Author's response to reviews

Title: Do outcomes differ between work and non-work-related injury in a universal injury compensation system? Findings from the New Zealand Prospective Outcomes of Injury Study.

Authors:

Rebecca C Lilley (rebbecca.lilley@otago.ac.nz)
Gabrielle Davie (gabrielle.davie@otago.ac.nz)
John D Langley (john.langley@otago.ac.nz)
Shanthi Ameratunga (s.ameratunga@auckland.ac.nz)
Derrett Sarah (sarah.derrett@otago.ac.nz)

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Author's response to reviews: see over
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Dear Editor,

Thank you for obtaining reviews of our paper titled “Do outcomes differ between work and non-work-related injury in a universal injury compensation system? Findings from the New Zealand Prospective Outcomes of Injury Study”, manuscript 6879441059661806.

A point by point response to each reviewers comments has been prepared and these responses follow this letter. There was also an editorial request to state the type of ethical approval obtained from participants to our study and this has also been addressed in our response and revised manuscript.

We thank you for considering our manuscript for publication in the BMC Public Health.

Kind regards

Dr Rebecca Lilley
Lead Author.

Reviewer 1: Jaeyoung Kim

Minor essential revisions

Reviewer 1, comment 1: Table 2, non-occupational injury seem to have more hospital admissions and higher injury severity score. Could it be interpreted as non-occupational injury tends to be more severe than occupational injury? And how this observation links to the result that occupational injury have poorer recovery outcome? Authors may need more explanation about this in discussion.
Response: It is true for our sample those workers sustaining an injury in a non-work setting tend to have more injuries coded as anatomically severe and more hospital admissions. This is mentioned in the Results section, paragraph 3. Our injury severity variable has been relabelled “anatomical severity-NISS” to aid reader understanding of how this has been treated in our multi-variable analysis. Covariate adjustment is discussed in paragraphs 1 & 2 of the discussion section.

Reviewer 1, comment 2: In 4th paragraph of discussion, health care system or compensation system should be excluded from the potential explanation for poorer outcomes among occupational injury in NZ. This paragraph need more work since it contains repeated, redundant sentences.
Response: This reviewer provides no justification for suggesting the removal of our discussion of the healthcare or compensation system as a potential explanation for poorer outcomes for those with work-related injuries. Discussion section, paragraph 4 has been reviewed and changes have been made to avoid repetition.

Reviewer 1, comment 3: How pre-injury status variables were used in the analysis? Although there were not many workers had pre-existing disability or health problems, it might be helpful to examine
study population by pre-injury status. Please check the result by restricting workers only who does not have any pre-existing disabilities or health problems.

Response: Upon review we identified there was potential for some misunderstanding of potential covariates in our analysis. From Table 1 the pre-injury health variables have been removed from the table as they were not considered as covariates for all our models. The pre-injury health outcomes (WHO-DAS, 5 EQ-5D plus cognitive function and psychological distress) were included in separate models to account for pre-injury differences in each outcome i.e. pre-injury WHO-DAS was only included in the 3- and 12-month WHO-DAS outcome models. More explanation of how we dealt with our covariates has now been added to the Methods section, statistical analysis sub-section, paragraph 1.

Reviewer 1, comment 4: In abstract method section, time period for data should be noted.
Response: Abstract modified as suggested “Methods: Workforce active participants from the Prospective Outcomes of Injury Study (POIS) cohort were followed up at 3- and 12-months following injury. Participants who were injured in the period 2007-09 were recruited from New Zealand’s universal entitlement injury compensation scheme managed by the Accident Compensation Corporation (ACC).”

Reviewer 1, comment 5: In method section, window period for depression questionnaires should be stated.
Response: Inserted as requested into method section, outcome variable sub-section, paragraph 5 “Two measures of psychological outcome were used. Kessler-6 psychological distress for the 30 days prior to interview was measured at both 3- and 12-months using the Kessler-6 summary score with scores dichotomised into distressed (≥ 13) and not distressed (< 13).[24]”

Reviewer 1, comment 6: Modelling processes should be explained in method section. How did you select adjusted variables and how did you select your model? Authors seem to put every covariate in the model and did not provide the rationale for that.
Response: As addressed in reviewer 1 comment 3 (above) changes have been made to the Methods section, Statistical Analysis sub-section, paragraph 1 to clarify the selection and treatment of covariates in this analysis. Additionally the basis for consideration of the covariates has been added to this paragraph “Pre-injury socio-demographic, co-morbidities, and injury (including anatomical severity-NISS and hospital admission) covariates, selected on the basis of an a priori relationship with work-related injury and/or identification in previous POIS analyses, were examined for inclusion into multivariable models by examining differences in distribution of the covariates by injury setting.”

