

# BMJ Open Assessing the effectiveness of workplace accommodations in facilitating return to work after traumatic brain injury: a systematic review protocol

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## ABSTRACT

**Introduction** Returning to work and sustaining employment can be a significant challenge for traumatic brain injury (TBI) survivors. Within the literature, there is recurring support for the role of workplace accommodations in effective and early return-to-work (RTW). To date, however, there has been a lack of systematic reviews exploring the specific role of workplace accommodations within the context of RTW after TBI. The primary objective of this protocol is to outline the methodological approach that will be undertaken to systematically review the literature and to assess the effectiveness of workplace accommodations in facilitating RTW.

**Methods and analysis** A total of nine databases will be searched systematically using the concepts ‘Brain injury,’ ‘RTW’ and ‘Job Accommodations.’ Study selection will be performed independently by three reviewers, based on predetermined eligibility criteria through two rounds of screening using, first, the title and abstract, followed by a full-text search. Extracted information will include the study’s purpose, design, and setting; the data source and type; the severity of TBI and the diagnostic criterion used; a comprehensive description of the intervention provided; the RTW outcome variables and the statistical methods used, etc. The data will be tabulated and narratively synthesised. Systematic review registration: This protocol has been registered with International Prospective Register of Systematic Reviews.

**Ethics and dissemination** As this review intends to use pre-existing published studies hence research ethics board approvals will not be required. Nevertheless, this review will follow the ethical and governance standards in the data management and presentation of results. The findings from this review will potentially be published in a peer-reviewed scientific journal (electronically and in print). The results of this review will be presented at both national/international conferences and shared with stakeholders influencing RTW practices.

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## BACKGROUND

Return-to-work (RTW) postinjury is a primary rehabilitation goal and perhaps the

## Strengths and limitations of this study

- This focused review addresses critical knowledge gaps in understanding how workplace accommodations can influence return-to-work (RTW) outcomes and which categories of workplace accommodations have a greater impact on the sustainability of RTW in the traumatic brain injury (TBI) population.
- Impact on health practitioners (physicians, rehabilitation professionals, vocational counsellors, etc.), researchers, policy-makers and survivors alike, that is, acquisition of implementable knowledge regarding the nature of the accommodations and their impact; directing resources towards evidence-based and cost-effective solutions; engaging TBI survivors to trial such accommodations early in their rehabilitation journey, etc.
- Exploration using a sex and gender lens offers a distinct advantage to understand the sex-based and gender-based influences on vocational outcomes.
- Heterogeneity of the TBI population, uniqueness of the employer/occupational variables as well as the individualised preferences and specific needs of the worker, as they relate to workplace accommodations, may pose a challenge for more precise interpretations.
- Environmental variables such as country of origin and, more specifically, variations in disability provisions, will need to be considered when interpreting the findings.

most reliable marker of functional recovery within a real-world context.<sup>1</sup> Returning to work and sustaining employment is a significant challenge for traumatic brain injury (TBI) survivors.<sup>2</sup> It is estimated that 60% of working age individuals with moderate to severe acquired brain injury are unable to RTW postinjury<sup>3</sup> and a substantial proportion cannot sustain RTW. There is evidence that early and targeted vocational rehabilitation is cost-effective and leads to improved



work-related outcomes.<sup>2</sup> Since TBI more frequently occurs during prime working years, when people aim for vocational goals and are acquiring the skills needed for success,<sup>4</sup> poor employment outcomes constitute a global health issue producing significant financial and societal burdens. The indirect economic cost of a TBI for working age Canadians is expected to increase to US\$8.2 billion by the year 2031, far exceeding costs of other common neurological conditions such as spinal cord injury, Parkinson's disease and multiple sclerosis.<sup>5</sup>

