

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Psychological distress following a motor vehicle crash: compelling evidence from a state-wide retrospective study examining settlement times and costs of compensation claims
AUTHORS	Guest, Rebecca; Tran, Yvonne; Gopinath, Bamini; Cameron, Ian; Craig, Ashley

VERSION 1 - REVIEW

REVIEWER	Tim Platts-Mills University of North Carolina, Chapel Hill Academic interest in this subject.
REVIEW RETURNED	22-Dec-2016

GENERAL COMMENTS	<p>Thank you for the opportunity to review this work. The authors sought to characterize how the presence of a psychological condition after MVC is associated with subsequent compensation outcomes, and, secondarily (temporally primary), what factors are associated with the development of such psychological conditions. A great deal of study has been dedicated to the topic of psychological morbidity after MVC, but parts of this study are novel and represent an important addition to the literature. There are several substantial limitations to the manuscript. One of which may be difficulty to address – that it is unclear whether the psychological condition identified after the MVC was present prior to the MVC. The others should be fixable and include a failure to fully define “psychological condition” and to differentiate between PTSD and depression in secondary analyses. I have the following specific suggestions.</p> <p>The title is somewhat convoluted, as cohort and case-control studies are inherently different (i.e., one looking forward from exposure to outcome, and one looking backward from outcome to exposure). It seems the authors are considering this study both a retrospective cohort study (Psychological condition Y/N --> compensation outcomes) and a case-control study (Factors --> psychological condition)? Regardless, this is confusing. I would probably describe this as a retrospective study of outcomes after MVC. I think data was extracted at one point in time but since the data reflects information over time, you might call it a cohort study, but not sure this is the word I would use in the title. You might simply say it's an analysis of claims data. The authors point out that psychological morbidity is treated as a dichotomous variable without consideration of temporality with respect to the MVC or lodging of a claim, making both a cohort and a case-control design impossible.</p> <p>I would favor not using “MI” as an abbreviation for musculoskeletal injury but rather spelling it out each time, as MI is such a universal abbreviation for myocardial infarct. If the authors elect to keep “MI,” the occurrence of “MI injuries” is redundant and should be removed.</p>
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	<p>The introduction paragraph beginning “Research to-date...” is not true in this reviewer’s opinion, as many studies with many hundreds or thousands of participants have been published describing the prevalence of psychological morbidity including PTSD, depression, and chronic pain (among others), as mentioned above. This paragraph overstates the importance of this study.</p> <p>Excluding claims that had been lodged but not settled likely excludes disproportionately more claims in which psychological morbidity played a role, as they are more likely than other claims to be lengthy. This should be stated in the limitations section.</p> <p>Measurements:</p> <ol style="list-style-type: none">1. You say the IRSD was assessed with the SEIFA. This is odd. I would think that the patients socioeconomic status was assessed using the SEIFA (or perhaps the IRSD).2. A clearer statement regarding the definition for psychological morbidity is needed. You say, “such as PTSD or major depressive disorder.” What else was included? This is essential for both interpretation and to allow replication. Further, these two conditions are both important but quite different. PTSD is likely to be a sequelae of the MVC. Depression is somewhat less likely to be a sequelae of the MVC. I like treating these as a combined outcome for the primary analysis, but I think it would be reasonable to do a secondary analysis treating PTSD and depression separately and I would think that these results could be included as appendices and summarized in a result paragraph. <p>Table 2. How are the locations of injuries organized? I would favor from most common to least common. The current organization scheme is unclear.</p> <p>Table 3. The Adjusted OR should have reference OR of 1.00 in them. (They are in the unadjusted column but should be written again in the adjusted column for clarify – and only for those variables that remained in the adjusted model.)</p> <p>The type of statistical test(s) used to generate the p-values in Table 1 should be described in the methods (e.g., t-test/ANOVA for continuous variables, chi-squared for categorical).</p> <p>Lower limb fracture might be more meaningfully presented in Table 2 in mutually exclusive categories, such as mild (2 of 6), moderate (3-4 of 6), and severe (5-6 of 6).</p> <p>The paragraph beginning with “ANOVA...” should be rephrased to “Mean days to claim settlement from accident date was significantly longer for MI+PC claimants than for MI only claimants (353.81 days; SD=164.83; 95%CI 340.67-366.95 versus 231.65 days; SD=142.08; 95% CI 227.97-235.32, respectively).</p> <p>In the strengths and limitations section, the second bullet “This is the first study...” is not true as it is currently written. A great deal of study has been undertaken on the topics of PTSD, depression, chronic pain, etc... after MVC. This study would add to an enormous body of evidence on this topic, rather than open a new field of study. In light of the unavoidable limitation of not knowing the temporality of psychological morbidity, perhaps the most reasonable and valid conclusion of this study is psychological morbidity predicts adverse outcomes of compensation proceedings, and thus, directing additional resources to people with psychological conditions may reduce costs. In regard to predicting which patients are at highest risk, I think the most reasonable thing would be to call for prospective studies that derive and validate instruments to identify patients at high risk for psychological morbidity following trauma.</p>
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REVIEWER	Maria Papadakaki Technological Educational Institute of Crete, Greece
REVIEW RETURNED	31-Mar-2017

