achieved data of people with the age greater than 12 years as passengers, as well as both of commercial or personal vehicles. Online data bases including MEDLINE/PubMed, Scopus, Web of Science, Embase, Cochrane Database of Systematic Reviews and the – PsychINFO will be investigated in the current study. Published and available articles will be evaluated according to the titles and abstracts. Published papers conforming to the inclusion criteria will be organized for a complete review. In the next step for eligibility, the full texts of the remaining articles will be studied independently by two authors. The quality of the selected studies will be assessed with appropriate tools. Based on the obtained information of data extraction, the type of determinants of seatbelt use will be classified.

### Ethics and dissemination

Ethics approval is not required, since this is a protocol for a systematic review and no any primary data will be collected. The authors will do their best to maintain the rights of the used and included articles in the present systematic review. The findings of this review will be published in a related peer-reviewed journal.

**PROSPRO registration number:** International Prospective Register for Systematic Reviews (PROSPERO) registration number: CRD42017067511.

**Key words:** Determinant, Seatbelt, Protocol

### Strengths and limitations of the study

- The protocol according to the PRISMA-P guidelines has been written.
- The authors will use the NNR (number needed to read) index for assessing of the sufficiency of the number of articles.
- Study screening, data extraction, and risk of bias assessment of the current study will be independently conducted by two authors.
- Heterogeneity between studies may be an obstacle to perform meta-analyses.

### Introduction

The World Health Organization (WHO) has announced for paying much attention to the prevention of traffic injuries/accidents for not only its member countries but also in all over the world. In addition, in 2008, a meeting held by United Nations General Assembly emphasized on the prevention and or reductions of road accidents and enhancements in the safety of roads according to the globally confirmed standards.<sup>1</sup> Most of the road traffic deaths (rather than 90%) occur in low- and middle-income countries.<sup>2</sup> Road traffic injuries have considerable influence on the economy of societies, individuals and their families. Considerable expenses may be associated with the treatment of injuries and disabilities and the support of family members who are affected by deadly collisions. Approximately 3% of the gross domestic product of countries around the world has been dedicated to the aftermath of road traffic collisions.<sup>3</sup>

The factors affecting road traffic collisions may be classified into 3 different categories: human, environmental, and vehicle-related factors.<sup>4</sup> Human factors, such as the non-use of seatbelts and helmets, ignoring regulations and rules, illegal speeding, drug abuse, and lack of knowledge and driving skills, as well as driving while drunk, are considered as the most common behavioral factors exposing a person to risk.<sup>5-7</sup>

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3 The World Bank Global Report has considered actions such as the use of a seatbelt as the safest  
4 way to reduce the burden of road collisions and save lives in developed countries.<sup>5</sup> Studies have  
5 established that the use of a seatbelt may prevent severe collision damages and keep passengers  
6 safe and secure against being injured and being thrown out of vehicles.<sup>8-10</sup>

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12 Appropriate use of seatbelts may reduce front-seat fatality rates by 60%. Based on a meta-  
13 analysis that was conducted recently, passengers who do not use a seatbelt are likely to be  
14 injured in car collisions.<sup>11</sup>

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19 To calculate a nationally representative estimation of constant seatbelt use by passengers in each  
20 region, a behavioral risk factor surveillance system was applied in a study in 2012; the results of  
21 that study indicated that the use of seatbelts varied based on region.<sup>12</sup>

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26 Despite the benefits related to seatbelt use, its application in most developing countries,  
27 including Iran, is not as high as it should be.<sup>13</sup> Although there have been dramatic achievements  
28 in recent years, mostly resulting from strict driving laws and severe cash penalties for persons  
29 who do not use seatbelts, many drivers and passengers still take the risk of driving or traveling  
30 without the use of a seatbelt.<sup>14-15</sup> Hence, we are facing with such complex conditions requiring  
31 deep study to clarify the various factors leading humans to this behavior. The results of such  
32 studies may help decision-makers focus their attention on priority areas.

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42 Several studies have addressed determinants of seatbelt usage<sup>15-18</sup>, but most of these studies are  
43 not shared formally in scientific databases and are not available to all researchers, and much time  
44 is required to gather main findings and identify the effective determinants of seatbelt use.

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49 Systematic review is one effective methodology that can be beneficial for the identification of  
50 determinants of seatbelt application. To the author's knowledge, there has been no systematic  
51 review for this purpose.<sup>19</sup>

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3 The aim of the current systematic review is to identify the determinants of seatbelt usage  
4 behaviors. The current review study will be performed based on the following 2 enquiries for the  
5 readers:  
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- 8 1. What determinants are being indicated in the literature for seatbelt use?
- 9 2. What are the individual and non-individual causes for seatbelt use?

## 10 11 12 13 14 15 16 **Objectives**

17 The objectives of the current review study are as follows:

- 18 1. Identification of the determinants of seatbelt use
- 19 2. Discovering of the potential sources of heterogeneity in primary studies.

## 20 21 22 23 24 25 26 **Methods and Analysis**

27 To study, the protocol was registered in PROSPERO. After completing each stage, the status of  
28 the project will be tracked and dated in PROSPERO.  
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## 37 **Study Eligibility criteria**

38 Studies will be selected according to the following criteria:

### 39 40 41 **Population**

42 In the current systematic review, only studies reporting data about seatbelts in commercial or  
43 personal vehicles (both drivers or passengers/front or rear) and people greater than 12 years as  
44 passengers will be included, since the use of seatbelts is recommended for people in the age  
45 ranged  $\geq 12$ , and for those passengers lower than this age range, child restraints should be used.<sup>20</sup>

46 Studies on special populations such as pregnant women and people with health issues or with  
47 physical disabilities (e g, abdominal surgery) and limitations on seatbelt usage will also be  
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3 included but the achieved results of these passengers will be applied separately in the present  
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5 study.  
6

### 7 8 **Exposure**

9  
10 The authors will consider the studies influencing on consumption, such as those addressing the  
11  
12 determinants of seatbelt usage.  
13

