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ACT COMPULSORY THIRD PARTY INSURANCE SCHEME

REVIEW OF ROAD TRANSPORT (THIRD PARTY INSURANCE) ACT 2008

LEGISLATIVE REVIEW UNDER SECTION 275



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JOINT SUBMISSION BY

LAW SOCIETY OF THE AUSTRALIAN CAPITAL TERRITORY,

BAR ASSOCIATION OF THE ACT

and

ACT BRANCH OF THE AUSTRALIAN LAWYERS ALLIANCE

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**JOINT SUBMISSION BY LAW SOCIETY OF THE AUSTRALIAN CAPITAL TERRITORY,
BAR ASSOCIATION OF THE ACT and ACT BRANCH OF THE AUSTRALIAN LAWYERS
ALLIANCE**

1. The ACT Law Society ("Law Society"), Bar Association of the ACT ("ACT Bar") and the Australian Lawyers Alliance ("ALA") are pleased to provide the following submission to the Section 275 Review ("the Review") into the operation of the Road Transport (Third Party Insurance) Act 2008 ("the Act").

The Law Society, Bar Association and ALA have previously had the opportunity to make submissions to Treasury and make submissions and give evidence before the Public Accounts Committee. We adopt those submissions and evidence.

Summary and Recommendations

2. The Law Society, ACT Bar and ALA welcome the completion of the Review and note that the Review has identified a number of positive developments with respect to the operation of the Act since its commencement in October 2008. We note that the Review has found:-
 - claims frequency has fallen;
 - the Act has been beneficial in improving the regulatory environment and prompt reporting;
 - that claims are finalising at a faster rate than claims brought prior to October 2008;
 - the Act has placed downward pressure on CTP premiums;
 - the Act has brought about early intervention and payment of medical, hospital and treatment expenses;
 - that the average claim size has decreased;
 - that legal costs are lower.
3. We are encouraged to observe that some of the principal ambitions of the Act have occurred and have been quantified by the Review.
4. We note that one of the significant elements of the Act, that is to increase and encourage competition of further CTP insurance providers, has not yet occurred. The Law Society, Bar Association and ALA remain of the view that there remains no impediment to a further CTP insurer entering the market, nor was there prior to the commencement of the Act.
5. The stated criteria for the Review were :-
 - "how effectively the scheme under the ACT provides reduced premiums for compulsory third party insurance policies for motor vehicles;
 - reforms to CTP schemes implemented in other jurisdictions in Australia; and
 - the impact of the changes on the recovery to health, wellbeing and work of the claimant."

6. Cumpston Sarjeant has conducted an actuarial investigation to some 11,400 claims, spanning the period 2001 to 2011. The Law Society, Bar Association and ALA would welcome the opportunity to peruse and review the actuarial analysis of Cumpston Sarjeant, as well as the data provided to it. We are also of the view that it would be proper and appropriate for the Public Accounts Committee to have the actuarial analysis of Cumpston Sarjeant and the data used in the actuarial analysis available to determine its findings.
7. In addition to the failure of a further CTP insurer to enter the market, we note that there is a further benchmark in the Review which remains to be achieved, that is the reduction in premiums. We will address that issue later in this submission.