GENERAL COMMENTS	<p>Thank you for the invitation to review this manuscript exploring distress, compensation times and costs following an MVC in Australia. I have some serious concerns that have to be addressed. My comments and suggestions are included below for the authors' assistance.</p> <p>Introduction</p> <p>1. There are many concepts introduced without a logical order. Which one is the problem/topic of interest for the study? Psychological distress or compensation times and costs? This is not at all clear.</p> <p>2. Distress seems to be a key concept in the study but there is no case definition provided at the introduction. Besides that, there are many different terms used interchangeably throughout the manuscript for distress, which is not helpful..."distress, condition, morbidity, comorbidity..."</p> <p>3. The literature review employed for the justification of the study does not have a logical order either. An attempt is made to link distress with claims, then a link is made between musculoskeletal injuries and distress and then with recovery. Then there is an emphasis on the study's impact on distress and then reference is made on the study's impact on compensation costs and then on recovery. I am afraid that the study lacks a clear focus.</p> <p>4. Besides that, the authors seem to have missed much of the recent relevant literature regarding post-impact care in MVC and psychological distress from Europe.</p> <p>5. The authors provide a vague statement regarding the aim of the study "...to analyse the data of a large number...." What analysis do they mean? Adding research questions and hypothesis would help the readers.</p> <p>6. It is not clear what the study adds to the existing literature. The authors need to indicate why showing that distress affects cost claims is important for international readership. Wasn't that expected and logical to claim more costs when sustaining distress? Wouldn't be more important to see the outcome of the claiming process?</p> <p>7. Besides that, there needs to be an introduction to laws and regulations regarding claiming costs for MVC in Australia and regarding the process of claiming. This is also necessary at the discussion. Otherwise it makes no sense to the international readership.</p> <p>Methods</p> <p>participants</p> <p>8. what was the total number of MVC cases?</p> <p>9. why certain type of injuries were excluded (e.g. spinal cord, etc.)? the authors need to explain.</p> <p>10. Please provide reference number and date for SIRA permission.</p> <p>Measurements</p> <p>11. Measurements need to be better defined in terms of the instruments used to collect the information and the exact documents required by law for the process of cost claim.</p> <p>Statistical analysis</p> <p>12. There is information regarding the aim of the study which better</p>
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	<p>fits in the introduction.</p> <p>13. The analysis presented in table 1 is not described in the section of “statistical analysis”. Furthermore, in some cases, the conditions to execute the analysis are not met. Please explain.</p> <p>Results</p> <p>14. Why table 2 doesn’t present information for MI and MI+PC with the relevant statistical test? It seems to be disconnected from the topic of interest as it is now.</p> <p>15. “.....most serious MI level removed....”. why removed? which were considered more serious? based on which criteria?</p> <p>16. The results show a different focus for every analysis introduced. It is not easy to identify what the study investigates. Although there is initially investigation of the connection between distress and cost claiming levels, then there is a focus on predictors of distress. The authors need to reconsider their focus.</p> <p>Discussion</p> <p>17. The authors present in the discussion the prevalence of psychological morbidity in Australia.....they should present the prevalence of psychological morbidity for MI+PC in Australia.</p> <p>18. “...the presence of psychological morbidity during the claims processresults in potentially adverse outcomes.....settlement times and costs” . How do the authors reach this conclusion? It is not supported by their data and analysis.</p> <p>19. Discussion of outcomes based on international literature is very poor, as well as discussion based on the country legislation and insurance is absent.</p> <p>20. There are more limitations not mentioned regarding the study design, the lack of important information regarding the injury, which may be confounding factors, the appropriateness of data, alternative sources that could be used, etc.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Tim Platts-Mills

Institution and Country: University of North Carolina, Chapel Hill, USA

Competing Interests: Academic interest in this subject.

Comment: Thank you for the opportunity to review this work. The authors sought to characterize how the presence of a psychological condition after MVC is associated with subsequent compensation outcomes, and, secondarily (temporally primary), what factors are associated with the development of such psychological conditions. A great deal of study has been dedicated to the topic of psychological morbidity after MVC, but parts of this study are novel and represent an important addition to the literature. There are several substantial limitations to the manuscript. One of which may be difficulty to address – that it is unclear whether the psychological condition identified after the MVC was present prior to the MVC. The others should be fixable and include a failure to fully define “psychological condition” and to differentiate between PTSD and depression in secondary analyses. I have the following specific suggestions.

Response:- Thank you for this comment. In response to your comment about the difficulty in identifying whether the psychological condition was present prior to the MVC, it was never the intention of this paper to determine the temporality of the psychological condition, and the words “**regardless of time of onset**” have been used throughout the paper to emphasise that we are not concerned whether the psychological distress was present before or after the MVC. Whilst it is

important to be able to control for pre-injury status, is not possible to determine whether a psychological condition was present prior to the person's MVC (because it is not information routinely collected by insurers), or whether the MVC was the cause of a psychological condition (this is difficult to confirm), the paper's objective was to identify the presence of a psychological condition (irrespective of time) and whether this was then associated with elevated claim completion times and costs.

The authors have endeavoured to ensure this is clear throughout the paper. For example, in the ABSTRACT, Page 2 Line 28 of the clean document and Page 3, Line 33 of the track-changed document, it reads **".....injuries sustained in a motor vehicle accident (MVC), regardless of time of onset, impacts compensation outcomes such as claim settlement times and costs."** Again, On Page 4, Line 66 of the clean document, and Page 5, Line 81 of the track-changed document under the heading 'Strengths and Limitations of this Study' the final dot point states, **"It was not possible to determine whether psychological distress was present prior to the MVC, as this information is not routinely collected by insurance companies."** In the INTRODUCTION on Page 7, Line 129 of the clean document and Page 10, Line 202 of the track changed document, it states **"Specifically, the aim was to determine the impact of psychological distress, regardless of time of onset on claim settlement times and total costs."** Under the heading "Statistical Analysis" on Page 10, Line 200 of the clean document, and Page 14, Line 308 of the track-changed document, this is again highlighted to the reader, **"Again, it should be noted that psychological distress can develop before the injury, as well as at any time throughout the claims process."** In the DISCUSSION, on Page 18, Line 381 of the clean document, and Page 24, Line 538 of the track changed document, it is further acknowledged, stating **"It is acknowledged that prior mental health problems can predispose people to elevated psychological distress after their MVC(Craig, 2016; Papadakaki et al., 2017), however there is no avenue available for assessing the impact of this influence given such a predisposing factor is not routinely collected by insurance companies"**. We further clarified this point in the "METHOD/Measurements" heading on Page 9 Line 170 of the clean document and Page 13, Line 270 of the track-changed document, stating **"However, timing of onset of psychological distress was not the aim of this research given such information is not routinely collected by NSW insurance companies and is therefore not collated by the NSW regulatory authority."** For further clarity, in the limitations section of the DISCUSSION on Page 19, Line 402 of the clean, and Page 25, Line 560 of the track changed document, it now reads, **"It was not possible to determine pre-injury presence of psychological distress."** Finally, on Page 20 , Line 428 of the clean document, and Page 26, Line 587 of the track changed document, it now reads, **"For example, in accordance with previous research, directing additional resources such as screening and treating psychological conditions of claimants who are at higher risk(Papadakaki et al., 2017) regardless of whether their psychological condition pre-dated their MVC provides opportunity for reducing time and costs involved with compensation claims."**

The authors believe there is now sufficient clarity about the issue of whether the psychological condition was pre-morbid or developed after the MVC, and that it is therefore not the focus of the paper. Moreover, the results suggest that if there is evidence of a psychological condition, this then warrants extra resources to reduce the risk of it negatively influencing settlement times and costs.