### 14 15 **Comparators**

16  
17 The use of seatbelts compared with the non-use of seatbelts.  
18  
19

### 20 21 **Study design**

22  
23 The authors will include qualitative, quantitative and mixed-method studies in which the  
24  
25 determinants of seatbelt behavior are described as well. Animal studies will not be considered in  
26  
27 the present research.  
28

### 29 30 **Determinants**

31  
32 Genetic factors, income level, poverty rate, environmental factors, political situations,  
33  
34 unemployment and homelessness rate, education levels, social and economic situations including  
35  
36 social exclusion and deprivation, occupational stress, common ancient customs, and type of  
37  
38 activities are the determinants that may significantly influence on the health status of people,  
39  
40 communities and societies.<sup>21</sup>  
41

42  
43 The meaning of determinants is the personal and impersonal factors that may affect considerably  
44  
45 on the application of seatbelts in communities' movements and transportations. Personal  
46  
47 determinants including age, gender, education level, knowledge, and attitude, and impersonal  
48  
49 determinants such as the type of seatbelt law (current traffic rules), time (day and/or night),  
50  
51 location of passengers as well as geographical conditions will be considered for investigation in  
52  
53 the present study. The above mentioned determinants are not exhaustive and completed,  
54  
55  
56  
57



1  
2  
3 additional determinants of seatbelt usage will be included, categorized and discussed in the  
4  
5 current or further systematic reviews.  
6

### 7 8 **Outcome** 9

10 The achieved results will be used to distinguish all possible parameters that may determine the  
11  
12 causes, times, conditions, and ways of which individuals who wear and/or do not wear the  
13  
14 seatbelts; in addition to the frequency of wearing seatbelts, the achieved results may either record  
15  
16 self-report or measure objectively the seatbelt usage based on the vehicle type, seat location and  
17  
18 type of seatbelts.  
19  
20

### 21 22 **Language** 23

24 A comprehensive study of several databases will be performed regardless the language  
25  
26 restrictions.  
27

### 28 29 **Setting** 30

31 There will be no any restrictions by the type of setting.  
32

## 33 **Search Methods for Identification of Studies** 34

### 35 **Electronic searches** 36

37 In this systematic review, the authors will develop a comprehensive search strategy for finding  
38  
39 appropriate scientific articles in the databases as mentioned at the following:  
40  
41

42 - MEDLINE/PubMed,  
43

44 - Scopus,  
45

46 - Web of Science,  
47

48 - Embase,  
49

50 - PsychINFO  
51

52 - Cochrane Database of Systematic Reviews.  
53  
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### **PubMed search strategy**

The PubMed database search syntaxes are presented as well in supplementary appendix 1. This syntax is a combination of MeSH terms, key words and tags and will be adopted for other databases. The authors will use PubMed's email alert service to identify the newly or/very recent published articles. If the authors identify additional relevant keywords through any of the applied electronic and/or other searches in the current study, they will modify and/or improve the electronic search strategies to combine these terms and documents with the alterations.

### **Searching other resources**

The authors will search in Google Scholar search engine and check the reference lists of the relevant reviews and previously published similar systematic reviews. Gray literature, including published abstracts, conference proceedings, reports, and theses as well as dissertations, will be searched with the use of sources including ProQuest, Dissertations and Theses, NHS Evidence, OpenGrey, WHO, Center for Disease Control and Prevention (CDC) and transportation research centers. Key journals are the other resources that will be used in searching circle. Finally, the authors will complete the searches by manual searching in Google.

In the published studies that seems to match our objectives, the authors will contact to the corresponding author(s) for more information. At the beginning the authors will contact via email to the corresponding author(s) and request data. If the authors of the current study do not receive a response after three time contacts, we will exclude the research.

Three groups of search terms relevant to the population (occupant), the outcome (seatbelt use) and terms relevant to determinants (determinants OR factor OR predictor) will be applied. The authors will include articles that are available in years between January of 1990 (January) and 2017(January-December), and will use the NNR (number needed to read) index the sufficiency

1  
2  
3 of the number of the selected articles<sup>22</sup>. All of the identified articles will be imported into  
4  
5 EndNote (reference manager) software. The current protocol follows the PRISMA-P (preferred  
6  
7 reporting items for systematic review and meta-analysis) checklist and will report the review  
8  
9 articles according to the PRISMA statement.<sup>23</sup>  
10  
11

## 12 **Data collection and analysis**

### 13 **Study selection**

14  
15 In the first step, two reviewers (JH, MG) will test the screening questions based on the inclusion  
16  
17 and exclusion criteria; then, the achieved results of the searching method will be screened for the  
18  
19 possible duplications, afterwards the possible duplications will be removed. In the next step, the  
20  
21 possible duplications, afterwards the possible duplications will be removed. In the next step, the  
22  
23 same two reviewers will independently evaluate the articles according to their titles and  
24  
25 abstracts. Conflicts will be resolved by discussion till reaching consensus. If consensus does not  
26  
27 reach on time, a third reviewer (BA) will be invited to act as an extra referee or arbitrator. The  
28  
29 inclusion criteria include articles published in years between 1990 and 2017, and people  
30  
31 travelling in different types of vehicle (both drivers and passengers) will be included. Studies on  
32  
33 booster seats or child restraints will exclude.  
34  
35

36  
37 Scientific papers containing inclusion criteria will be ordered for a full and complete review. In  
38  
39 the third step, for eligibility criteria, the full texts of the remaining articles will be studied  
40  
41 independently by two authors (JH, MG). (Figure 1)  
42  
43  
44

### 45 **Data extraction**

46  
47 The specific data of the studies including the studied population, the applied design, the selected  
48  
49 country, the achieved outcomes and other necessary data will be extracted independently by two  
50  
51 reviewers (JH, BA), with the use of a quantitative data extraction form. Based on the data  
52  
53 extraction approach, the type of determinant of seatbelt usage will be classified. (Figure 1)  
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3 Any disagreement will be resolved by consensus between the two reviewers (JH, BA) and, when  
4  
5 consensus does not reach, a third reviewer (MG) will act as an extra referee and/or arbitrator to  
6  
7 make the final decision on the data entered.  
8  
9