Deficiencies in the Review

8. We note with some concern that, at page 8 of the Review, it is stated;
"the effectiveness of the reforms implemented through the Act in achieving improved health outcomes can in principle be assessed through quantity of methods. As stated later in this report, however, there is limited ACT specific information available at this stage. Some inferences may be drawn from an analysis of the reporting and claim finalisation times, and possibly through the analysis of the expenditure on medical treatment."
It is of some concern that there appears to be an admission that there is insufficient data available at this time for the reviewer to make findings, rather than relying upon inferences based upon the lack of information. It has been the position of the Law Society, Bar Association and ALA throughout the period since the proposed 2011 Road Transport (Third Party Insurance) Bill that there has been both a lack of information and data made available to the public with respect to the operation of the 2008 Act and that the 2008 Act has not been in operation for a sufficient period of time for an accurate assessment of its effects to be quantitatively made. The first paragraph on page 8 of the Review appears to bear out this concern. Furthermore, we are concerned that the actuarial analysis, which has not been provided to the Law Society, Bar Association, ALA or the public, may not be quantitatively accurate for the reasons identified in the Review.
9. One of the reasons we hold fears as to the accuracy of the Review is the assertion made at page 8 under the heading "Data Information Sources" that "the actuarial review analyzed approximately 11,400 claims records for the ACT Scheme ... each record included: ... payments by head of damage for each claim:" We note that the Review asserts that some 85% of the 11,400 claims records relate to claims made prior to October 2008 for which there is an admission, at page 3 of the Executive Summary, "there was a lack of information around CTP claims and in particular, medical intervention, treatment, rehabilitation and return to health" with respect to the operation of the scheme which existed prior to 2008. The actuaries state that, notwithstanding this lack of data, they were able to identify 11,400 claim records with respect to their particular heads of damage for each claim.
10. The Law Society, Bar Association and ALA submit that it is improbable, if not impossible, for 11,400 claims to be broken down into their various heads of damage given that the vast majority of those claims, somewhere in the order of 85-90%, would have been resolved between the parties, in the absence of a verdict of a Court, as a compromised settlement. In those instances where a matter has been settled between the parties arising from negotiation, there is in most cases an absence of agreement as to the heads of damage. For the actuaries to assert that they are able to identify heads of damage in 11,400 matters is strange and we can only assume that some arbitrary mechanism or formula has been imposed by the

NRMA with respect to matters settled after the event. We would question the veracity and utility, as well as the arbitrary nature of any such formula. Again we would call upon the Government to make available the actuarial study and the data used in its findings.

11. The Law Society, Bar Association and ALA also note with some concern that the Review has, in certain instances, reported into areas beyond the scope and terms of the Review.
12. The Review purports to comment upon the effect of the proposed 2011 Bill which falls outside the terms of the Review pursuant to Section 275.

Changes in Premiums

13. We note that the Review, at pages 12 and 13, makes certain findings in relation to the increase in premiums since the introduction of the Act in 2008. The Review identifies that "increases in premiums are primarily due to:

- claims inflation pressure, mainly for old scheme claims yet to be finalised; and
- poor financial market performance following the Global Financial Crisis ("GFC") making it necessary for insurers to make greater provision for future claim liabilities. Earnings have suffered an additional recent down turn."

The reviewer goes on to state, at page 12 "There has been a net increase in premiums of \$141.00 since the introduction of the legislation in 2008. The net increase is largely attributable to :

- claims costs relating to claims under pre-2008 legislative environment; and
- drop in investment earnings."

The 2008 Act was brought into place to regulate claims costs, which it has largely achieved. Pre-2008 claims remain outside the scope of the operation of the 2008 legislation and, presumably, this would have been anticipated by the authors and legislators of the 2008 Act, as well as any stakeholders such as the NRMA who may have been involved in the drafting of the 2008 legislation.

14. The fact that there has been "a drop in investment earnings" is instructive in relation to the removal of the rights of injured motorists anticipated in the 2011 Bill. The stated aims of the 2011 legislation were to "increase medical and hospital treatment and rehabilitation intervention and payments" although, of course, there is nothing within the 2011 Bill which effects any increase in those benefits. The effect of the 2011 Bill is simply to deprive injured motorists of their rights for non-economic loss, future medical, hospital and treatment expenses, future economic loss and future domestic assistance entitlements which will result in a net reduction in the payment of benefits. It would not be a long bow to draw to assert that the "drop in investment earnings" is the principal driver behind the proposed 2011 Bill and that the 2011 Bill has nothing to do whatsoever with respect to providing any benefit to injured motorists. It is of some concern that the "drop in investment earnings" has not been referred to by the treasury witnesses or the NRMA witnesses in their evidence and submissions before the Public Accounts Committee. The Law Society, Bar Association and ALA call upon the Government and NRMA to provide to them, or alternatively to the Public Accounts Committee, the data with respect to the drop in investment earnings and its effect on the scheme.