TBI is caused by 'a bump, blow, or jolt to the head or a penetrating head injury that disrupts the normal function of the brain'.<sup>6</sup> TBI is rated as mild, moderate and severe based on the initial trauma that caused the injury. Concussion and mild TBI (mTBI) are the most common of all TBIs,<sup>7</sup> yet there is lack of understanding regarding their management in the workplace. mTBIs and concussions can have long-term functional effects on activities of daily living and return to productivity.<sup>8</sup> This is evidenced by the fact that the number of time loss claims for work-related concussions has increased by over 400% in Ontario, Canada, from 2005 to 2013.<sup>9</sup> The sequelae resulting from TBI are often diverse (eg, headaches, memory difficulties, seizures, fatigue, visual and auditory deficits, etc.) and accommodating for these impairments is necessary to ensure successful functioning in any reintegrative setting, including academic environments.<sup>10 11</sup> While memory loss and attention/concentration concerns are the most common functional limitations reported by TBI survivors, the persistent difficulties with emotional deregulation and the presence of medical symptoms have been identified as strong indicators limiting job retention.<sup>12</sup>

Workplace accommodations (WAs) refer to the individually-tailored supports resulting from adaptations, alterations and/or modifications to job demands or workplace operations, which enable employee's equal access to essential aspects of their work.<sup>13 14</sup> Within the context of personal injury, WAs attempt to facilitate re-integration to pre-injury work status.<sup>15</sup> WAs can be implemented in various forms across all stages of recovery to facilitate RTW. They may include provisions for flex days, opportunities for untimed breaks, the option to work from home, the arrangement of a job coach for specific work-oriented tasks etc.<sup>16 17</sup>

Within the literature, there is recurring support for the role of WAs in effective and early RTW (e.g., shorter work absence duration,<sup>18</sup> reduced disability costs,<sup>19</sup> postponement or prevention of job loss, fewer job disruptions<sup>20</sup> and reduced productivity loss<sup>21</sup>). It is estimated that a significant proportion (83.5%) of workers with mental health conditions need accommodations, yet only 30.5% receive them.<sup>22</sup> After a musculoskeletal injury, workers who accept WAs are not only able to RTW but are also able to sustain work, compared to employees who rejected or did not receive an offer to accommodate.<sup>23</sup> In general, the use of compensatory strategies and supported employment practices enhance the likelihood of employment success after TBI.<sup>24</sup> Colantonio *et al*<sup>25</sup> have reported that 76% of

TBI survivors identified 'job modifications' and 'accommodations for treatment needs by employers' as factors that facilitated RTW. Stergiou-Kita *et al* have indicated that there is a lack of adequate understanding regarding the scope of WAs among both stakeholders, employers and employees.<sup>26 27</sup> A systematic review<sup>28</sup> did not find strong evidence to support that the patients' preinjury or post-injury characteristics, or rehabilitation interventions had any effect on productivity status and vocational outcomes after TBI. Yet, the review did not consider organisational or vocational modifications such as accommodations and natural supports. Kristman *et al*,<sup>29</sup> however, later reported that organisational factors are more important than demographic and occupational factors when considering RTW among employees with injuries other than TBI. Non-traditional determinants, such as family support, have been shown to play an equally important role in facilitating community and work reintegration following TBI.<sup>30</sup>

There is evidence to suggest that sex and gender exerts significant influences on RTW processes, yet the influence of sex and gender on workplace injuries and outcomes is understudied.<sup>31 32</sup> Further, these terms are often used interchangeably in the literature but they refer to different constructs. Recent evidence reveals low and inconsistent support for the argument that sex and gender significantly informs RTW after TBI<sup>33-35</sup> partly given the small number of females included in these samples; nevertheless positive outcome related to females in resuming work status after severe TBI is present.<sup>36</sup> After adjusting for demographic and health characteristics, adverse life events independently predicted increased rates of sickness-related absences among women<sup>37</sup> in a sex-balanced sample. Franche *et al* have reported that, following an occupational musculoskeletal injury, pink-collar employees (referred to as female-dominated occupations such as clerical, sales and service) are significantly more likely to receive an offer for accommodation, they are also more likely to refuse accommodations compared with their blue-collared counterparts (referred to as male-dominated occupations such as manufacturing, materials handling, construction, transport, mining).<sup>23</sup> The reasons for these discrepancies remain to be explored. A systematic review<sup>38</sup> on prognostic indicators of mTBI outcomes found that only 7% of >200 studies reviewed provided data stratified by sex. We are not aware of any other recent systematic reviews on RTW after TBI wherein the evidence was stratified by sex and gender.