### 10 **Assessment of risk of bias of included studies**

11  
12 Assessment of the risk of bias and methodological quality within the included studies will be  
13  
14 implemented by two of the reviewers (JH, SR) independently, considering the items according to  
15  
16 the Effective Public Health Practice Project (EPHPP), Quality, Assessment tool for the  
17  
18 assessment of the quantitative studies,<sup>24</sup> and the Newcastle-Ottawa Scale (NOS) for the  
19  
20 evaluation of the quality of nonrandomized studies in the current review<sup>25</sup> as well as the Joanna  
21  
22 Briggs checklist for qualitative research in terms of the qualitative studies.<sup>26</sup> According to the  
23  
24 achieved scores, the studies will be classified into three different categories including high  
25  
26 quality, fair quality and poor quality.  
27  
28  
29

### 30 **Assessment of publication bias**

31  
32 To explore/discover the possibility of small study bias, the authors will assess funnel plots (ie,  
33  
34 constructed plots of the achieved results versus precision) and Begg's and Egger's tests, when  
35  
36 there are 10 or more included studies.<sup>27</sup>  
37  
38  
39

### 40 **Data Synthesis**

#### 41 **Descriptive analysis**

42  
43 The authors will apply the narrative analysis method<sup>28</sup>, and the obtained results of the study will  
44  
45 be descriptively reported in a summery table presenting complete information on the study  
46  
47 population, study design, sitting patterns, quality of the performed study, behavioral patterns as  
48  
49 well as the achieved results of seatbelt usage.  
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3 The authors expected that in the present systematic review, articles will be included from various  
4 study designs of which are not appropriate for lumping together in the analysis; therefore, it may  
5 not be possible to analyze the obtained data with the use of meta-analysis approach. It should be  
6 noted that in term of the existence of conditions, the authors will use meta-analysis and subgroup  
7 analyses to explore any possible sources of heterogeneity based on drivers versus passengers,  
8 passenger's location (front seats versus back seats) and commercial versus passenger (personal)  
9 vehicles as well as males versus females.  
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### 20 **Summary of the findings**

21  
22 The authors will systematically and comprehensively describe the obtained results of each study,  
23 highlighting the important characteristics of the study including important similarities or  
24 differences (for instance, the study design, selected population, intervention or other elements);  
25 then, the patterns in the data will be explored and discovered as well. The reasons for finding  
26 both of the similarities and differences of the obtained outcomes in the current study will be  
27 systematically explored, and possible explanations for the pattern of results will be considered  
28 and described or reported in a logical manner for each of the performed studies.  
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39 The guidelines of Cochrane narrative synthesis will be employed as the framework for data  
40 synthesis. These guidelines describe the following four main steps for the narrative synthesis:  
41  
42

- 43 1. Developing a theory of how the intervention (exposer) works, why and for whom?
  - 44 2. Developing a preliminary synthesis of the findings of the included studies.
  - 45 3. Exploration of the relationships in the achieved data within and between the performed  
46 studies.
  - 47 4. Assessing the robustness of the synthesis.<sup>29</sup>
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### **Ethics and Dissemination**

Since no primary and experimental data will be collected in the present study, adherence to formal ethical guidelines in the current study is not necessary. The authors will conduct a full and comprehensive search in various electronic databases; additionally, study selection and data extraction will be performed as well. The strategy mentioned in the method and the analysis section, will be performed by two independent reviewers, the authors will try to maintain the rights of the authors of the current research and the cited articles' in the present systematic review. The findings of the current review will be published in a relevant peer-reviewed journal.

### **Discussion**

The use of seatbelts is the most logical way to reduce collision leading to death and hard injuries<sup>30</sup>. Although a seatbelt is not able to prevent collisions, but it has an effective role in not only reductions of the injuries' intensity but also it may be effective in prevention of the possible damages.<sup>8</sup>

Seatbelt use by front-seat occupants may reduce the risk of death in a crash by about 61%, which is greater than the effectiveness of air bags<sup>31</sup>.

So far, few systematic reviews, Meta-analysis and protocol have been published on seatbelts<sup>11,32-33</sup>. However, none of them comprehensively studied the determinants of seatbelt usage behavior.

Only one Meta-analysis has been found by the authors of the current study that reviewed factors influencing of seatbelt usage rates in the United States<sup>34</sup>. Hence, a systematic review is required to comprehensively identify the determinants of seatbelt usage.

The present study will clarify unknown aspects of the reasons why some people used to use or do not use seatbelts. Studies on the determinants of seatbelt use behavior may help to identify which determinants contribute mostly to seatbelt use in car occupants and provide a comprehensive

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2  
3 framework of factors affecting significantly on this behavior. Additionally, the current study will  
4 provide important information for researchers, stakeholders in public health and policy makers as  
5 well as for designing intervention programs to increase seatbelt use. Moreover implications for  
6 future research may be drawn from the achieved results of the present study.  
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### 12 **Contributors**

13  
14 JH, M GH, BA, SR, O-SH, YM and HS conceived and designed the study. JH, M GH, BA and  
15 SR developed the search strategies. JH, BA and M GH were responsible for the initial drafting,  
16 edition of the manuscript and approved the manuscript for submission. O-SH, HS and YM  
17 revised the manuscript. JH and M GH will also screen potential studies, extract data and assess  
18 their quality. Any discrepancies will be resolved by consensus between JH and M GH. When  
19 consensus is not reached, BA will act as an extra or third arbitrator to make a final decision.  
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### 29 **Competing interests**

30  
31 The authors declare that there is no conflict of interest.  
32

### 33 **Funding**

34  
35 Not applicable.  
36  
37

### 38 **Data sharing statement**

39  
40 To gain access to the data, the researchers should submit a detailed description of their projects,  
41 as well as personal identification and institutional affiliation, and a complete list of data should  
42 be requested. All applicants will be required to sign an agreement of confidentiality stating that  
43 data will not be transferred without permission and that no attempts will be made to identify the  
44 participants' ID.  
45  
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1  
2  
3 The authors would like to acknowledge the efforts of Abbas Ali Keshtkar and Aatefeh  
4 Aboutorabi for their assistance during this protocol. The authors also particularly dedicate their  
5  
6 sincere thanks to the reviewers for their valuable comments, which helped considerably in  
7  
8 improvement of the quality of the manuscript.  
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#### 14 **Amendments of previously completed protocol (bmjopen-2017-018913)**

15  
16  
17 1\_ Edit English by American Journal Experts.