Comment: The title is somewhat convoluted, as cohort and case-control studies are inherently different (i.e., one looking forward from exposure to outcome, and one looking backward from outcome to exposure). It seems the authors are considering this study both a retrospective cohort study (Psychological condition Y/N --> compensation outcomes) and a case-control study (Factors --> psychological condition)? Regardless, this is confusing. I would probably describe this as a retrospective study of outcomes after MVC. I think data was extracted at one point in time but since the data reflects information over time, you might call it a cohort study, but not sure this is the word I

would use in the title. You might simply say it's an analysis of claims data. The authors point out that psychological morbidity is treated as a dichotomous variable without consideration of temporality with respect to the MVC or lodging of a claim, making both a cohort and a case-control design impossible.

Response:- Thank you for these comments. The authors agree that the use of 'cohort case-control study' is inaccurate. The title has been changed to improve accuracy and clarity by removing the words 'case-control' and replacing with the word 'retrospective'. The title now reads, **"Psychological distress following a motor vehicle crash: compelling evidence from a state-wide retrospective study examining settlement times and costs of compensation claims."** The authors have elected to retain the specific words reflecting the claims data being analysed, "settlement times and costs" because there is significantly more claims data collected by insurers, albeit not analysed by this paper, for example 'time of day of MVC', 'how many passengers in the vehicle' etc. The words, "case-control" have been replaced with the words, "retrospective" throughout the paper. For example in the ABSTRACT on Page 2, Line 32 of the clean document, and Page 3, Line 37 of the track-changed document, it now reads, **"Design: State-wide retrospective study."** Similarly, on Page 9, Line 179 of the clean document and Page 13, Line 279 of the track changed document it now reads, **"A retrospective design was employed....."**

Comment: I would favour not using "MI" as an abbreviation for musculoskeletal injury but rather spelling it out each time, as MI is such a universal abbreviation for myocardial infarct. If the authors elect to keep "MI," the occurrence of "MI injuries" is redundant and should be removed.

Response: Thank you for this comment. Given the universal abbreviation of MI relating to myocardial infarct, and the likelihood of the medical profession reading our paper, the authors have elected to use the words musculoskeletal injury in full throughout the paper. All "MI" references have been replaced with "musculoskeletal injury" (including in the tables) to eliminate confusion. Thank you for pointing this out. For example, on Page 6, Line 98 of the clean document and Page 7, Line 133 of the track changed document, 'MI' has been replaced with **"Musculoskeletal injuries are common following a MVC and often lead to compensation claims."**

Comment: The introduction paragraph beginning "Research to-date..." is not true in this reviewer's opinion, as many studies with many hundreds or thousands of participants have been published describing the prevalence of psychological morbidity including PTSD, depression, and chronic pain (among others), as mentioned above. This paragraph overstates the importance of this study.

Response:- Thank you for this comment. You are correct, there is a great deal of research on psychological morbidity, however our paper is referring to sample sizes drawn from compensation schemes and relevant research. In light of this comment, and also comments from Reviewer 2, significant changes to the INTRODUCTION have been made to improve clarity, accuracy and readability. The paragraph you are referring to on Page 6, Line 108 of the clean document and Page 9, Line 174 of the track changed document has been improved and now reads, **"A review of research that focussed on disability arising from a MVC concluded that there was a need to clarify rates of disability arising from a MVC, especially with regard to methodological issues and complicating factors like compensation. This is also true for the impact of psychological distress following a MVC, including the influence of involvement in compensation claims(Craig, 2016; Papadakaki et al., 2017). Research in this area has been limited by uncertain diagnoses of psychological distress disorders and small sample sizes."**

Comment: Excluding claims that had been lodged but not settled likely excludes disproportionately more claims in which psychological morbidity played a role, as they are more likely than other claims to be lengthy. This should be stated in the limitations section.

Response:- Thank you for this comment. The authors agree that this factor needs to be noted in the limitations section of the DISCUSSION. On Page 19, Line 413 of the clean document and Page 25, Line 572 of the track-changed document, it now reads, **“The inclusion of only settled claims has the potential to exclude more claims in which psychological distress played a role given their propensity to be more lengthy for the claimant.”**

Comment: Measurements:

1. You say the IRSD was assessed with the SEIFA. This is odd. I would think that the patients socioeconomic status was assessed using the SEIFA (or perhaps the IRSD).

Response:- Thank you for this comment ? To clarify, the SEIFA is the overall measure and the IRSD are calculated from within the SEIFA. The authors have reworded this for improved clarity under the heading ‘Measurements’ on Page 8, Line 159 of the clean document and Page 12, Line 257 of the track changed document which now reads, **“The Index of Relative Socioeconomic Disadvantage (IRSD) was calculated from the Socio Economic Index for Areas (SEIFA) which ranks areas in Australia according to relative socio-economic advantage and disadvantage.”**

Comment: 2. A clearer statement regarding the definition for psychological morbidity is needed. You say, “such as PTSD or major depressive disorder.” What else was included? This is essential for both interpretation and to allow replication. Further, these two conditions are both important but quite different. PTSD is likely to be a sequelae of the MVC. Depression is somewhat less likely to be a sequelae of the MVC. I like treating these as a combined outcome for the primary analysis, but I think it would be reasonable to do a secondary analysis treating PTSD and depression separately and I would think that these results could be included as appendices and summarized in a result paragraph.