Reviewer 1, comment 7: In Table 1, numbers do not sum to total for both work-related and non-work-related groups. This might be due to missing values. If this is the case, it should be noted below the table a footnotes. It also applied to Table 2.
Response: The following footnote has been added to Table 1: “*Numbers do not sum to N=2089 for some variables due to missing values“ and the relevant variables have been marked.

Reviewer 1, comment 8: In Table 2, the total number of non-work should be 1348 rather than 1341.
Response: Changed as requested.
Reviewer 1, comment 9: Legend of Table 3 should be placed above the table.
Response: Legend shifted as suggested.

Reviewer 1, comment 10: In Table 4, mark of * and ** in 12-month column was misplaced.
Response: * marks have been corrected and are now consistent in the table and the key.

Reviewer 1, Discretionary revisions
In the discussion, authors seem to state the return to site of injury is main explanation for their results. Additional description about practical, policy implication that workplace needs to prevent future injury again will make the paper richer.
Response: The paper actually states a raft of potential explanations for our findings (discussion section, paragraphs 5 and 6). Given that this is the first time we are aware of that this hypothesis has been tested in a single compensation scheme with universal entitlement and there are numerous other potential explanations for our findings beyond entitlement to compensation we have cautiously stated the implications of our findings, as further work is needed to confirm our findings.

Reviewer 2: Judith Savageau

Introduction
Reviewer 2, comment 1: The 2nd paragraph which discusses the current healthcare access and reimbursement system in New Zealand is somewhat unique compared to many other countries. This should be noted in terms of utility of the findings should the hypothesis be accepted.
Response: Utility of findings addressed in Discussion section, paragraph 7. See response to comment 15 below.

Reviewer 2, comment 2: The only suggestion related to the hypothesis proposed in the last paragraph – “differences in recovery outcome” is not well defined. Throughout the article, I struggled with the assessment of 3- and 12-month “return to work” issues as one of the major outcomes (ie.absence from work) – yet never is it clear whether those who have not yet returned to work will actually get there (this is somewhat a Methods issue in actuality). Are all those assessed planning on returning to work? If not the denominator is a fairly mixed group of individuals for whom the factors that separate out work-related and non-work-related outcomes may plan out quite differently.
Response: We have not assessed if participants plan on returning to work following their injury. We do know their employment status following injury, however, and the denominator includes a small group of participant who have indicated a shift out of the workforce (students, homemakers and retirees) by 12 months (n=80, 4%). Additional analyses show that there are no statistically significant differences in the distribution of these workers by work-related and non-work-related injury (Chi-square 0.44, p=0.5) so it is unlikely that the inclusion of this group explains the findings we have obtained by injury setting. We included these workers in our analysis as we know that labour market participation is fluid, for example many of our group have become students (n=37) since their injury with the assumed intention of re-entering the labour market at some stage.

Methods
Reviewer 2, comment 3: It would be of interest to note why the authors chose 3- and 12-month time frames for their study given how many other time points might have been available for study.

Response: Further clarification of why 3- and 12-month outcomes have been examined has been added to Methods section, Study sample and data collection sub-section, paragraph 1 “Data collected at 3 months was of interest to examine short-term outcomes, while 12 month data was included to examine if there were differences for medium-term outcomes. Outcome data to 24 months was unavailable at the time of analysis.”

Reviewer 2, comment 4: It is unclear what the explanatory variable “highest qualification” means? Based on Table 1 and the Discussion, one might assume it’s a subject’s education level – but perhaps that should be defined for locales outside of New Zealand.

Response: Highest qualification refers to educational level – this has now been re-labelled “highest educational qualification” to aid reader understanding.

Reviewer 2, comment 5: Severity of injury doesn’t seem to be well defined/described. I do believe that it’s likely incorporated into the many independent variables assessed, but if it is there, it’s not clear.

Response: Injury severity is assessed using the derived variable New Injury Severity Score (NISS). In the tables the NISS label has been changed to read ‘anatomical severity – NISS’ to aid reader identification of the injury severity variable. Further clarification has been added to the methods section, Explanatory Variables sub-section, paragraph 4.

Reviewer 2, comment 6: Were injuries to internal organs, lacerations, the brain, amputations etc included? Again, if they were, it’s just not clear. If they were not then the entire article needs to clearly outcome that work- and non-work related injuries are limited to this particular body system.

