

# BMJ Open Biopsychosocial factors associated with non-recovery after a minor transport-related injury: protocol for a systematic review

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## ABSTRACT

**Introduction** Globally, road transport accidents contribute substantially to the number of deaths and also to the burden of disability. Up to 50 million people suffer a transport-related non-fatal injury each year, which often leads to long-term disability. It has been shown that substantial number of people with minor injuries struggle to recover and the reasons are still not well explored. Despite the high prevalence, little is known about the factors hindering recovery following minor traffic-related injuries. The aim of this paper is to present a protocol for the systematic review aiming to understand biopsychosocial factors related to non-recovery and identify current gaps in the literature.

**Methods and analysis** The review will be conducted in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocol guidelines. A search of the electronic databases, MEDLINE, EMBASE, Cochrane Central Register of Controlled trials, will be undertaken, in addition to Google Scholar and grey literature to identify studies in period from 2006 to 2016. Quantitative and qualitative research articles describing and identifying biopsychosocial factors associated with non-recovery and health outcomes such as pain, disability, functional recovery, health-related quality of life, post-traumatic stress disorder, depression, anxiety and return to work will be included. A conceptual framework developed to identify biopsychosocial factors will be applied to assure defined criterion. At present, there is little anticipation for meta-analyses due to the heterogeneity of factors and outcomes assessed. Therefore, a narrative synthesis based on study findings will be conducted.

**Ethics and dissemination** Ethical approval is not required as primary data will not be collected. Review results will be published as a part of thesis, peer-reviewed journal and conferences.

**Trial registration number** PROSPERO registration number: CRD42016052276.

## INTRODUCTION

Worldwide, road transport accidents contribute substantially to the number of deaths and also to the burden of disability. WHO estimates that by 2020 road accidents will be the third leading cause of disability.<sup>1</sup>

## Strengths and limitations of this study

- This will be the first systematic review evaluating biopsychosocial factors associated with non-recovery across the different types of minor transport-related injuries.
- The review has distinct inclusion criteria and clearly outlines how the items will be selected and abstracted.
- The review aims to offer highest level of evidence on factors deterring recovery after minor traffic-related injuries.
- However, due to the variety of factors and relevant outcomes, comparison of the outcomes may not be possible.
- The potential issue of heterogeneity across the studies may affect the study results.

According to WHO data, deaths from road traffic injuries account for around 25% of all deaths from injury.<sup>2</sup>

Minor injuries are the most recurrently reported injuries following a transport-related accident.<sup>3</sup> While the number will fluctuate between countries, the literature suggests that the total incidence of minor injuries (musculoskeletal and soft tissue) has increased in the last 30 years.<sup>4</sup> Whiplash and whiplash-associated disorder (WAD) are the most frequently reported minor injuries following a transport accident.<sup>3 5–10</sup> Other minor injuries include contusions, skin abrasions, lacerations, sprains and strains, as defined by Minor Injury Guidelines. The guideline defines a Minor injury as follows: 'minor injury means a sprain, strain, WAD, contusion, abrasion, laceration or subluxation and any clinically associated sequelae. This term is to be interpreted to apply where a person sustains any one or more of these injuries'.<sup>11</sup> Despite a substantial amount of WAD epidemiology and treatment research, understanding factors that hinder and

obstruct recovery for WAD and other minor injuries is scant.<sup>5</sup>

The complexity and heterogeneity of the profile, of those suffering minor traffic-related injuries are reasons to explain why many people do not recover as expected.<sup>12</sup> It has been estimated that approximately half of the patients with minor injuries may never completely recover<sup>13</sup> and large proportion of people with WAD would suffer psychological distress for at least 3 years postaccident.<sup>14</sup>

In Victoria, while preventive methods have been directed to patients with major injuries, there are no preventive recommendations and rehabilitative guidelines for patients with minor injuries. Yet, it is believed that there is much to be achieved by understanding factors and interventions aimed at reducing long-term disability and improving recovery for those who have sustained minor injuries.<sup>15</sup> It is also important to note that there are various complexities in treating and managing patients with minor injuries. Although it is expected that not everyone who sustains a minor injury will develop persistent symptoms, cautious consideration is required to understand and identify in a timely manner those patients with minor injuries who are at high risk of protracted recovery.