15. With respect to the admission of the "poor financial market performance" the position of the Law Society, Bar Association and ALA is that, given that the CTP insurance providers are apparently suffering from reduced investment earnings, the proposed increase in the discount rate for future economic loss, future medical expenses and future domestic assistance expenses, as proposed in the 2011 Bill, is entirely unwarranted. The increase in the discount rate assumes that the injured claimant can earn higher investment returns on damages received. This leads to a reduction in the lump sum payments for future medical expenses and future lost income. This assumption that a claimant can earn higher investment returns is entirely at odds with the poor financial market performance, as disclosed in the Section 275 Review, and if a CTP insurance provider, such as the NRMA, is unable to earn a decent return on its investment, there is absolutely no reason whatsoever that an injured motorist should have the discount rate increased on his or her future earnings.

Impact of 2008 Legislation on Health Outcomes

16. The Law Society, Bar Association and ALA agreed that the 2008 legislation has been beneficial with respect to health outcomes insofar as the payment of medical, hospital and treatment expenses and the provision for early payment introduced by the 2008 legislation has a positive effect on health.
17. The Law Society, Bar Association and ALA take exception to the representations made under the Section 275 Review under "recent clinical studies in the ACT" at page 20, given that the ACE project referred to has never been provided to us, nor has it been provided to the Public Accounts Committee. We are not in a position to comment on its findings in the absence of its provision and we are also somewhat concerned that the findings of the ACE project are outside the scope and terms of the Review. The Law Society, Bar Association and ALA reject the findings of the Review that claimants for damages in motor vehicle accident injuries are likely to suffer worse health outcomes than people who do not make a claim. In our view, the assertion is to the contrary and in that regard we refer the Committee to the paper of Natalie M. Spearing and Luke B. Connolly "Whiplash and Compensation Hypothesis", a copy of which we enclose.

Closing Remarks

18. While the Law Society, Bar Association and ALA differ in some respects to the findings of the Review, we are encouraged and acknowledge the aspects of the Review which identify a positive impact of the 2008 scheme, namely that claims frequency has fallen, claims are being reported more promptly, claims are being resolved more quickly and legal costs are lower. We remain of the view that the 2008 legislation has been the driver of all of these positive aspects.

Further detail on the article referred to under the section entitled—**Impact of 2008 Legislation on Health Outcomes (paragraph 17)** is set out below:

Natalie M. Spearing and Luke B. Connolly "Whiplash and the Compensation Hypothesis", *SPINE*, Vol. 36, No. 25S, pp. S303–S308.

CHAPTER 6: Whiplash and “The Compensation Hypothesis”

This chapter forms the basis for the publication: Spearing NM, Connelly LB. Whiplash and the compensation hypothesis. *Spine* 2011;36(25 Suppl):S303-308.

Abstract

Study Design Review article. **Objective** To explain why the evidence that compensation-related factors lead to worse health outcomes is not compelling, either in general, or in the specific case of whiplash. **Summary of Background Data** There is a common view that compensation-related factors lead to worse health outcomes (“the compensation hypothesis”), despite the presence of important, and unresolved, sources of bias. The empirical evidence on this question has ramifications for the design of compensation schemes. **Methods** Using studies on whiplash, this paper outlines the methodological problems that impede attempts to confirm or refute the compensation hypothesis. **Results** Compensation studies are prone to measurement bias, reverse causation bias, and selection bias. Errors in measurement are largely due to the latent nature of whiplash injuries and health itself, a lack of clarity over the unit of measurement (specific factors, or “compensation”), and a lack of appreciation for the heterogeneous qualities of compensation-related factors and schemes. There has been a failure to acknowledge and empirically address reverse causation bias, or the likelihood that poor health influences the decision to pursue compensation: it is unclear if compensation is a cause or a consequence of poor health, or both. Finally, unresolved selection bias (and hence, confounding) is evident in longitudinal studies and natural experiments. In both cases, between-group differences have not been addressed convincingly. **Conclusions** The nature of the relationship between compensation-related factors and health is unclear. Current approaches to testing the compensation hypothesis are prone to several important sources of bias which compromise the validity of their results. Methods that explicitly test the hypothesis and establish whether or not a causal relationship exists between compensation factors and prolonged whiplash symptoms are needed in future studies.