18  
19 2\_ Correction inclusion and exclusion criteria applied;

20  
21 3\_ Add a flow diagram depicting the flow of information through the different phases of  
22  
23 systematic review  
24

25  
26 4\_ Expression the risk of reporting bias assessment  
27

28  
29 5\_ PRISMA-P checklist Completed and included in submission  
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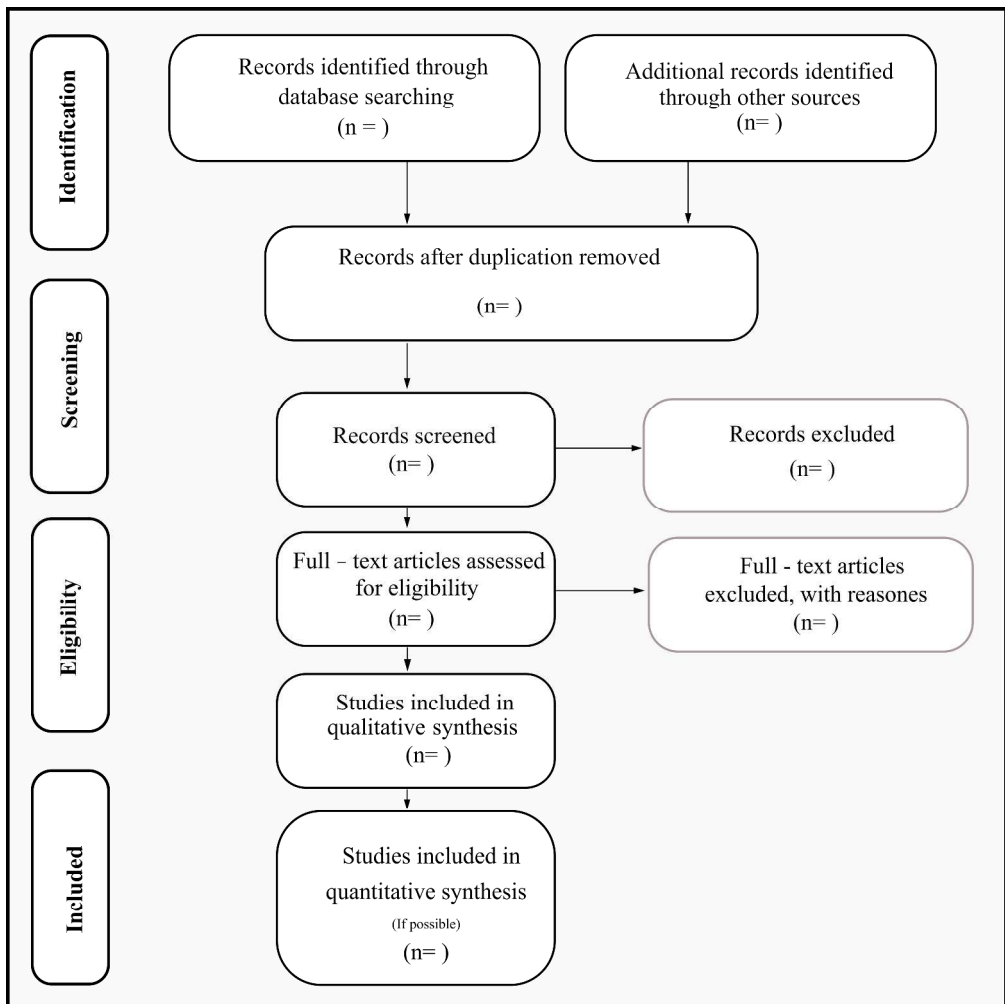
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12 **Figure Legends**  
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15 **Figure 1:** Flowchart presenting an overview of the search results.  
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4 **APPENDIX 1: Search strategy for MEDLINE via PubMed**  
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**1. “Determinant Factor”**

**2. Correlate**

**3. Contributor**

**4. Predictor**

**5. Factor**

**6. Determinant\***

**7. 1 OR 2 OR 3 OR 4 OR 5 OR 6**

**8. Seatbelt**

**9. “Safety belt”**

**10. “Belt seat”**

**11. “Seat belt”**

**12. “Road safety”**

**13. 8 OR 9 OR 10 OR 11 OR 12**

**14-(1990/01/01:2017/12/31[dp])**

**14 – 7 AND 13 AND 14**



**PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol\***

Section and topic	Item No	Checklist item	Reported On page
<b>ADMINISTRATIVE INFORMATION</b>			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	P:1 line:1,2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	NA*
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	P:2 line 44
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	P:1 line 6-20
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	P:14 line 291-296
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	P:14 line:298-304
Support:			
Sources	5a	Indicate sources of financial or other support for the review	NA
Sponsor	5b	Provide name for the review funder and/or sponsor	NA
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	NA
<b>INTRODUCTION</b>			
Rationale	6	Describe the rationale for the review in the context of what is already known	P:3,4 line:50-88
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	P:4,5,6 line 90_134
<b>METHODS</b>			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	P:6
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	P: 6,7,8
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	P:10

Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	P:10,11
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	P:8,9,10
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	P:8,9
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	P:5,6
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	P:6
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	P:9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	P:11
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as $I^2$ , Kendall's $\tau$ )	NA
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	P:11
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	P:10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	NR

\* NA: Not Applicable    NR: Not Reporting

# BMJ Open

## Determinants of Seatbelt Use Behavior: A Protocol for a Systematic Review

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## Determinants of Seatbelt Use Behavior: A Protocol for a Systematic Review

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### Abstract

#### Introduction

The use of seatbelts could prevent severe collision damage to people in vehicle accidents and keep passengers safe from sustaining serious injuries; for instance, it could prevent passengers from being thrown out of a vehicle after the collision. The current systematic review will identify and analyze the determinants of seatbelt use behavior.