### Minor transport-related musculoskeletal injuries

The severity of injuries between different groups and patients are compared according to different scales. Numerous injury severity scales exist in practice and in the literature. However, the assessment of motor vehicle injuries relies mainly on the Abbreviated Injury Scale (AIS).<sup>16</sup> AIS is the first broadly implemented injury severity scale used in practice and is primarily an anatomical measure of injury severity. It classifies severity on the basis of the region of the body injured and the degree of the injury in that particular body region. For example, an AIS score of 1 interprets a minor injury, while an AIS score of 6 is considered as a non-survivable injury. It is important to note that the scores from 1 to 6 do not reflect an interval scale, and comparable AIS scores may not be similar across different body regions. In summary, a higher severity score indicates a gradually more severe injury.<sup>17</sup>

The most common types of minor transport-related injuries are musculoskeletal and/or soft tissue injuries.<sup>18</sup> Musculoskeletal injuries refer to those which affect muscles, bones, joints, tendons, ligaments, cartilage and spinal discs. Soft tissue injuries can arise in any soft tissue in the body. If they occur in the skin, they are known as contusions, in the muscle they are identified as strains, and in the tendons and ligaments, they are recognised as sprains.<sup>19</sup> While some of these injuries are benign and do not require complex treatments, others may lead to chronic and persistent challenges.<sup>20 21</sup> The cause of protracted symptoms are thought to be complex and multifactorial. According to the literature, these conditions are often shown to be painful and require medical intervention. Minor injuries are usually treated in primary

healthcare. However, some require specialist intervention, treatment and, in some cases, hospitalisation.<sup>22</sup> It is to note that there is no current evidence of types and number of medical treatments which would be most beneficial for patients with minor traffic-related injuries.

### Rationale and objectives

There is still paucity of research into predictors and determinants of recovery following minor injuries. In clinical practice, there remains a lack of recognition that patients with minor injury may have a slow recovery and long-term adverse biopsychosocial consequences.<sup>3</sup> Previous research demonstrates differences in patient's recovery outcomes and identifies a number of factors leading to long-term disability and poor health outcomes.<sup>23–27</sup> However, the results are not consistent and generalisable to larger population. It is evident that more research is needed to understand and investigate whether early identification of the most predictive factors could reduce chronicity and long-term disability. It is also believed that the quality of management of the most common types of minor injuries should be improved.<sup>28</sup> In conclusion, these patients should be identified as early as possible in their injury trajectory so that active support and management can be provided.

The objectives of the proposed systematic review are to identify and assess biopsychosocial factors and relevant predictors of non-recovery and determine the benefits of using biopsychosocial model (BPS) or approach on identifying health outcomes after minor transport-related injury.

### METHODS AND ANALYSES

A detailed description on population, intervention, comparison and outcome of the systematic review is outlined in [table 1](#) and described below:

#### Inclusion criteria

Articles will be included if they are:

- ▶ Investigating patients sustained minor transport-related injury;
- ▶ Assessing biological, psychological and social factors as defined by BPS model of health<sup>29</sup>;
- ▶ Using BPS model of health as a core model or approach for identifying health outcomes;
- ▶ Published in English language;
- ▶ Published in the last decade (from January 2006 to December 2016).

#### Exclusion criteria

Articles will be excluded if they were:

- ▶ Published in a language other than English;
- ▶ Published prior to January 2006 or after December 2016;
- ▶ Describing work-related injury;
- ▶ Not using validated tools to measure recovery outcomes;

**Table 1** Description of the population, intervention, comparison and outcome (PICO) of the systematic review

Serial no	PICO	Descriptions
1	Population	Injured people who were involved in a transport accident and have sustained one or more minor injuries (eg, whiplash, contusion, sprain, strain, abrasion and laceration)
2	Intervention	The main phenomena of interest are articles identifying biopsychosocial factors impacting recovery (3, 6, 12, 24 and 48 months post-accident) with following inclusion and exclusion criteria: Articles will be included if they were: <ul style="list-style-type: none"> <li>▶ Describing minor transport-related injuries</li> <li>▶ Describing either biological, psychological and social factors impacting recovery</li> <li>▶ Identifying related health outcomes using one or more biopsychosocial models or tools</li> </ul> Articles will be excluded if they were: <ul style="list-style-type: none"> <li>▶ Written in a language other than English</li> <li>▶ Written prior to January 2006 or after December 2016</li> <li>▶ Describing work-related injury, articles on moderate and severe or fatal transport-related injuries</li> <li>▶ Investigating other type of outcomes (eg, compensation outcomes, cost-associated outcomes) or the impact on cost and quality of compensation systems</li> </ul>
3	Comparison	Comparators: <ul style="list-style-type: none"> <li>▶ Articles on factors facilitating recovery and health outcomes</li> <li>▶ Studies without a comparator will be considered for inclusion</li> </ul>
4	Outcome	Primary outcome measure is: <ul style="list-style-type: none"> <li>▶ Pain</li> <li>▶ Disability</li> </ul> Secondary outcome measures are: <ul style="list-style-type: none"> <li>▶ Functional recovery</li> <li>▶ Health-related quality of life</li> <li>▶ Psychological outcomes (depression, anxiety, post-traumatic stress disorder, sleeping disorders, fear of movement, coping skills, pain catastrophising)</li> <li>▶ Social outcomes (return to work, return to usual daily activities, self-reported driving difficulty and procedural, interactional and informational justice)</li> </ul>