6.1 Introduction

Negative associations between compensation-related factors and persistent symptoms after whiplash (Pobereskin 2005; Dufton et al., 2006; Gun et al., 2005) are often interpreted as evidence that compensation adversely affects health. Some believe the evidence is sufficiently compelling to accept that compensation-related factors are a *cause* of worse health (Cameron & Gabbe 2009). For convenience, we refer to this idea that a causal pathway runs from compensation factors to worse

health as “the compensation hypothesis.” Despite its apparent acceptance (AFOM 2001; Carroll et al., 2008b; Cote et al., 2001a; Cassidy et al., 2000), and indeed its use, in a general sense, to influence injury compensation legislation (NSW Parliament 2005), serious methodological problems constrain the validity of the compensation hypothesis, regardless of the type of compensable injury.

There are two primary reasons why some characteristics of compensation systems and/or compensation payments themselves are believed to be harmful to health. First, compensation systems that require individuals to prove their ill-health and functional limitations in an adversarial environment are thought to adversely affect recovery (O'Donnell 2000), a view supported by studies showing negative associations between lawyer involvement (Dufton et al., 2006; Gun et al., 2005), claiming (Pobereskin 2005), and fault-based compensation schemes (Cameron et al., 2008) and health outcomes. Second, the prospect of financial gain is believed to motivate some individuals to exaggerate their injury or their symptoms (Ferrari et al., 1999). This idea, that whiplash is a behavioural response to the availability of compensation (Ferrari 2003), which may be supported by third parties also seeking to gain financially (Kwan et al., 2001), is reinforced by the relative dearth of whiplash in countries where compensation is not available (Schrader et al., 1996), and by the reduction in the rate of whiplash claims when financial compensation is lowered (Cassidy et al., 2000).

In spite of the apparent support for the compensation hypothesis in relation to whiplash, and there is evidence to the contrary (Scholten-Peeters et al., 2003; Sterling et al., 2006; Spearing & Connelly 2011a), studies to date are subject to flaws which unacceptably heighten the risk of spurious empirical results, irrespective of the conclusions drawn. Some of these sources of bias, measurement bias and selection bias, are well-documented in reviews of the whiplash literature (Kwan & Friel 2003b; Freeman et al., 1999; Carroll et al., 2009b). However, another important source of bias, reverse causality, or the question of whether compensation is a cause or a consequence of poor health, or both, is only rarely discussed (Atherton et al., 2006; Joslin et al., 2004) in whiplash studies, and has not been addressed empirically in compensation research. Reverse causation bias has serious implications for policy decisions related to compensation scheme design, and, of course, for those affected by such decisions. Policies based on studies which have failed to consider the inverse (and equally plausible) proposition that worse health prompts individuals to seek compensation (Elliott et al., 2009b; Gargan & Bannister 1994; Norris & Watt

1983) are likely to be ineffective and may inadvertently compromise the health and wellbeing of those individuals who are in most need of financial assistance.

Using studies on whiplash, this paper describes the methodological problems confronting studies on the compensation hypothesis, and discusses them in relation to current empirical approaches. While examples of studies are provided, this paper does not constitute a systematic review.