Response: All injury types, including injuries to internal organs, lacerations, amputations and brain injuries, are included, therefore this analysis is not limited to any one body system. Further clarification of the way injury types were dealt with in the analysis has been added to the Methods section, Explanatory Variables sub-section, paragraph 4.

Reviewer 2, comment 7: It’s also not clear (if it’s there) whether the injuries included in this study were permanent or one expected to have some level of recovery. This would definitely affect return to work issues and the factors related thereto, regardless of location of injury, healthcare access or healthcare reimbursement.

Response: The aim of POIS was to observe outcomes in injured New Zealanders up to 24 months following injury resulting in an entitlement claim with New Zealand’s Accident Compensation Corporation. As the POIS study is observing outcomes no judgement has been made during the study regarding the permanence of disability or expected level of recovery. Anatomical severity – NISS, hospital admission and perceived threat to severe disability have been included in our analysis to control for differences in injury severity and the potential for permanent disability due to injury severity. Furthermore, there are no statistically significant differences in self-reported expectations of recovery at 3 months between our two groups so it is unlikely that differing expectations of recovery is influencing work participation differences by setting of injury in our analysis.
Reviewer 2, comment 8: At the end of the long paragraph describing injury diagnosis, it’s clear where the open-ended responses that the authors discuss were captured? Who post-coded these responses?
Response: Upon review of the variable “health service access” the reference to open-ended questions was found to be an error. The correct coding of the categorical variable has been inserted into the Methods section, Explanatory Variables sub-section, paragraph 3 “The question “Did you have difficulties getting to or accessing healthcare services” was used to create the variable ‘access to healthcare services’ by dichotomising responses into: trouble accessing (yes-trouble and mixed) and no trouble accessing (no-trouble).”

Reviewer 2, comment 9: At the beginning of the paragraph discussing pre-injury measures, it’s not clear what the time frame is for recall of pre-injury disability information. Persons were asked about pre-injury (and other) information for the 30 days prior to their injury, but at what point was this recall actually assessed? This should, perhaps, also be included as a limitation in the Discussion.
Response: The collection time point has been added to the methods section, explanatory variables sub-section, paragraph 5 “At the 3 month interview, participants were asked to recall their pre-injury disability and functional status for the 30 days prior to their injury for disability and in the day prior to their injury for functional status.” Additionally the potential for recall bias has been added to the discussion section, paragraph 8 “The use of ‘subjective’ pre-injury characteristics recalled at the 3 month interview possibly introduced recall bias. Previous analysis of POIS data indicates that estimation of health status prior to injury using retrospective recall of general health status is more appropriate than applying population norms.[34]”

Reviewer 2, comment 10: It’s not clear why some measures were assessed at 3 months and others assessed at 12 months (eg. psychological outcome, respondent burden etc)
Response: Only the PTSD outcome was assessed at 12 months but not at 3 months to reduce respondent burden; all the remaining outcomes were assessed at both 3- and 12-month time periods. This has now been clarified in the methods with the relevant time periods for each outcome included to avoid reader confusion.

Reviewer 2, comment 11: The statistical analysis description appears very completed though it’s not clear to what extent hospitalisation rates or severity of illness were included.
Response: Anatomical severity of injury and hospital admission were considered in the variable group referred to as “injury covariates”. The sentence referring to these covariates has been modified to clarify this in the methods section, statistical analysis sub-section, paragraph 1: “Pre-injury socio-demographic, health status, and injury (including anatomical severity - NISS and hospital admission) covariates were examined for inclusion into multivariable models by examining differences in distribution of the covariates by injury setting.”

Results
Reviewer 2, comment 12: The 2089 injuries denoted as the denominator (against 741; 35% were included) is not the same as the denominator described in the Methods; 2856 participants available for study. The difference between these 2 numbers was never outlined.
Response: The difference between the total original cohort is partly described in the methods section, study and participants sub-section, paragraph 1 “The POIS cohort of 2856 participants,
followed up at 3-, 5-, 12- and 24-months after injury, was recruited from New Zealand’s universal,
no-fault ACC scheme.[8] This paper examines outcomes collected at 3- and 12-months following
injury for the 2626 (92%) participants who indicated they were actively working in paid employment
such as for salary, wages or self-employed earnings (referred to as workforce active) prior to their
injury.” In the results section, paragraph 1 the total cohort for analysis additional description has
been added “Of the 2626 workforce active participants, 2089 participants had completed both 3- and
12 month interviews. 741 (35%) of injuries were sustained in a work-related setting.”