- ▶ Involving children and describing paediatric injuries;
- ▶ Describing moderate and severe or fatal transport-related injuries (based on AIS scores of 2–6);
- ▶ Investigating other type of outcomes (eg, compensation outcomes such as cost, time to claim closure, impact on cost and quality of compensation systems or services);
- ▶ Unpublished manuscripts, dissertations, books and book chapters, conference proceedings, meeting abstracts, and guideline statements will be excluded.

### Study design

Quantitative (eg, cohort, longitudinal, case studies, prospective and retrospective) and qualitative studies (eg, ethnography, phenomenological, grounded theory and case report) exploring biopsychosocial factors impacting recovery and related health outcomes in patients with minor transport-related injury will be included. Mixed methods research articles will also be included in the review.

### Comparator(s)/control

Comparators such as positive factors and factors enabling recovery after minor transport-related accident will be considered for inclusion.

### Context

Studies conducted in the clinical environments such as acute care (emergency departments) and subacute care (primary healthcare, pain clinics, rehabilitation centres) will be included. Settings such as insurance databases and registries will also be included.

### Outcome measure/outcome of interest

The following outcomes will be investigated:

- ▶ Functional recovery (eg, return to pre-accident level of functionality or independence or usual activities)
- ▶ Disability (eg, temporary, long-term, permanent)
- ▶ Pain intensity (eg, low, moderate, severe)
- ▶ Health-related quality of life (eg, poor, good)
- ▶ Psychological outcomes (eg, depression, fear, sleep disorder, anxiety, post-traumatic stress disorder)
- ▶ Social outcomes (eg, socioeconomics, return to work, family and community support, quality of healthcare).

### Search methods

The database records and details of how the search was undertaken will be maintained at each stage of the review process. A senior medical librarian (LR) will assist in the final draft of the search strategy.

The suggested review will search the following electronic databases: MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials and the Google Scholar. If relevant, grey literature such as government reports may also be included. The search strategy will be developed in Medline and then adopted to the other databases. It will include the subject headings specific to each database and a free text word specific to review inclusion criteria. The complete search strategy can be seen in online supplementary appendix 1. Databases containing the results of the searches will be created using EndNote X7.

### Study screening and selection

A three-phase screening process will be applied. In phase one, an experienced medical librarian (LR) and a researcher (SS) will conduct the initial search. In a second phase, two researchers (SS, SME) will independently screen the titles and abstracts of all articles identified in the search strategy to determine eligibility and classify studies as relevant, possibly relevant and irrelevant. During the last phase, the researchers (SS, RR) will independently review the full text to make a final determination of eligibility. Any disagreements that arise between the reviewers will be resolved through a discussion and consensus. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocol methodology, checklist and standard search strategy using predefined inclusion and exclusion criteria and structured data abstraction tools will be used.

### Data extraction

Data from the relevant articles will be assessed based on the Cochrane data abstraction form.<sup>30</sup> The data will be extracted by two reviewers (SS, RR) and any inconsistencies arising will be identified and resolved through discussion with a third reviewer. Evidence will be synthesised based on the following information:

- ▶ study period (start and end date)
- ▶ study population (number of participants)
- ▶ type of study (quantitative or qualitative)
- ▶ injury studied (type and severity of injury)
- ▶ outcome/s of interest
- ▶ tools used to identify outcomes
- ▶ type of factors (biological, psychological and social)
- ▶ effect and directions of biopsychosocial factors on outcome/s (prediction and impact)
- ▶ limitations of study
- ▶ key findings and recommendations.