Response:- Thank you for this comment. In light of reviewer 2’s comment about the use of several different ways of describing psychological distress such as ‘distress’ versus ‘condition’ versus ‘morbidity’; all references to these words have been changed throughout the paper to now read **“psychological distress”**. Further, there is now a clearer definition of ‘psychological distress’ in the INTRODUCTION on Page 5, Line 83 of the clean document and 6, Line 110 of the track changed document, which now reads, **“For the purpose of this study, psychological distress is defined as an unpleasant mental condition perceived as disturbing and which can impede daily functioning, with mental symptoms including agitation, fatigue, confusion, loss of motivation and depressed mood.”**

The authors have provided an additional analysis using the separation of PTSD from Depression. The results of this additional sensitivity analysis confirmed the outcomes found by our analysis with PTSD and Depression combined. Under the “RESULTS” section, Page 16, Line 331 of the clean document, and Page 22 Line 485 of the track changed document, there is a new paragraph under heading, ‘Sensitivity analysis’, which now reads, **“Sensitivity analysis was conducted with a subset of those that had PTSD only. In this subset those with other types of psychological distress were excluded from the analysis. For those with PTSD only (n=83), SEIFA, fault, and rehabilitation indicators were significant predictors. Although employment and sex were no longer significant in this model, the effect sizes for all predictors were greater in this the PTSD only subset, indicating that reduced statistical power caused these predictors to be non-significant. The overall performance of the model was greater in the PTSD only subset with a concordance index of 0.764 compared to 0.695 in the original model.”**

Comment: Table 2. How are the locations of injuries organized? I would favor from most common to least common. The current organization scheme is unclear.

Response:- Thank you for this comment. The authors agree that the configuration of Table 2 required improvement. On Page 12, Line 230 of the clean document and Page 17, Line 345 of the track changed document, Table 2 has been reconfigured to show most common to least common musculoskeletal injuries. In response to a comment from Reviewer 2, this table also now includes totals separated by musculoskeletal injury only versus musculoskeletal injury + psychological distress.

Comment: Table 3. The Adjusted OR should have reference OR of 1.00 in them. (They are in the unadjusted column but should be written again in the adjusted column for clarify – and only for those variables that remained in the adjusted model.)

Response:- Thank you for this comment. Relevant 1.00 have been added to the 'Adjusted' column of Table 3 on Page 15, Line 326 of the clean document and Page 21 Line 480 of the track-changed document.

Comment: The type of statistical test(s) used to generate the p-values in Table 1 should be described in the methods (e.g., t-test/ANOVA for continuous variables, chi-squared for categorical).

Response:- Thank you for this comment. Additional information has been added under the 'Statistical Analysis' heading on Page 9, Line 182 of the clean document and Page 13, Line 283 of the track-changed document which now reads, **“Descriptive statistics were used to summarise demographic and claim/accident characteristics of the participants by psychological injury status. The differences in the demographics and claim characteristics between those that claimed/accident compensation and those that did not were compared using Analysis of Variance (ANOVA) tests for continuous variables and chi-squared tests for categorical variables.”**

Comment:- Lower limb fracture might be more meaningfully presented in Table 2 in mutually exclusive categories, such as mild (2 of 6), moderate (3-4 of 6), and severe (5-6 of 6).

Response:- Thank you for this comment. We are unable to change these categories in Table 2, as these are categories nominated by the Personal Injury Register from State Insurance Regulatory Authority, and we do not have enough information to make the same breakdowns as you have suggested. To reduce confusion, however, and improve clarity only total lower limb fracture has been retained and the other breakdowns removed. The authors agree this is an improvement in the table without loss of important information. This has been reflected in Table 2 Page 12, Line 230 of the clean document and Page 17, Line 345 of the track changed document.

Comment: The paragraph beginning with “ANOVA...” should be rephrased to “Mean days to claim settlement from accident date was significantly longer for MI+PC claimants than for MI only claimants (353.81 days; SD=164.83; 95%CI 340.67-366.95 versus 231.65 days; SD=142.08; 95% CI 227.97-235.32, respectively).

Response:- Thank you for this comment. The authors agree with your comment and this sentence has been changed on Page 12 Line 256 of the clean document and Page 18, Line 408 of the track-changed document and now reads, **“Mean days to claim settlement from accident date was significantly longer for musculoskeletal injury + psychological distress claimants than for musculoskeletal injury only claimants (353.81 days; SD=164.83; 95% CI 340.67-366.95 versus 231.65 days; SD=142.08; 95% CI 227.97-235.32, respectively).”**

Comment: In the strengths and limitations section, the second bullet “This is the first study...” is not true as it is currently written. A great deal of study has been undertaken on the topics of PTSD, depression, chronic pain, etc... after MVC. This study would add to an enormous body of evidence on

this topic, rather than open a new field of study.

Response:- Thank you for your comment. The authors agree that this point was confusing because it did not specifically highlight the paper's interest in the compensation population. This is now the first bullet point on Page 4, Line 57 of the clean document and Page 5, Line 71 of the track-changed document, the first bullet point now reads, **“This is the first study to investigate the impact of psychological distress in all claimants experiencing a musculoskeletal injury and who lodge and settle their compensation claim for a MVC over a 2 year period in the state of NSW. It was revealed that the presence of psychological distress greatly increased settlement times and costs.”**

Comment: In light of the unavoidable limitation of not knowing the temporality of psychological morbidity, perhaps the most reasonable and valid conclusion of this study is psychological morbidity predicts adverse outcomes of compensation proceedings, and thus, directing additional resources to people with psychological conditions may reduce costs. In regard to predicting which patients are at highest risk, I think the most reasonable thing would be to call for prospective studies that derive and validate instruments to identify patients at high risk for psychological morbidity following trauma.

Response:- Thank you for these comments. The authors agree that the points you make would improve the quality of our paper. We have also cited the most recent study published after our paper was originally submitted (Papadakaki et al. 2017) which further compliments these conclusions. The authors have improved the conclusion of the ABSTRACT on Page 2 Line 48 of the clean document and Page 4 Line 55 of the track changed document which now reads, **“Results provide compelling evidence that psychological distress has an adverse impact on people with musculoskeletal injury as they progress through compensation. Findings suggest additional resources should be directed toward claimants who are at risk (e.g. the socially disadvantaged or those unemployed prior to the claim), the aim being to reduce risk of psychological distress and subsequent risk of increased settlement times and claim costs. Prospective studies are now required that investigate treatment strategies for those at risk of psychological distress associated with a MVC.”** This information is also now reflected in the final paragraph of the DISCUSSION, Page 20, Line 427 of the clean document and Page 26, Line 586 of the track-changed document, which now reads, **“This suggests changes to healthcare protocols and practices are warranted. For example, in accordance with previous research, directing additional resources such as screening and treating psychological conditions of claimants who are at higher risk (Papadakaki et al., 2017) regardless of whether their psychological condition pre-dated their MVC provides opportunity for reducing time and costs involved with compensation claims.”**

Reviewer: 2

Reviewer Name: Maria Papadakaki

Institution and Country: Technological Educational Institute of Crete, Greece

Competing Interests: None declared

Thank you for the invitation to review this manuscript exploring distress, compensation times and costs following an MVC in Australia. I have some serious concerns that have to be addressed. My comments and suggestions are included below for the authors' assistance.