To date, there has been a knowledge gap created by the lack of systematic reviews exploring the specific role of WAs within the context of RTW after TBI. While there are studies and reviews that have investigated the role of work-related interventions on RTW, these reviews have focused on care and therapeutic programmes or multidisciplinary intervention(s) that impact RTW including vocational rehabilitation.<sup>39-41</sup> Donker-Cools *et al* conducted a systematic review<sup>42</sup> and found strong evidence that interventions with a combination of work-directed components

are facilitating RTW in TBI survivors. Nevertheless, the extracted data in this particular review paired rehabilitation interventions with work-related supports/aids to explain combined effects, vs stratifying for specific outcomes. Another scoping review concluded that WAs appear to be important for supporting employees with mental illness, but identified the implementation and evaluation of WAs as an area for further research.<sup>43</sup> A more recent systematic review focused on workplace factors, conducted by Alves *et al*,<sup>44</sup> identifies that onsite workplace adaptations are potential avenues for increased RTW yet there remains lack of a robust evidence base concerning the association between modifiable workplace factors and work retention after experiencing ABI; the scope of their work, however, was broad and included both traumatic and non-TBIs. Hence, while it is important to understand WAs from policy, legislative and social perspectives, it is perhaps more paramount to investigate the direct impact of WAs on employment re-entry and retention. Also, it is important to investigate the influence of sex and gender on the offer, acceptance and implementation of WAs.

The primary purpose of this protocol is to outline the methodology for a project that will systematically review the literature to identify and characterise the categories of WAs that best facilitate re-entry to work and investigate the translational effect of successful WAs on the effectiveness of vocational outcomes, specifically RTW and, more importantly, long-term sustainability after RTW. The secondary aim is to consolidate and synthesise the quantitative and qualitative evidence in the literature, although separately. This review's final goal is to determine whether sex and gender variables are correlated with the effectiveness of accommodations in promoting re-entry into the workplace.

## METHODS/DESIGN

### International Prospective Register of Systematic Reviews

This protocol has been registered with International Prospective Register of Systematic Reviews (PROSPERO 2016:CRD42016043517), an international prospective register of systematic reviews database in health and social care, welfare, public health, education, crime, justice and international development, where there is a health related outcome.

### PATIENT and public involvement

No patients involved.

### Search strategy

The search strategy was developed with an information specialist at the Toronto Rehabilitation Institute-University Health Network. A modified Population, Intervention, Comparison, Outcome (PICO) framework was used to facilitate and refine the search strategy in accordance with an evidence-based approach. The PICO framework was modified given that a comparison patient population and/or intervention was not considered. The search

strategy was developed using a combination of comprehensive and specific subject headings and keywords, to balance sensitivity with specificity, and render articles across a wide spectrum of specific literature. The patient population was defined using broad terms such as “brain injuries”, “craniocerebral trauma”, “head injuries, closed” and “TBI” and the use of specific keywords which included but were not limited to “head”, “intracran\*”, “concuss\*”, and “brain” combined with “trauma”, “edema” and “lesion” using adjacent and wildcard operators. Broader terms such as ‘return to work’, “employment”, “occupations” and “workplace” were used to search for articles, while specific narrow-focussed keywords such as “absenteeism”, and “work” were searched with “status”, “activit\*”, “abilit\*” and “capacity” while additional keywords such as “return” were searched with “work” and “dut\*” using the adjacent and wildcard operators to render relevant non-traditional publications. In the latter combination, the intend was to include a broad range of literature where the title, abstract and/or author provided keywords included traditional keywords like ‘return to work’ but also other variants such as ‘returning back to work’ or ‘return to part time work’ or ‘returning to modified duties’ or ‘returned to preinjury duties’ etc. Similarly, generic heading such as “equipment and supplies” and “Work Capacity Evaluation” were searched alongside “ergonomic”, “jobsite” with “interven\*”, “duties” “counsel\*”, “training” and “approach\*”, again using the adjacent and wildcard operators. These alternative terms helped capture publications that may have been excluded with reliance on more commonly deployed workplace adaptation keywords.