### Data management

The relevant review documentation and search results will be uploaded and saved in faculty-allocated network storage (S-drive) located in Monash University and will be backed up on faculty-allocated network storage. The data will be accessed only by the reviewers.

### Study quality and assessing risk of bias

A critical appraisal for quantitative studies will be made using the Scottish Intercollegiate Guideline Network (SIGN) tool to assess risk of bias for individual quantitative studies included in the review.<sup>31</sup> SIGN provides checklists to assess the quality of systematic reviews and meta-analyses, randomised control trials, cohort studies, case-control studies, diagnostic studies and economic studies. This criteria will assist with the evaluation of the impact of detection, selection, performance, information bias and confounding on study results. Two review authors (SS, RR) will independently appraise the methodology of the included studies and categorise the study as being of high (++), acceptable (+) or unacceptable (0) quality. Qualitative studies will be assessed based on the Cochrane guidance for inclusion of qualitative research in systematic reviews.<sup>32</sup> Core elements of credibility, transferability, dependability and confirmability will be assessed and reported. The Standards for Reporting Qualitative Research<sup>33</sup> tool covers all the recommended criteria for assessing risk of bias in qualitative studies and will be used for critically appraising methodology of qualitative studies. Any discrepancies arising will be discussed between the reviewers.

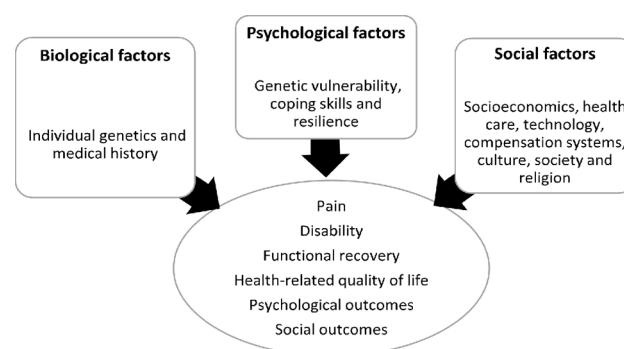
### ANALYSIS

#### Descriptive analysis

The conceptual framework has been developed to identify biopsychosocial factors impacting recovery and relevant health outcomes (figure 1). The Cochrane data abstraction criteria<sup>30</sup> will be used to synthesise the results of the included studies.

#### Statistical analysis

Unavoidably, number of different studies brought together will differ and high variability is expected for the proposed review. It is anticipated that there will be limited capacity to undertake a meta-analysis because of the range and the heterogeneity of the factors, outcomes and profile of those who have sustained a minor transport-related injury. However, careful consideration will be undertaken involving a consultation with a systematic review experts based on the attributes of the included



**Figure 1** Conceptual framework for identifying factors impacting recovery after traffic-related accident.



studies. If a decision is made to conduct a meta-analysis, reviewers will consider recommendations on selecting an appropriate method for dealing with heterogeneity in meta-analysis outlined by Schroll *et al.*<sup>34</sup> We will likely consider random-effect meta-analysis as it is highly unlikely that all studies will be functionally equal. If we determined that heterogeneity is too large and decide not to pursue meta-analysis, we will present descriptive analyses of the included studies.

## DISCUSSION

The proposed review aims to improve understanding of non-recovery after minor injuries and its associated factors. It intends to assess the best available evidence of the biopsychosocial factors hindering recovery following a minor transport-related accident. The review main aim is to provide a detailed description of a range of biological, psychological and social factors and explain why some people with minor injuries do not recover as expected.

The results of this study should form the basis to better understand recovery after minor injury and inform health policy and clinical management about current evidence in the literature.

However, it is to note that there will be challenges in the review process and also in interpreting findings. First, the evaluation of the primary outcomes will depend on the intervention and tools used to identify these outcomes. Second, as some minor injuries do not require hospitalisation, less physical proof will be available for this group. Third, data on social outcomes may not be representative as it may not be reported in a sufficient number of studies.

In conclusion, the proposed systematic review will aim to identify gaps in the current knowledge and provide a detailed summary of factors deterring recovery at different time points after traffic-related injury based on the BPS model of health.

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**Contributors** SS, SME and RR have contributed in developing the idea and methodology for systematic review. SS registered the protocol with PROSPERO and drafted the first manuscript which was reviewed by all the authors. The constructive feedback was given from SME and RR and encompassed in the final version. The final version was critically revised by all the authors and finalised by SS. All authors read and approved the final manuscript.

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**Competing interests** None declared.

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