Comment: Introduction

1. There are many concepts introduced without a logical order. Which one is the problem/topic of interest for the study? Psychological distress or compensation times and costs? This is not at all clear.

Response:- Thank you for this comment. The focus of this paper is on psychological distress associated with a MVC resulting in musculoskeletal injury and the impact of psychological distress on compensation claim settlement time and costs. The logic of the paper has been re-ordered to improve the logical flow of the paper. In the INTRODUCTION, Page 5, Line 70 of the clean document and Page 6, Line 87 of the track changed document the authors have re-ordered the entire INTRODUCTION for improved clarity. A brief discussion of the impact of MVCs is followed by an introduction to the problem of psychological distress and its definition, followed by studies on its impacts and longer term outcomes. We then discuss compensation and the relation to psychological distress, followed by musculoskeletal injury and psychological distress. The paper then flows on to aims and objectives. The flow of this information has then been similarly replicated in the results section with similar focus on each point.

The authors agree that the paper now better reflects the topic of interest with improved logical flow of information throughout.

Comment: 2. Distress seems to be a key concept in the study but there is no case definition provided at the introduction. Besides that, there are many different terms used interchangeably throughout the manuscript for distress, which is not helpful..."distress, condition, morbidity, comorbidity..."

Response:- Thank you for this comment. The authors agree that a clearer definition of psychological distress would improve the paper. In the "INTRODUCTION", on Page 5, Line 83 of the clean document and Page 6, Line 110 of the track changed document, the inclusion of a definition now reads, "**For the purpose of this study, psychological distress is defined as an unpleasant mental condition perceived as disturbing and which can impede daily functioning, with mental symptoms including agitation, fatigue, confusion, loss of motivation and depressed mood.**"

Further, in line with the more succinct definition of 'psychological distress', the words "psychological distress" have been universally used throughout the paper now, and where appropriate, 'condition', 'morbidity' have been replaced.

Comment: 3. The literature review employed for the justification of the study does not have a logical order either. An attempt is made to link distress with claims, then a link is made between musculoskeletal injuries and distress and then with recovery. Then there is an emphasis on the study's impact on distress and then reference is made on the study's impact on compensation costs and then on recovery. I am afraid that the study lacks a clear focus.

Response:- Thank you for this comment. As stated in our responses above, the INTRODUCTION, and similarly the RESULTS and DISCUSSIONS sections have been re-ordered to improve logical order and flow of the paper. The authors believe that the paper has been substantially improved with

this re-organisation, in addition to a further literature review to ensure all relevant and recent research has been included (as per your comment below).

Comment: 4. Besides that, the authors seem to have missed much of the recent relevant literature regarding post-impact care in MVC and psychological distress from Europe.

Response:- Thank you for this comment. A review of the original literature review has been undertaken by the authors. As a result, several additional papers have been cited. Additional information from the recent paper suggesting the implementation of the type of study we have carried out has now been added; under the heading, 'INTRODUCTION' on Page 6, Line 108 of the clean document and Page 9, Line 174 of the track-changed document which now reads, **“A review of research that focussed on disability arising from a MVC concluded that there was a need to clarify rates of disability arising from a MVC, especially with regard to methodological issues and complicating factors like compensation.(Ameratunga, Norton, Bennett, & Jackson, 2004) This is also true for the impact of psychological distress following a MVC, including the influence of involvement in compensation claims.(Craig, 2016; Papadakaki et al., 2017)”** Further, previous research has suggested the need for a well-designed population-based study using sound psychometric tools and appropriate comparison groups to determine risk of disability after MVCs.(Ameratunga et al., 2004)

The authors note that our paper was first submitted to BMJ Open on 9th December 2016, and subsequent research has since been published. For example, Papadakaki, M. et al. (2017), Psychological distress and physical disability in patients sustaining severe injuries in road traffic crashes: results from a one-year cohort study from three European countries'. This research investigated the impact of injury on psychological and physical condition, and whilst it was not focussed on compensation claiming, including impact on wellbeing, costs or time to completion, the authors agree that the long term follow up results are an important inclusion in our paper as well as the need for screening and treating psychological conditions. To include this latest research, additional information has been added under the heading "INTRODUCTION" Page 5, Line 79 of the clean document and Page 6 Line 100 of the track changed document which now reads, **“Recent prospective research found 1 in 2 persons suffered elevated rates of psychological distress (e.g. depression) soon after the MVC(Papadakaki et al., 2017). Factors such as more severe physical injury, older age, and past negative emotional reactions to distress were associated with elevated psychological distress 12 months post-MVC.(Papadakaki et al., 2017)”** Furthermore, in the DISCUSSION on Page 20, Line 428 of the clean document and Page 26, Line 587 of the track changed document additional information to acknowledge this latest research has been included and now reads, **“For example, in accordance with previous research, directing resources such as screening and treating psychological conditions of claimants who are at higher risk(Papadakaki et al., 2017)”**

Comment: 5. The authors provide a vague statement regarding the aim of the study “...to analyse the data of a large number...” What analysis do they mean? Adding research questions and hypothesis would help the readers.

Response:- Thank you for this comment. The authors agree that adding research questions would improve the understanding of the paper. On Page 7, Line 133 of the "INTRODUCTION" of the clean document and Page 10 Line 206 of the track-changed document, the research questions have been added and now reads, **“Accordingly, findings should address 2 key research questions: 1. Whether psychological distress is associated with longer claim time to completion and greater claim costs, and 2. what injury or demographic characteristics are associated with psychological distress.”** The authors note that this information was stated under the heading,

“Statistical Analysis”, however, the addition of the addition information at the end of the introduction has improved clarity.