#### Methods and Analysis

We will include qualitative, quantitative, and mixed-method studies reporting the acquired data from passengers aged greater than 12 years and drivers, from both commercial and personal

1  
2  
3 vehicles. Online databases including MEDLINE/PubMed, Scopus, Web of Science, Embase,  
4  
5 Cochrane Database of Systematic Reviews, and PsychINFO will be investigated in the current  
6  
7 study. Published and available articles will be evaluated according to their titles and abstracts.  
8  
9 Published papers conforming to the inclusion criteria will be organized for a complete review.  
10  
11 Next, the full text of the remaining articles will be studied independently for eligibility by two  
12  
13 authors. The quality of the selected studies will be assessed with appropriate tools. Based on the  
14  
15 information obtained from the data extraction, the type of determinants of seatbelt use will be  
16  
17 classified.

### 17 **Ethics and dissemination**

18  
19 Ethics approval is not required, because this is a protocol for a systematic review and no primary  
20  
21 data will be collected. The authors will ensure to maintain the rights of the used and included  
22  
23 articles in the present systematic review. The findings of this review will be published in a  
24  
25 relevant peer-reviewed journal.

26 **PROSPRO registration number:** International Prospective Register for Systematic Reviews  
27  
28 (PROSPERO) registration number: CRD42017067511.

29  
30  
31 **Key words:** Determinant, Seatbelt, Protocol

### 33 **Strengths and limitations of the study**

- 34 ➤ The protocol has been written according to the PRISMA-P guidelines.
- 35 ➤ The authors will use the NNR (number needed to read) index for assessing a sufficient number
- 36 ➤ of articles.
- 37 ➤ Study screening, data extraction, and risk of bias assessment of the current study will be
- 38 ➤ independently conducted by two authors.
- 39 ➤ Heterogeneity between studies may be an obstacle to perform meta-analyses.
- 40
- 41
- 42
- 43

### 44 **Introduction**

45  
46 The World Health Organization (WHO) has been paying tremendous attention to the  
47  
48 prevention of traffic injuries/accidents not only in its member countries but also worldwide. In  
49  
50 addition, in 2008, a meeting held by the United Nations General Assembly emphasized the  
51  
52 importance of the prevention and/or reduction of road accidents and the implementation of  
53  
54 enhancements in road safety according to globally confirmed standards.<sup>1</sup> Most of the road traffic-  
55  
56 related deaths (more than 90%) occur in low- and middle-income countries.<sup>2</sup> Road traffic-related  
57

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2  
3 injuries have a considerable effect on the economy of societies, individuals, and their families,  
4 and considerable expenses may be associated with the treatment of injuries and disabilities and  
5 the support of family members who are affected by fatal collisions. Approximately 3% of the  
6 gross domestic product of countries around the world has been dedicated to the aftermath of road  
7 traffic collisions.<sup>3</sup>

8  
9  
10  
11 The factors affecting road traffic collisions may be classified into 3 different categories: human,  
12 environmental, and vehicle-related factors.<sup>4</sup> Human factors such as not using seatbelts and  
13 helmets, ignoring traffic regulations and rules, illegal speeding, drug abuse, lack of knowledge  
14 and driving skills, and driving under the influence of alcohol are considered the most common  
15 behavioral factors exposing a person to traffic accident risk.<sup>5-7</sup>

16  
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19  
20 The World Bank Global Report has considered actions such as the use of a seatbelt as the safest  
21 way to reduce the burden of road collisions and to save lives in developed countries.<sup>5</sup> Studies  
22 have established that the use of a seatbelt may prevent severe collision damage and keep  
23 passengers safe and secure from sustaining serious injury and from being thrown out of vehicles  
24 after the collision.<sup>8-10</sup>

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Appropriate use of seatbelts may reduce front-seat fatality rates by 60%. Based on a recent meta-  
analysis, passengers who do not use a seatbelt are more likely to be injured in car collisions.<sup>11</sup>

To calculate a nationally representative estimate of constant seatbelt use by passengers in each  
region, a surveillance system of behavioral risk factors was applied in a study in 2012; the results  
of that study indicated that the use of seatbelts varied based on region.<sup>12</sup>

Despite the benefits related to seatbelt use, its application in most developing countries,  
including Iran, is not as high as it should be.<sup>13</sup> Although there have been dramatic improvements  
in recent years, mostly resulting from strict driving laws and substantial cash penalties for  
persons who do not use seatbelts, many drivers and passengers still take the risk of driving or  
traveling without the use of a seatbelt.<sup>14-15</sup> Hence, we are faced with complex conditions that  
require a profound study to clarify the various factors that lead people to follow this behavior.  
The results of such studies may help decision-makers focus their attention on priority areas.

Several studies have addressed the determinants of seatbelt usage<sup>15-18</sup>, but most of these studies  
were not shared formally in scientific databases and therefore are not available to all researchers;  
and a considerable amount of time is thus needed to gather the main findings and identify the  
effective determinants of seatbelt use.

1  
2  
3 Systematic review is an effective methodology that can be useful to identify the determinants of  
4 seatbelt use. To the authors' knowledge, no systematic review has been conducted to date  
5 regarding the effective determinants of seatbelt use.<sup>19</sup>  
6  
7

8 The aim of the current systematic review is to identify the determinants of seatbelt use  
9 behaviors. The current review study will be performed based on the following 2 questions for the  
10 reader:  
11  
12

- 13 1. What determinants are being described in the literature for seatbelt use?
- 14 2. What are the individual and non-individual reasons for seatbelt use?