Search terms were also adapted from previously published systematic reviews on the topic.<sup>45 46</sup> The search terms and search strategy were independently peer-reviewed by another information specialist. Changes and suggestions were incorporated before the search terms were translated across nine databases, that is, (1) Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, (2) EBM Reviews Cochrane Central Register of Controlled Trials, (3) EBM Reviews Cochrane Database of Systematic Reviews, (4) Embase, (5) PsycINFO, (6) CINAHL, (7) PubMed, (8) OT SEEKER and (9) Health and Safety Science Abstracts. Additional online supplemental file 1 provides the search strategy for each database. Furthermore, conference materials such as abstracts, editorials and/or commentaries will be excluded as they do not provide sufficient information required for the purposes of this review. All database results will be limited to English language. A limit to human only studies will be applied.

### Study selection

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines for systematic reviews will be used to report the findings of this review.<sup>47</sup>

Study selection will be completed by three reviewers, pre-determined eligibility criteria will guide all three reviewers and screening will be undertaken in two steps.



Level I screen will involve screening of studies based on their titles and abstracts only. The level I screen inclusion criteria are: (1) study participants must have sustained a TBI (irrespective of the mechanism or place of injury), (2) an outcome related to RTW must have been reported and (3) study participants must be of working age (18–65 years). The primary outcome of interest, ‘RTW’, is defined as a postinjury attempt to resume competitive gainful employment. Each article may have one of three possible ratings, that is, ‘yes’, ‘no’ and ‘maybe’. All three reviewers will discuss articles that have non-matched ratings; if consensus is not achieved, mediation consultation will be undertaken. Articles that pass the first screen criteria will proceed to the full-text level II screen. The level II screen entails a full-text screening of articles. Two additional criteria will be considered during the full-text level II screen: (1) study participants were working at the time of the injury/loss and (2) an intervention that includes WAs (of any kind) was provided to facilitate the RTW. The decision to screen for WAs during full-text screening is made after much deliberation as it is thought that a large proportion of titles and abstracts may not clarify the details of the interventions, specifically WAs, in an abstract when discussing RTW outcomes, hence, risking the erroneous elimination of articles that could have met the inclusion criteria.

For the purposes of this review, our operational definition of ‘WA’ is ‘any measurable change and/or alteration in the process flow of an organisation, materials used to accomplish a job demand, services provided/used at the workplace and/or routines for oneself (or others) to compensate for impairments or modify a work environment after a condition, disorder, injury and/or illness in an attempt to facilitate re-entry into the workforce’ (Adapted from refs. 48 49). All study designs will be included, for instance, randomised and non-randomised controlled trials, case-control studies, cohort and longitudinal studies, retrospective analysis, scoping or systematic reviews, case studies, qualitative studies and/or mixed methods research studies. Qualitative and case studies will particularly be included as they may contain details which quantitative exploration alone cannot capture. With respect to vocational status, all types of employment (full time, part time, casual, contract, self-employed, etc.) and occupational categories will be considered. The same will be true for injury severity, whereby all mild, moderate and severe injuries will be considered. All types of injury mechanisms (blunt and penetrating trauma) will be included. Depending on the nature of the data, analysis will be stratified by sex, age and injury severity. Data from international publications, although written in English, will be included.

### Data extraction and management

All three reviewers will develop and pilot the data extraction form. The form will be modified to ensure that relevant data is captured for the assessment of study quality. The data extraction form will include author(s),

study title, publication year, the year the study data was collected, purpose of study, study design, study setting (including the country of study, methods employed for recruiting study participants), sample size, demographic and vocational characteristics of the study participants, data source or type (e.g., retrospective, interviews, etc.), severity of TBI and the diagnostic criterion used, statistical methodology used (e.g., descriptive, analytical and/or stratification techniques), comprehensive description of the intervention provided (e.g., employer initiated, RTW coordinator, occupational therapist, case manager, etc.), duration of RTW, subsequent follow-up(s), characteristics and costs of the accommodations provided, outcome of the stated intervention, etc. Where possible, the outcome ‘RTW’ will be further clarified, that is, distinctions will be made between RTW at the preinjury job versus RTW at a new job, whether the new job is comparable to pre-existing job demands and/or remuneration and whether it is made possible with/without added training and/or accommodations and whether return to the preinjury job occurred with modification and/or accommodation, etc. If possible, secondary outcomes such as quality of life, health status and satisfaction indicators will also be reported in a separate table. The stated conflicts of interest and ‘Risk of Bias’ assessments will also be presented in a table.