Comment: 6. It is not clear what the study adds to the existing literature. The authors need to indicate why showing that distress affects cost claims is important for international readership. Wasn't that expected and logical to claim more costs when sustaining distress? Wouldn't be more important to see the outcome of the claiming process?

Response:- Please see our response to your Point 4 above and the addition of the study by Ameratunga et al. (2004) asking for further research to clarify disability following a MVC, and our study contributes to understanding psychological disability and its impacts. There is in fact very little literature reporting on this area internationally. There are some preliminary studies, however, these are prospective studies and involve far less participants than our study (e.g., Air and McFarlane 2003). We believe the findings presented in this paper are very important for an improved understanding of issues concerned with people who enter compensation after a MVC and who also have associated psychological distress. We have, for instance, argued the value of the paper in Strengths and Limitations. Essentially, this study presents retrospective data on all people completing a claim over several years in NSW who did and did not have a psychological distress condition as reported by treating clinicians etc. It provides clear evidence for the first time, that psychological distress increases compensation costs and extends time to settlement, both of which are undesirable outcomes. It also provides some clarity on factors that may contribute to outcomes. The value is for health scientists to build on this knowledge and investigate preventative strategies for reducing psychological distress as a person enters compensation. We however also mention there is a need for prospective research in the area.

Comment: 7. Besides that, there needs to be an introduction to laws and regulations regarding claiming costs for MVC in Australia and regarding the process of claiming. This is also necessary at the discussion. Otherwise it makes no sense to the international readership.

Response:- Thank you for this comment. Additional information in relation to the NSW compensation scheme has been added to the end of the “INTRODUCTION” on Page 7, Line 121 of the clean document and Page 10 Line 193 of the track changed document which now reads, **“The NSW CTP scheme is a fault based scheme with limited access to entitlements for those at fault. Its purpose is to compensate those with injuries who were not at fault in the MVC with the claim requiring police and medical reports as evidence, in addition to a personal injury claim form.”** Further, in the “DISCUSSION” on Page 16, Line 342 of the clean document and Page 22 Line 497 of the track changed document, additional information has been added and now reads, **“In NSW, Australia a MVC fault based system is legislated which provides compensation for people injured in MVCs that were the fault of another vehicle owner or driver. The driver at fault is the person who was driving the vehicle considered most at fault in the accident.”**

Comment: Methods
participants

8. what was the total number of MVC cases?

Response:- Thank you for this question. The total number of MVC cases was 24,164 of which 6,341 were extracted for analysis due to their musculoskeletal injury. This is stated under the heading, “ABSTRACT/Participants Page 2, Line 35 of the clean document and Page 3 Line 40 of the track-changed document, which reads, **“Participants: 6,341 adults who sustained a musculoskeletal injury, and who settled a claim for injury compensation after a MVC. Participants included those diagnosed with psychological distress (n=607) versus those not diagnosed (n=5,734)”**. Further, on Page 7, Line 142 of the clean document, and Page 12 Line 239 of the track changed

document in the heading, 'METHOD/Participants' section, it now reads, **Permission was sought and granted on 22nd November 2016 from SIRA to access a total of 24,164 claims from the Personal Injury Register (PIR) of SIRA to determine their potential inclusion in the analysis. The PIR contains all MVC-related claims that occur in NSW. Inclusion criteria consisted of i) the injured adult (18+) having a musculoskeletal injury and ii) the claim had been lodged and also settled over a 27 month period (October, 2011-December, 2013). Claims which had been lodged but not settled, and claims involving catastrophic injuries such as spinal cord injury and severe traumatic brain injury were excluded (catastrophic injury related claims are directed toward an alternative scheme in NSW). This resulted in 6,341 participants who had experienced a MVC and sustained a musculoskeletal injury, and who lodged and settled a claim in NSW, Australia between October 2011 and December 2013 (27 months). The combined cohort data was received from SIRA in de-identified form and therefore human research ethics approval was deemed not to be required.**

To summarise, the total number was 24,164. 6,341 had musculoskeletal injury of which 607 also had a diagnosed psychological distress.

The authors believe it now clearly states what the total number of MVC cases there were, and total number included in the analysis.

Comment: 9. why certain type of injuries were excluded (e.g. spinal cord, etc.)? the authors need to explain.

Response: Our paper was only interested in non-catastrophic injury because people with catastrophic injury (e.g., SCI, severe TBI) in NSW enter a different claim scheme. To clarify, additional information has been added to the METHOD/Participants section Page 8, Line 147 of the clean document and Page 12 Line 245 of track-changed document, which now reads, **"Claims which had been lodged but not settled, and claims involving catastrophic injuries such as spinal cord injury and severe traumatic brain injury were excluded (catastrophic injury related claims are directed toward an alternative scheme in NSW)."**

Comment: 10. Please provide reference number and date for SIRA permission.

Response:- Date of SIRA permission was 22nd November 2016 and original reference/grant no. is MAA ref: 14/366. The grant reference number is stated at the end of the paper under the heading, "Funding" at the end of the paper. To clarify permission was granted from SIRA to analyse their date, the date of SIRA permission has been added under the heading "METHOD/Participants" on Page 7, Line 142 of the clean document and Page 12 Line 239 of the track-changed document, which now reads, **"Permission was sought and granted on 22nd November 2016 from SIRA to access a total of 24,164 claims from the Personal Injury Register (PIR) of SIRA to determine their potential inclusion in the analysis."**

Comment: Measurements

11. Measurements need to be better defined in terms of the instruments used to collect the information and the exact documents required by law for the process of cost claim.