### 15 **Objectives**

16 The objectives of the current review study are as follows:

- 17 1. Identification of the determinants of seatbelt use.
- 18 2. Discovering the potential sources of heterogeneity in primary studies.

### 19 **Methods and Analysis**

20 For this study, the protocol was registered in PROSPERO. After completing each stage, the  
21 status of the project will be tracked and dated in PROSPERO.  
22  
23

### 24 **Patient and Public Involvement**

25 There has been no patient and public involvement in this systematic review.  
26  
27

### 28 **Study Eligibility criteria**

29 Studies will be selected according to the following criteria:  
30  
31

#### 32 **Population**

33 In the current systematic review, we will include studies reporting data on seatbelt use in  
34 commercial or personal vehicles for both drivers and passengers seated in front or rear.  
35  
36

37 Passengers aged greater than 12 years will include, as the use of seatbelts is recommended for  
38 people aged 12 years or older, and for passengers younger than 12 years, child restraints should  
39 be used.<sup>20</sup>  
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41

42 Studies on special populations such as pregnant women, people with health issues or with  
43 physical disabilities (e.g., abdominal surgery), and those with limitations on seatbelt use will also  
44 be included, but the results collected from these drivers or passengers will be treated separately  
45 in the present study.  
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#### 54 **Exposure**

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3 The authors will consider the studies those addressing the determinants of seatbelt usage.  
4

### 5 **Comparators**

6 The results for use of seatbelts will be compared with those for not using seatbelts.  
7

### 8 **Study design**

9  
10 The authors will include qualitative, quantitative, and mixed-method studies in which the  
11 determinants of seatbelt behavior are described. Animal studies will not be considered in the  
12 present research.  
13  
14

### 15 **Determinants**

16  
17 Genetic factors, income level, poverty rate, environmental factors, political situations,  
18 unemployment and homelessness rate, education levels, social and economic situations including  
19 social exclusion and deprivation, occupational stress, common ancient customs, and type of  
20 activities are the determinants that may significantly influence on the health status of people,  
21 communities, and societies.<sup>21</sup>  
22  
23

24  
25 Determinants may be defined as personal and impersonal factors that have an effect on the  
26 wearing of seatbelts in the transport system of a community. Personal determinants including  
27 age, gender, education level, knowledge, and attitude, and impersonal determinants such as the  
28 type of seatbelt law (current traffic rules), time (day and/or night), location of passengers, and  
29 geographical conditions will be considered for investigation in the present study. The  
30 aforementioned determinants are not exhaustive and complete, and additional determinants of  
31 seatbelt usage could be included, categorized, and discussed in the current or further systematic  
32 reviews.  
33  
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### 39 **Outcome**

40  
41 The achieved results will be used to distinguish all possible parameters that may determine the  
42 causes, times, conditions, and ways in which individuals wear or do not wear seatbelts. In  
43 addition to the frequency of wearing seatbelts, the achieved results may either record self-  
44 reported seatbelt use or seatbelt use measured objectively based on the vehicle type, seat  
45 location, and type of seatbelts.  
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### 50 **Language**

51 A comprehensive study of several databases will be performed regardless of language  
52 restrictions.  
53  
54

### 55 **Setting**



1  
2  
3 There will not be any restrictions due to the type of setting.

## 4 **Search Methods for Identification of Studies**

### 5 **Electronic search**

6  
7  
8 In this systematic review, the authors will develop a comprehensive search strategy for finding  
9 appropriate scientific articles in the following databases:

- 10 - MEDLINE/PubMed,
- 11
- 12 - Scopus,
- 13
- 14 - Web of Science,
- 15
- 16 - Embase,
- 17
- 18 - PsychINFO
- 19
- 20 - Cochrane Database of Systematic Reviews.
- 21

### 22 **PubMed search strategy**

23  
24 The PubMed database search syntaxes are presented in Supplementary Appendix 1. This syntax  
25 is a combination of MeSH terms, key words, and tags and will be adopted for other databases.  
26 The authors will use PubMed's email alert service to identify any newly or very recently  
27 published articles. If the authors identify additional relevant keywords through any of the applied  
28 electronic and other searches in the current study, they will modify and improve the electronic  
29 search strategies to combine these terms and documents with the alterations.  
30  
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### 34 **Searching other resources**

35  
36 The authors will search in Google Scholar search engine and check the reference lists of the  
37 relevant reviews and previously published similar systematic reviews. Gray literature, including  
38 published abstracts, conference proceedings, reports, and theses as well as dissertations, will be  
39 searched with the use of sources, including ProQuest, Dissertations and Theses, NHS Evidence,  
40 OpenGrey, WHO, Centers for Disease Control and Prevention (CDC), and transportation  
41 research centers. Key journals are the other resources that will be used in this search. Finally, the  
42 authors will complete the search process by manual searching in Google.  
43  
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48 In the published studies that appear to match our objectives, the authors will contact the  
49 corresponding author(s) for more information. Initially the authors will contact the corresponding  
50 author(s) by email and request data. If a response is not received after three contact attempts, we  
51 will exclude the research from the review.  
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3 Three groups of search terms relevant to the population (occupant), the outcome (seatbelt use),  
4 and terms relevant to determinants (determinants OR factor OR predictor) will be used. The  
5 authors will include articles that are available between January 1990 and December 2017, and  
6 will use the NNR (number needed to read) index to ensure a sufficient number of selected  
7 articles<sup>22</sup>. All the identified articles will be imported into EndNote (reference manager) software.  
8 The current protocol follows the PRISMA-P (Preferred Reporting Items for Systematic Review  
9 and Meta-analysis) checklist and will report the review articles according to the PRISMA  
10 statement.<sup>23</sup>

## 11 **Data collection and analysis**

### 12 **Study selection**

13 In the first step, two reviewers (JH and MG) will test the screening questions based on the  
14 inclusion and exclusion criteria; then, the results obtained from the search method will be  
15 screened for possible duplications, and any possible duplications will be removed. Next, the  
16 same two reviewers will independently evaluate the articles according to their titles and  
17 abstracts. Conflicts will be resolved by discussion until a consensus is reached. If a consensus  
18 cannot be reached, a third reviewer (BA) will be invited to act as a referee or arbitrator. The  
19 inclusion criteria include articles published between 1990 and 2017, and the study population  
20 will include people traveling in different types of vehicles (both drivers and passengers). Studies  
21 on booster seats or child restraints will be excluded.