Study data included after the level II screen will be extracted by two reviewers using a blinded extraction process. Reviewers will cross-review the collected data to document and address any discrepancies and rationales. Following this comparative analysis, the revised data extraction will be peer-reviewed by the third reviewer. Completed data extraction forms will be archived, and information from these forms will be entered and stored in Excel. One reviewer will independently check the data entry for accuracy.

### Quality assessment

The Critical Appraisal Skills Programme (CASP) checklists<sup>50</sup> will be used to assess study quality by guiding the assessment of validity and reliability of the included studies. The rationale for selecting the CASP checklists was made primarily due to the availability of separate checklists for different study designs such as cohort studies, review papers, randomised controlled trials and qualitative studies. Two reviewers will complete the checklists, through a blinded process, and later cross-review to document and address any discrepancies and rationales. Following consensus, the third reviewer will peer-review all checklists associated with this review’s articles. With respect to missing data, study authors may be contacted for any queries regarding relevant data capture or additional data required to assess the risk of bias. Interstudy bias will be reported separately in a table and may be discussed in the narrative.

### Data analysis, synthesis and reporting

Data will be collected from each study and tabulated in a summary table. Due to the anticipated heterogeneity

of study designs, patient cohorts, variability of outcome measures as well as personal and vocational factors (organisational structure, work industry, employment type, etc.), outlining a single metric for WAs would undermine the richness of the existing data; hence, a meta-analytical approach or data pooling may not be feasible. Also, we anticipate that there will be few controlled studies that would be rated as high quality using typical level of evidence paradigms. Given the customisable and individualised nature of WAs, we believe that the richness of the data will actually come from small cohort, case-control, case-series and qualitative studies. Below we have outlined our intended approach to incorporate findings from all levels of evidence.

Nevertheless, descriptive statistics will be used to characterise and synthesise the evidence from quantitative studies while data from qualitative studies will be summarised by identifying prominent and prevalent themes. A sequential exploratory mixed-methods approach<sup>51</sup> will be used to analyse the extracted data. All relevant raw text narratives describing WAs provided to facilitate a RTW outcome will be compiled for each study. After reiterative readings, an inductive approach will be used to condense the relatively extensive raw data by assigning codes to the text narratives and establishing a consolidated group of broader meaningful categories for WAs. While a qualitative approach will be used to characterise and consolidate the data, a quantitative methodology will be used to determine statistically significant associations between WAs and the RTW outcome. This approach is intended to enhance the utility and impact of the findings.<sup>52</sup> A data analysis strategy<sup>53</sup> may be used to aggregate results, integrate the original meaning of the primary studies and reconstruct the findings to facilitate new interpretations of the data. The sources of the synthesised information from quantitative and qualitative studies will be reported separately.

### Subgroup analysis

With sufficient data, subgroup analyses will be undertaken to investigate differences in outcomes. Given the expansion of the literature with respect to sex and gender differences in outcomes, two relevant Cochrane tools will be used, that is, the Sex and Gender in Systematic Reviews Planning Tool and the Equity Checklist for Systematic Review Authors.<sup>54 55</sup> This unique investigation will clarify differences observed in data collection, analysis, and interpretation across studies. To examine the impact of interventions on inequality, the data will be further assessed using an intersectional lens to better understand the contributions of social determinants of health (eg, age, race, education, socioeconomic status, etc.) on the outcomes of RTW and productivity.

The review will be undertaken according to this published protocol. Any deviations from the protocol will be reported in a separate subsection and labelled 'differences between published protocol and review'.

## DISCUSSION

We believe this focused undertaking is the first of its kind. At this time, there have been no systematic reviews exploring the effectiveness of specific WAs that facilitate and/or sustain RTW after TBI. Reviews published to date have generally considered the combined role of care programmes such as outpatient rehabilitation programmes, generic workplace interventions, the impact of community-based remediation on RTW and/or return-to-productivity outcomes.