Response:- Thank you for this comment. Additional information has been added under the heading "METHOD/Measurements" on Page 8, Line 157 of the clean document and Page 12 Line 255 of the track-changed document, which now reads, **"Musculoskeletal injury severity was assessed using the New Injury Severity Score (NISS) which computes the simple sum of squares of the three most severe injuries identified by the abbreviated injury scale (AIS). The Index of Relative Socioeconomic Disadvantage (IRSD) was calculated from the Socio Economic Index for Areas**

(SEIFA) which ranks areas in Australia according to relative socio-economic advantage and disadvantage. Rehabilitation Indicator refers to whether the claimant required rehabilitation as part of their recovery plan. Presence of psychological distress, such as post-traumatic stress disorder or major depressive disorders, was determined using the ICD-10-AM Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines at some time within the claims process (the database is progressively updated over the duration of the claim). Psychological distress was determined from sources such as reports and independent assessments from General Practitioners, Psychiatrists, and Psychologists.”

The authors agree that this additional information provides more precise definitions of the instruments used to collect the information and improves international understanding.

Comment: Statistical analysis

12. There is information regarding the aim of the study which better fits in the introduction.

Response:- Thank you for this comment. The information regarding the aim of the study has been repositioned into the end of the “INTRODUCTION” on Page 7, Line 126 of the clean document and Page 10 Line 199 of the track-changed document. The paragraph also more clearly emphasises the 2 relevant research questions as per your earlier comment. This paragraph now reads, “**The objective of this research was to analyse the data of all NSW MVC survivors who sustained a musculoskeletal injury and who settled their claim over a two year period. Compensation outcomes of those without diagnosed psychological distress were then compared to those with diagnosed psychological distress. Specifically, the aim was to determine the impact of psychological distress, regardless of time of onset, on claim settlement times and total costs. A further aim was to determine factors, routinely collected by NSW CTP insurance companies and collated by SIRA, that predict elevated risk of having psychological distress. Accordingly findings should address 2 key research questions: 1. whether Psychological distress is associated with longer claim time to completion and greater claim costs, and 2. what injury or demographic characteristics are associated with psychological distress. The findings should be beneficial for informing general practitioners and insurer policymakers, and thus improve healthcare practices for injury-related compensation claimants.**”

Comment: 13. The analysis presented in table 1 is not described in the section of “statistical analysis”. Furthermore, in some cases, the conditions to execute the analysis are not met. Please explain.

Response:- Thank you for this comment. On Page 9, Line 182 of the clean document and Page 13 Line 283 of the track-changed document, additional information has been added under the heading ‘Statistical Analysis’ to describe that which is presented in Table 1. **Descriptive statistics were used to summarise demographic and claim/accident characteristics of the participants by psychological distress status. The differences in the demographics and claim characteristics between those that claimed compensation and those that did not were compared using Analysis of Variance (ANOVA) tests for continuous variables and chi-square tests for categorical variables. In order to determine predictive factors, logistic regression was employed. Only statistically significant socio-demographic and injury variables from Table 1 were included in the logistic regression analysis from which unadjusted odds ratios were determined. Following this, all the variables were again used in backward elimination ($P < .05$) logistic regression, and adjusted odds ratios calculated.**

In regard to your comment about conditions not being met, the analysis included all the characteristics we examined which is why $p > 0.2$ characteristics were also reported.

Comment: Results

14. Why table 2 doesn't present information for MI and MI+PC with the relevant statistical test? It seems to be disconnected from the topic of interest as it is now.

Response:- Please see our response to your Point 13 above. Table 2, On Page 12 Line 230 of the clean document and Page 17 Line 345 of the track changed document has been reconfigured to show total number of musculoskeletal injuries from most common to least common, separated by musculoskeletal injury only versus musculoskeletal injury + psychological distress.

Comment: 15. ".....most serious MI level removed....". why removed? which were considered more serious? based on which criteria?

Response:- On the new injury severity scores we we-ran the analysis just on the minor to moderate (1-8) to investigate whether the increased costs and time were still occurring with the more severe injuries excluded.

Comment: 16. The results show a different focus for every analysis introduced. It is not easy to identify what the study investigates. Although there is initially investigation of the connection between distress and cost claiming levels, then there is a focus on predictors of distress. The authors need to reconsider their focus.

Response:- Thank you for this comment. The population we have focussed on are those who have gone through the NSW CTP compensation schemes and who have also suffered a musculoskeletal injury. These are presented in order via Table 1- Participants and their socio-demographic/injury data), followed by Table 2 - types of musculoskeletal injury. The focus of the paper was then to determine i) whether psychological distress is associated with increased time to settlement and costs of compensation claims (presented under the heading "Claim settlement times, costs and legal representation, followed by ii) what injury and/or socio-demographic factors are associated with psychological disorder (presented under the headings, "Impact of socio-demographic and injury characteristics on probability of a psychological condition" and also under the heading "Logistic regression analysis of significant socio-demographic and injury characteristics".

The authors agree that the information is presented in an orderly and concise manner throughout the results section of the paper which follows the logical order presented in the INTRODUCTION.

Comment: Discussion

17. The authors present in the discussion the prevalence of psychological morbidity in Australia.....they should present the prevalence of psychological morbidity for MI+PC in Australia.

Response:- Thank you for the comment. Specific information on prevalence rates of comorbid overall psychological morbidity with total musculoskeletal injuries is unavailable for Australia, however, rates on musculoskeletal injuries with comorbid depression is available. This information has been added to under the heading, "DISCUSSION", Page 17, Line 348 of the clean document and Page 23 Line 504 of the track-changed document which now reads, "**For comparison, the Australian prevalence of elevated psychological distress such as PTSD is estimated at 0.9±0.1% and depression is estimated at 3.5±0.2%. The prevalence of musculoskeletal injury with a comorbid depression has been estimated at 29.51±3.21.**

Comment: 18. "...the presence of psychological morbidity during the claims processresults in potentially adverse outcomes.....settlement times and costs" . How do the authors reach this conclusion? It is not supported by their data and analysis.

Response:- Thank you for this comment. The data presented in our paper indicates that 1) the presence of a musculoskeletal injury with comorbid psychological distress is associated with lengthier time to claim settlement and higher claim costs (adverse outcomes) than for claimants who do not experience psychological distress along with the musculoskeletal injury. The results also suggest that there are demographic and injury characteristics which are more likely to be associated with experiencing psychological distress. The authors have reviewed the RESULTS and DISCUSSION sections and believe this is clearly stated and is supported by the data analysis.

Comment: 19. Discussion of outcomes based on international literature is very poor, as well as discussion based on the country legislation and insurance is absent.