22 Scientific papers that match the inclusion criteria will be ordered for a full and complete review.  
23 Finally, to review eligibility criteria, the full texts of the remaining articles will be studied  
24 independently by two authors (JH and MG) (Figure 1).

### 25 **Data extraction**

26 The specific data of the studies, including the studied population, the applied design, the selected  
27 country, the achieved outcomes, and other necessary data, will be extracted independently by  
28 two reviewers (JH and BA) by using a quantitative data extraction form. Based on the data  
29 extraction approach, the type of determinant of seatbelt usage will be classified (Figure 1).

### 30 **Assessment of risk of bias of included studies**

31 Assessment of the risk of bias and methodological quality within the included studies will be  
32 conducted by two reviewers (JH and SR) independently, considering the items according to the  
33 Effective Public Health Practice Project (EPHPP) tool, Quality assessment tool for the  
34

1  
2  
3 assessment of the quantitative studies,<sup>24</sup> and the Newcastle-Ottawa Scale (NOS) for the  
4 evaluation of the quality of nonrandomized studies in the current review.<sup>25</sup> We will also use the  
5 Joanna Briggs checklist for qualitative research for the qualitative studies.<sup>26</sup> According to the  
6 scores achieved, the studies will be classified into three different categories including high  
7 quality, fair quality, and poor quality.  
8  
9

### 11 **Assessment of publication bias**

12 To explore the possibility of small study bias, the authors will assess funnel plots (i.e.,  
13 constructed plots of the achieved results versus precision) and Begg's and Egger's tests, when  
14 there are 10 or more included studies.<sup>27</sup>  
15  
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17

### 18 **Data Synthesis**

#### 19 **Descriptive analysis**

20 We will apply the narrative analysis method<sup>28</sup>, and the results obtained from the study will be  
21 descriptively reported in a summary table presenting complete information on the study  
22 population, study design, sitting patterns, quality of the performed study, behavioral patterns, and  
23 the results of seatbelt usage.  
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29 The authors expect that in the present systematic review, articles will be included from various  
30 study designs that are not appropriate to analyze the obtained data by using the meta-analysis  
31 approach. It should be noted that in the existence of conditions the authors will use meta-analysis  
32 and subgroup analyses to explore any possible sources of heterogeneity based on drivers versus  
33 passengers, passenger's location (front seats versus back seats), commercial versus passenger  
34 (personal) vehicles, and males versus females.  
35  
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37  
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#### 39 **Summary of the findings**

40 The authors will systematically and comprehensively describe the results obtained from each  
41 study, highlighting the important characteristics of the study including important similarities or  
42 differences (for example, study design, selected population, intervention, or other elements);  
43 then, the patterns in the data will be explored and described. The reasons for the occurrence of  
44 both similarities and differences of the outcomes found in the current study will be  
45 systematically explored, and possible explanations for the pattern of results will be considered  
46 and described or reported in a logical manner for each of the included studies.  
47  
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53 The guidelines of the Cochrane narrative synthesis will be employed as the framework for data  
54 synthesis. These guidelines describe the following four main steps for the narrative synthesis:  
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57

- 1
- 2
- 3 1. Developing a theory of how the intervention (exposer) works, why, and for whom?
- 4
- 5 2. Developing a preliminary synthesis of the findings of the included studies.
- 6
- 7 3. Exploring the relationships in the accumulated data within and between the performed studies.
- 8
- 9 4. Assessing the robustness of the synthesis.<sup>29</sup>
- 10

## 11 **Ethics and Dissemination**

12 Because no primary and experimental data will be collected in the present study, adherence to  
13 formal ethical guidelines in the current study is not necessary. The authors will conduct a full  
14 and comprehensive search in various electronic databases; additionally, study selection and data  
15 extraction will be performed. The strategy mentioned in the method and the analysis section will  
16 be performed by two independent reviewers, and the authors will try to maintain the rights of the  
17 authors of the current research and the cited articles' in the present systematic review. The  
18 findings of the current review will be published in a relevant peer-reviewed journal.

## 19 **Discussion**

20 The use of seatbelts is the most logical way to reduce collision leading to death and serious  
21 injuries<sup>30</sup>. Although a seatbelt by itself cannot prevent collisions, it has an effective role not only  
22 in reducing the injuries' intensity but also in preventing possible damage to passengers and  
23 drivers.<sup>8</sup>

24 Thus far, few systematic reviews, meta-analyses, and protocols have been published on the use  
25 of seatbelts<sup>11, 31-32</sup>. However, none of them comprehensively studied the determinants of the  
26 behavior of seatbelt use. We found only one meta-analysis that reviewed factors influencing the  
27 rate of seatbelt use in the United States<sup>33</sup>. Hence, a systematic review is required to  
28 comprehensively identify the determinants of seatbelt use.

29 The present study will clarify unknown aspects of the reasons why some people use or do not use  
30 seatbelts. Studies on the determinants of the behavior of seatbelt use may help to identify the  
31 determinants that contribute mostly to seatbelt use by car occupants and provide a  
32 comprehensive framework of factors that significantly affect this behavior. Additionally, the  
33 current study will provide important information for researchers, stakeholders in public health  
34 and policy makers, as well as for designing intervention programs to increase seatbelt use.  
35 Moreover, implications for future research may be drawn from the results obtained from the  
36 present study.