The Convention on the Rights of Persons with Disabilities,<sup>56</sup> Disability Discrimination Act<sup>57</sup> as well as the Canadian Human Rights Act (CHRC)<sup>14</sup> mandates equal rights and opportunities at the workplace, that is, employees with disabilities are entitled to the same opportunities and benefits as people without disabilities. Under the legal test, CHRC, the employer has a duty to take reasonable steps to accommodate the position of an employee unless the employer's business would suffer 'undue hardship'. Although the Guides for Assessing Persons with Disabilities<sup>49</sup> have provided some guidance regarding the interpretation of undue hardship, operationalising the construct of WAs has been short of easy. We believe this review will help shed light on the various conceptualisations of accommodations within the workplace and how WAs are operationalised within the practice of RTW following TBI. Investigating effective interventions that facilitate returning TBI survivors to work not only has the potential for short-term impact on a person's working life and ability to contribute to the economy, but also on the long-term health and well-being of society.

Given the evolving workforce, certain work-related supports are naturally embedded within the workplace, available for all employees and not considered a customised adjustment. These are often referred to as 'natural supports'. It is important to distinguish between WAs and natural supports, the former being a support customised for a particular worker who is encountering difficulties with work resumption. This review, however, will be focused specifically on WAs.

Effective WAs hold the potential to foster inclusive work designs for TBI survivors who are considering a return to employment. Given that a large proportion of TBI survivors face challenges reintegrating into the workforce, the study has implications from a labour market policy perspective. The information gathered and consolidated in this review will help health practitioners, policy-makers, researchers and other workforce-related stakeholders make informed decisions when considering service delivery or future research into RTW for TBI survivors. With respect to service delivery, the 'low cost and high impact'<sup>58</sup> feature of WAs makes it not only easy to implement but also economically lucrative. Added benefits of WAs include retention of previously trained employees and hence elimination of costs associated with training a new employee, boosted morale among workers and an increased sense of well-being at both individual and societal levels.



Traditional RTW practices focus excessively on sickness and disability, whereby, based on a reported mismatch between the client's limitations and the demands of the job—a worker is deemed 'unfit to work'. In 2010, the UK replaced its 'sickness certificate' with a statement of fitness for work also known as the 'fit note'.<sup>59</sup> The shift in methodology from 'not fit to work' to 'fit to work' (if the employer is able to make necessary modifications) transformed the traditional 'disability' lens into a 'functional' focus. Currently, many procedural, legislative, training and practical issues remain regarding the nature of the ideal fit note, nevertheless, there is evidence to support that these notes, when filled correctly, are not only useful to the employer for planning an employee's return but are also improving RTW rates by more than 80%.<sup>60</sup> In countries where WAs are legislated, healthcare practitioner's, physician's and employer's knowledge of effective WAs can facilitate work re-entry by ensuring an inclusive and safe work environment for the worker. The findings of this review may also be transferable across other sectors concerned with RTW or sustainability at work.

Effective WAs, for workers with special needs, may foster increased productivity which leads to economic well-being and eventually can be operationalised as the living standards for the population. Creating an inclusive labour market by removing barriers and providing employment opportunities to people with disabilities will not only generate a high impact return on the investment but also maximise the utility of human capital.

### Dissemination plan

In addition to traditional knowledge translational approaches (i.e., publishing the findings in peer-reviewed journals, presenting at local and international conferences, posting summary-of-findings on university websites, etc.), findings from this review will be disseminated using an integrated action-oriented knowledge translation framework.<sup>61</sup> It is hoped that this action-oriented framework will enable contextualisation of the knowledge and findings to ensure impact in the real world. Initial interest will be ignited through free webinars and podcasts as well as social media engagements, such as Twitter. Later, various stakeholders (i.e., Workplace Safety and Insurance Board, Insurance Bureau of Canada, Accessibility Ontario, etc) will be invited to engage in a discussion to: (1) understand and contextualise the knowledge gained and (2) to explore how to reduce potential uptake barriers within the workplace environment. A special rehabilitation focus will be maintained to translate the knowledge to health practitioners, and to facilitate the development guidelines that will help facilitate the integration of these findings into day-to-day RTW practice.

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**Contributors** AC and RS conceptualised the study. RS formulated the design, drafted the manuscript, assisted with the development of the search terms and registered the protocol via PROSPERO. AC provided expertise at each level and also reviewed the protocol. Both authors read and approved the final manuscript.

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