Reviewer 2, comment 13: One of my major concerns .... While the authors do a good job walking the
reader through each of the tables, there are a number of variables (eg. prevalence of pre-injury
disability, pain/discomfort problems etc) which have very, very low prevalence (ie. 5% or less).
While the sample size clearly ‘allows’ for statistical analysis using these numbers, I was very troubled
by the use of so many independent variables with such low prevalence. The low prevalence is, in or
of itself, of interest, but it makes most of these variables not very analysable because of the lack of
distribution. When you have 95+% of an occurrence of any one of these, it’s hard to imagine that
differentiating among those with work- or non-work-related injuries ‘matters’ much in the low
percent of the population for whom there was so little occurrence of any of these variables. I
believe that the authors need to defend why they included so many variables with such low
prevalence. This is true of many variables in both Table 1 and Table 2.
Response: As we have stated in our response to Reviewer 1 comment 3, we now realise the inclusion
of the pre-injury states for 8 of our outcome variables in Table 1 could lead a reader to think that all
these variables (some with very low prevalence) were included in the multi-variable models when in
fact only the corresponding pre-injury variable matching the particular outcome variable was used in
each model. Considering the 3-month WHODAS outcome, the only variable included from table 1
with low prevalence would be prior disability which was included as a covariate to adjust for pre-
injury WHODAS. As stated in our response to Reviewer 1, this table has been modified to clarify this.
With regards to Table 2, there are obviously a number of variables with low prevalence but as stated
in the methods section, statistical analysis subsection, paragraph 1, only those covariates with a p-
value <0.1 were included in the multi-variable modelling meaning only one variable (upper extremity
open wound) from Table 2 with prevalence of 5% was included in the final model.

Reviewer 2, comment 14: While 12-month return to work assessment seems to be an outcome
worth of study, it’s somewhat unclear to me whether the assessment of outcomes at 3-months is
reasonable.
Response: 3 month outcomes have been included to examine short-term outcomes as addressed in
reviewer point 3 above.

Reviewer 2, comment 15: Again, since it’s truly unclear to what extent severity of illness was well
represented in the variables controlled for, acute vs more permanent injuries would be expected to
have different outcomes regardless of whether the injury was work-related or not.
Response: Injuries were represented through a number of variables included in the model namely
anatomical severity-NISS, hospital admission and perceived threat of severe disability. Re-labelling of
the anatomical severity-NISS variable and additional description of this variable (see reviewer2,
have made this clearer to readers. The original cohort was deliberately selected to include all types of injury that resulted in an entitlement claim (requiring some form of additional care or support beyond simple medical treatment only). It is one of the strengths of POIS that we were able to include people with injuries that had, for example, not necessarily resulted in hospitalisation. POIS is showing that patterns of recovery can be slow for those not hospitalised as a consequence of their injury – as for those who were hospitalised. It has sometimes been assumed that only those injuries resulting in hospitalisation or those of high anatomical severity-NISS result in disability – but our findings show this not to be the case.

Reviewer 2, comment 16: I don’t see a good discussion of the generalizability of this study’s findings and feel this to be a major omission in the paper.
Response: The reviewers concern with generalizability of the study have been addressed by adding the following sentence into the Discussion section, paragraph 8 “While this analysis was intended to test a hypothesis by taking advantage of the design of the ACC compensation scheme, it is also a limitation as these findings are potentially not generalizable beyond similar no-fault compensation schemes.”

Reviewer 2, comment 17: I also would have liked to see some discussion (even in a minor way) of future studies including the assessment of these issues more than 12-months post-injury.
Response: Added to Discussion section, paragraph 9 “Additionally, further investigation of the possible time-dependent pattern of recovery by injury setting is warranted with possible consideration of outcomes beyond 12 months.”

Reviewer 2, comment 18: Lastly it not clear to what extent the difference between 3- and 12-month assessments would have included subjects making a decision not to (possibly) return to work, but to strongly (begin) consider retirement options. This would affect many issues, including those psycho-social ones studies by the authors.
Response: See response to reviewer2, comment 2 above.

Conclusion

Reviewer 2, comment 19: The last comment in the Discussion is something I would have liked to see in the conclusions; ie., how returning to work “yes” vs ‘perhaps not at all” should be considered in studies of this type.
Response: We have reviewed our conclusions and are happy with them as they are stated. Refer to reviewer 2, comment 2 above for further discussion of this issue.

Editorial request

'Please state in the Methods section whether written informed consent for participation in the study was obtained from participants or, where participants are children, a parent or guardian.'
Response: Added as requested to Methods section, Study sample & data collection sub-section, paragraph 1 as follows “Ethical permission was obtained verbally from each participant.”