**Contributors**

JH, M GH, BA, SR, O-SH, YM, and HS conceived and designed the study. JH, M GH, BA, and SR developed the search strategies. JH, BA, and M GH were responsible for the initial drafting, editing of the manuscript, and approved the manuscript for submission. O-SH, HS, and YM revised the manuscript. JH and M GH will also screen potential studies, extract data, and assess their quality. Any discrepancies will be resolved by consensus between JH and M GH. When consensus is not reached, BA will act as an arbitrator to make a final decision.

**Competing interests**

The authors declare that there is no conflict of interest.

**Funding**

Not applicable.

**Data sharing statement**

To gain access to the data, the researchers should submit a detailed description of their projects, as well as personal identification and institutional affiliation, and a complete list of data should be requested. All applicants will be required to sign an agreement of confidentiality stating that data will not be transferred without permission and that no attempts will be made to identify the participants.

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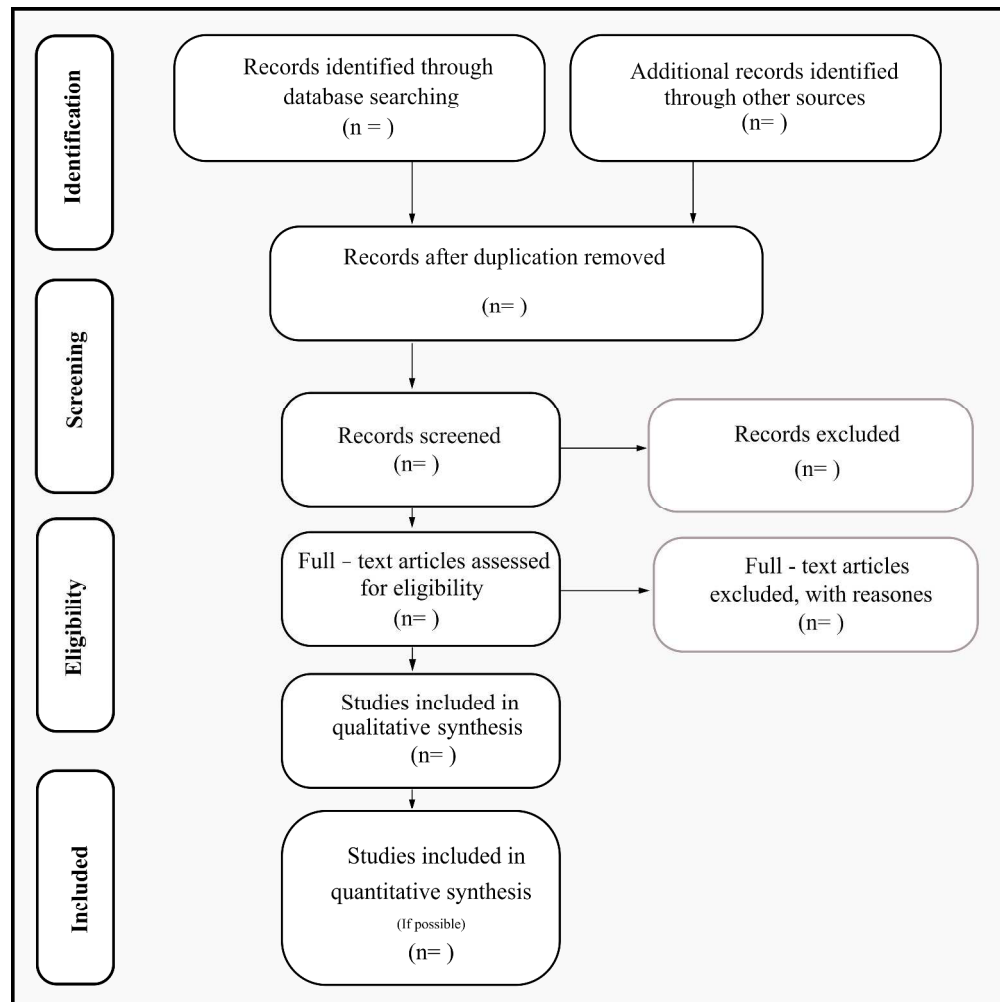
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## 26 **Figure Legends**

27 **Figure 1:** Flowchart presenting an overview of the search results.  
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39 Figure 1: Flowchart presenting an overview of the search results.

40 501x501mm (300 x 300 DPI)



**APPENDIX 1: Search strategy for MEDLINE via PubMed**

- 1. “Determinant Factor”**
- 2. Correlate**
- 3. Contributor**
- 4. Predictor**
- 5. Factor**
- 6. Determinant\***
- 7. 1 OR 2 OR 3 OR 4 OR 5 OR 6**
- 8. Seatbelt**
- 9. “Safety belt”**
- 10. “Belt seat”**
- 11. “Seat belt”**
- 12. “Road safety”**
- 13. 8 OR 9 OR 10 OR 11 OR 12**
- 14-(1990/01/01:2017/12/31[dp])**
- 14 – 7 AND 13 AND 14**

**PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol\***

Section and topic	Item No	Checklist item	Reported On page
<b>ADMINISTRATIVE INFORMATION</b>			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	P:1 line:1,2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	NA*
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	P:2 line 44
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	P:1 line 6-20
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	P:14 line 291-296
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	P:14 line:298-304
Support:			
Sources	5a	Indicate sources of financial or other support for the review	NA
Sponsor	5b	Provide name for the review funder and/or sponsor	NA
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	NA
<b>INTRODUCTION</b>			
Rationale	6	Describe the rationale for the review in the context of what is already known	P:3,4 line:50-88
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	P:4,5,6 line 90_134
<b>METHODS</b>			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	P:6
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	P: 6,7,8
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	P:10

Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	P:10,11
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	P:8,9,10
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	P:8,9
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	P:5,6
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	P:6
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	P:9
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	P:11
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as $I^2$ , Kendall's $\tau$ )	NA
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	P:11
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	P:10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	NR

\* NA: Not Applicable    NR: Not Reporting