6.2 Methodological Issues

In the context of compensation research, it is generally not feasible to randomly allocate the treatment of interest, compensation *per se* and/or its related processes (hereafter, compensation-related factors), in an experimental setting. Instead, observational research is relied upon to answer questions about the impact of compensation factors on health. Observational studies are, however, subject to several important sources of bias, and whiplash studies are no exception (Kwan & Friel 2003b; Freeman et al., 1999; Carroll et al., 2009b). Testing whether compensation-related factors affect health is complicated by: the difficulties in measuring the concepts of interest (health and compensation), the possibility that the relationship between compensation factors and health is simultaneously and jointly-determined (reverse causation bias), and the problem of selection bias, which will confound the association between the variables of interest if left unresolved.

6.2.1 Measurement Bias

Measuring health status

Health—defined according to the WHO (1946) definition—is a latent variable. It cannot be observed directly, and although some indicators of it are observed, it is not possible to actually measure health or ill-health, *per se*. Whiplash is, by and large, a latent injury, as there are no objectively discernible features in the vast majority of cases: cervical fractures occur only rarely, and the most common symptom of whiplash is pain, a subjective indicator assumed to be related to soft tissue injury (Carroll et al., 2008b). Self-reported pain, disability, psychosocial and functional status are commonly relied upon as measures of the health status of people with whiplash (Nordin et al., 2009). Other measures, such as claim duration and return to work, are sometimes used as proxies for health and/or recovery. These proxies are appealing because they are observed directly and data are relatively easy to collect, however, they do not necessarily coincide with the cessation

of symptoms (Carroll et al., 2008b; Rebbeck et al., 2006; Hendriks et al., 2005; Brison et al., 2000). There is no consensus as to what constitutes whiplash “recovery” (Walton 2009).

In compensable environments, the relationship of whiplash symptoms to the true but latent health state is usually unobservable or imperfectly observable, resulting in the potential for moral hazard (*ex post*) (Arrow 1963; Pauly 1968) under such circumstances. Quantifying the presence or extent of this source of measurement error is not currently possible. Although insurers estimate that 5% of whiplash claims are fraudulent (ABI 2008), there is no empirical evidence to support this approximation, or others (Carroll & Abrahamse 2001), as there is no validated, objective test for identifying whiplash injuries (Elliott et al., 2009a). In addition, studies on people with objectively measurable compensable injuries (Gabbe et al., 2007; O'Donnell et al., 2010), which, it is argued (Cameron & Gabbe 2009), are less prone to measurement error from moral hazard, are subject to the same problems arising from unresolved reverse causality and selection bias, discussed below. The reliance on self-reported diagnosis has led to speculation that whiplash is a mythical injury (Ferrari 2003).

Measuring compensation-related variables

Compensation, when defined as a payment from one party to another as recompense for losses arising from an injury, is monetised and hence objectively measurable. However, in the applied work, it is sometimes unclear if the effect of financial compensation *per se* on health is actually of interest, or whether it is the compensation-related processes that are suspected of influencing health. For example, whether or not an individual submits a claim for compensation (Pobereskin 2005; Sterling et al., 2006), whether or not a lawyer is retained (Dufton et al., 2006; Gun et al., 2005; Hendriks et al., 2005), and whether or not litigation is involved (Kasch et al., 2001) are several examples of the measures—all of which represent different phenomena—that have been used to examine the relationship between compensation factors and health in subjects reporting whiplash. This raises the question of whether indicators of these phenomena are meant to reflect otherwise-latent factors that are involved in the compensation-seeking process, or whether they are actually direct measures of the variables of interest.

The foregoing conceptual issue also matters for practical reasons. First, if one suspects that a particular aspect of the compensation-seeking process—for example, lawyer involvement—is a cause of poorer health outcomes, lawyer involvement is the measure of “compensation” that is of

direct interest. Conversely, if this variable was chosen as an indicator that compensation was sought, the implications for measurement error are different: individuals who sought compensation but did not retain a lawyer will be misclassified. Second, if particular characteristics of compensation schemes, other than the magnitude of damages sought/awarded, do lead to poorer health outcomes, policies that are designed to curtail compensation payments may not only have zero effect on health outcomes, but may also leave injured people worse off financially (Connelly & Spearing 2011).