Response:- Thank you for this comment. As per your earlier comment, information has been added to the "INTRODUCTION" and "DISCUSSION" regarding international research and Australia's legislation and insurance system to provide for improved international understanding. For example, in the INTRODUCTION, Page 7, Line 121 of the clean document and Page 10 Line 193 of the track changed document additional information about the compensation scheme has been added, and now reads, **"The NSW CTP scheme is a fault based scheme with limited access to entitlements for those at fault. Its purpose is to compensate those with injuries who were not at fault in the MVC with the claim requiring police and medical reports as evidence, in addition to a personal injury claim form."** Further, the first sentence under the heading, 'DISCUSSION' on Page 16, Line 342 of clean document and Page 22 Line 497 of the track changed document now reads, **"In NSW, Australia a MVC fault based system is legislated which provides compensation for people injured in MVCs that were the fault of another vehicle owner or driver. The driver at fault is the person who was driving the vehicle considered most at fault in the accident."**

Comment: 20. There are more limitations not mentioned regarding the study design, the lack of important information regarding the injury, which may be confounding factors, the appropriateness of data, alternative sources that could be used, etc.

Response:- Thank you for this comment. Additional limitations regarding design, information and appropriateness of the data, alternative sources that could be used have been added under the heading 'DISCUSSION' on Page 19, Line 402 of the clean document and Page 25 Line 560 of the track-changed document. This paragraph now reads, **"Limitations of this study need to be discussed. It was not possible to determine pre-injury presence of psychological distress. It is expected that the presence of pre-injury psychological distress would have a considerable impact on the presence of psychological distress during the claims process. However, arguably, proxy measures of pre-injury psychological distress existed in the study, namely social disadvantage and unemployment, both highly related to the presence of psychological disorder. These two measures were found to predict psychological distress during the claim process. Nevertheless, research with access to pre-injury health data shows that diagnosed psychological/psychiatric illness prior to injury is a significant risk factor for psychological distress following a MVC incident. Due to the data being collected in a fault based CTP scheme, very few claimants were at fault, and this may have been a factor in its predictor status of psychological distress. Clearly, the predictive capacity of fault status requires further research. The inclusion of only settled claims has the potential to exclude more claims in which psychological distress played a role given their propensity to be more lengthy for the claimant. It was also not possible to know with a high level of accuracy what psychological condition was experienced."**

References

- Ameratunga, S. N., Norton, R. N., Bennett, D. A., & Jackson, R. T. (2004). Risk of disability due to car crashes: A review of the literature and methodological issues. *Injury*, 35(11), 1116-1127. doi:<http://dx.doi.org/10.1016/j.injury.2003.12.016>
- Craig, A., Tran, Y., Guest, R., Gopinath, B., Jagnoor, J., Bryant, R. A., Collie, A., Tate, R., Kenardy, J., Middleton, J., Cameron, I. D. (2016). The psychological impact of injuries sustained in motor vehicle crashes: Systematic review and meta-analysis. *BMJ Open*, *In press*.
- Papadakaki, M., Ferraro, O. E., Orsi, C., Otte, D., Tzamalouka, G., Von-der-Geest, M., . . . Sarris, M. (2017). Psychological distress and physical disability in patients sustaining severe injuries in road traffic crashes: Results from a one-year cohort study from three European countries. *Injury*, 48(2), 297-306.

VERSION 2 – REVIEW

REVIEWER	Tim Platts-Mills University of North Carolina Chapel Hill United States of America
REVIEW RETURNED	07-May-2017

GENERAL COMMENTS	<p>This is a well written paper on an important subject. The authors have done a nice job of presenting a large amount of data. There are some methodologic issues that need to be clarified as well as the following additional comments.</p> <p>The conclusion of the abstract says that efforts to reduce post-MVC psychological distress are needed in order to reduce the length and cost of settlements. This is not the primary reason why these efforts are needed. The primary reason is because PTSD is common and debilitating condition. Although reducing the cost of settlements is an okay additional reason for trying to prevent post-MVC PTSD, it is not the main reason.</p> <p>Please use “an MVC” rather than “a MVC.” Use AN before words such as "hour" (“MVC”) which sound like they start with a vowel even if the first letter is a consonant</p> <p>Methods. More information needs to be provided regarding how the logistic regression was developed. How is it that age is not in the adjusted model? Did you use a stepwise regression? If it was just based on a p-value from bivariate analysis, it appears age and other variables would be included. The method of variable selecting for the final model needs to be described clearly for understanding and to allow replication.</p> <p>Table 2. What is a “neck” injury and how is this different from “whiplash”?</p> <p>Table 2. In Table 1, you present column percentages. In Table 2, you switch to row percentages. Why? If you stay with row percentages, please report the percentage for the entire sample at the top – i.e. what % had psych distress – as the first row in the table. That way the reader can use that as a reference to see patterns of association relative to the average.</p>
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VERSION 2 – AUTHOR RESPONSE

1. Abstract. Thank you for this comment. We have changed this sentence to read, 'the major aim being to reduce risk of psychological distress, such as post-traumatic stress disorder, and associated risk of increased settlement times and claim costs. This highlights the reduction of risk of PTSD being the major aim, and the settlement times and costs being an associated aim.'

2. We agree with the reviewer on changing 'a MVC' to 'an MVC'. All references throughout the document have been changed accordingly.

3. Methods - Thank you for this comment. Age was not included in the adjusted model, because as shown in Table 1, there is only just over 12 month's difference between the 2 groups so we do not believe it is an important factor to contribute to the model. Legal representation was not added as it can occur any time during the claims process and therefore we do not believe it can be a predictor. Occupation level was not adjusted in the model as we believe that socio economic disadvantage covers this variable. More information has been provided on the logistic regression and place in the relevant section under 'Statistical Analysis'.

4. Table 2. We agree with the reviewer and we have collapsed the 5 neck injuries into the Whiplash category and adjusted figures and percentages accordingly.

5. Table 1 and 2 Percentages. Thank you for this comment. We believe row percentages are more illustrative. We have therefore included the percentages for the entire sample in the first row in Table 2, and we have included an explanatory note at the base of the Table. We used row percentages because injury type is shared, in other words, people can have multiple injury types.