Finally, injury compensation schemes are commonly quite complex and their designs often differ considerably by jurisdiction and according to the cause of an injury and who was at fault. The array of legal processes and incentives to claim limits the validity of efforts to compare the health of individuals exposed to different schemes (Connelly & Spearing 2011). Moreover, the methods for determining eligibility for whiplash compensation differ across countries (Chappuis & Soltermann 2008). Furthermore, classifying individuals according to whether or not they are compensable, whether or not they have sought compensation, or whether or not compensation has been received implies different conceptualisations of the treatment, "compensation". These subtle but important distinctions are often not made (Grant & Studdert 2009).

6.2.2 Reverse Causation Bias

In addition to the potential for measurement error, a source of bias that is less commonly considered, but of particular importance in compensation research, is the problem of reverse causality, which refers to the presence of a circular or two-way causal relationship (Culyer 2010). According to the adage, "association is not causation", the presence of a statistical association alone is not sufficient for the purposes of drawing conclusions about the nature of a relationship between two variables; a plausible causal framework is also needed (Pearl 2009). Where such a framework exists, the interpretation of a statistical association is straightforward. For example, a negative association between age and neck pain is easily interpreted to indicate that a causal pathway runs *from age to neck pain* because we know that the inverse proposition, neck pain leads to age, is implausible: the causal pathway in this example is unambiguous.

Associations between compensation-related variables and health status are less amenable to interpretation, however, because the causal pathway in the relationship is ambiguous: it is likely to run in both directions. For example, a negative association between claiming compensation and

health, which is often interpreted as evidence that claiming leads to worse health, could equally be interpreted as evidence that (worse) health leads to the decision to claim compensation—and the evidence shows that individuals in comparatively worse health are more likely to pursue compensation (Elliott et al., 2009b; Gargan & Bannister 1994; Norris & Watt 1983). In short, compensation may affect health, and similarly, health may affect (the decision to pursue) compensation. Both possibilities must be considered to expose the true nature of the relationship between the variables; these are expressed mathematically in the following two-equation model (Figure 6.1):

Figure 6.1: Conceptual Model of Reverse Causality (Two-Equation Model)

$$HS = f(COMP + X + \mu) \quad (1)$$

$$COMP = f(HS + Y + \varepsilon) \quad (2)$$

Equation (1) represents what could be considered the usual approach to testing the effect of compensation-related factors on health, where health status (HS) is a function of compensation-related factors (COMP), contingent on the effects of observed (X) and unobserved (μ) variables, and, equation (2) represents the inverse of (1), which is that exposure to compensation-related factors is a function of health status, contingent on other observed (Y) and unobserved (ε) factors.

Reverse causality is critical to resolve to avoid biased and inconsistent estimates (Wooldridge 2009), and this is true regardless of the type of injury and whether or not it is objectively verifiable. Where it is ignored, it will be unclear whether a negative association does indeed reflect a compensation-related effect, or whether it reflects the pursuit of compensation by those with (comparatively) worse health. While the former explanation is often assumed (Cameron & Gabbe 2009), if the latter were true, policy decisions aimed at reducing compensation benefits could adversely affect those who are in most need of financial assistance.

Reverse causality is not a new concept in compensation research (Dworkin 1990; Teasell 2001); and, while it is occasionally considered in whiplash studies (Atherton et al., 2006; Joslin et al., 2004), no attempt has been made to resolve it. Additional statistical techniques are required to interpret the direction and the magnitude of an observed association when the potential for an inverse causal relationship is thought to exist. Importantly, bias from reverse causality is systematic and cannot, therefore, be resolved by increasing the number of observations. Possible options to address reverse causation bias include estimating systems of equations (Wooldridge 2009), the use of instrumental variables techniques (Wooldridge 2009; Angrist & Pischke 2009), and fixed and

random effects models in longitudinal settings (Wooldridge 2009). While a discussion of tests for reverse causation bias and possible methods for addressing it (Wooldridge 2009; Angrist & Pischke 2009) is beyond the scope of this paper, more attention to this seldom considered source of bias is needed.

6.2.3 Selection Bias

In addition to the potential for measurement error and reverse causation bias, the latter of which is related to the nature of the relationship between compensation and health, the problem of selection bias in observational studies involving between-group comparisons must be considered. In particular, when group membership is self-selected, as it is when a decision is made to claim compensation or not, the distribution of characteristics (measured and unmeasured) will differ systematically between the comparator groups; therefore, the health outcomes of claimants and non-claimants will vary for reasons other than whether or not they made a compensation claim. Selection bias is a well-recognised problem in non-randomised studies, including those involving whiplash (Kwan & Friel 2003b; Freeman et al., 1999; Carroll et al., 2009b). It can result in confounding if between-group differences are not addressed (Rochon et al., 2005; Grimes & Schulz 2002), producing results that are spurious and misleading.

The validity of causal inferences in non-randomised studies rests on whether between-group differences have been accounted for (Grimes & Schulz 2002). When random allocation is infeasible, matching, restricting, or stratifying subjects on the basis of known or suspected confounders (Grimes & Schulz 2002), multivariate regression analysis (Grimes & Schulz 2002), and propensity score analysis (Rosenbaum & Rubin 1983) can be used to control for measured (observed) confounders. Unmeasured confounders can be addressed using instrumental variables techniques and, in longitudinal designs, fixed effects models are also an option (Wooldridge 2009).

Unless measures are taken to balance the distribution of characteristics among the groups, it will not be possible to determine, reliably, whether or not differences in health outcomes are due to compensation, or due to a third variable (confounder) that also affects health (Grimes & Schulz 2002).

6.3 Empirical Approaches

Observational data obtained from surveys of individuals presenting for treatment, and from insurance claims databases are used to study the relationship between compensation-related factors and health outcomes after whiplash.

Studies vary widely with respect to their design. Cross-sectional studies have been performed (Klein et al., 2001; Swartzman et al., 1996), although longitudinal, comparative studies are considered the strongest of the observational designs for drawing causal inferences—notwithstanding the need to address the problems of measurement bias, reverse causality, and selection bias. Quasi-experimental studies, designed to infer causality, have also been undertaken (Cassidy et al., 2000; Cameron et al., 2008).

Among the primary studies, sampling procedures and sample characteristics (e.g., place and time of inception, injury severity), study inclusion criteria, outcome measures, compensation-related variables, length and frequency of follow-up, and the covariates included in multivariate analyses. The substantial heterogeneity across studies complicates efforts to meta-analyse the results of studies on compensation, although qualitative syntheses have been undertaken (Carroll et al., 2008b; Cote et al., 2001a; Scholten-Peeters et al., 2003; Spearing & Connelly 2011a).

6.3.1 Longitudinal Studies

Several longitudinal studies have produced information on the comparative effect on health outcomes of exposure/non-exposure to compensation factors. However, these comparisons are largely incidental, as most such studies are prediction studies (Pobereskin 2005; Gun et al., 2005; Sterling et al., 2006; Hendriks et al., 2005) which are designed to estimate the probability of an outcome, not to establish whether a causal association exists between two variables (Moons et al., 2009). As a result, measures to address selection bias, such as establishing the comparability of claimants and non-claimants at baseline (Grimes & Schulz 2002), and adjusting specifically for variables which may confound the observed relationship between the compensation claiming and the outcome of interest (Grimes & Schulz 2002), for example, are not apparent. By default, however, it could be argued that selection bias and confounding are dealt with to some extent through the use of multivariate statistical adjustment, even though this is not deliberate, and is not the intention in prediction research (Moons et al., 2009). The subtle distinctions in the application of

multivariate regression techniques are a cause for some concern if readers draw causal interpretations from prediction studies that have included compensation factors as co-predictors. However, irrespective of whether prediction or causality is the motivation for these studies and whether selection bias is fully addressed, the observed association between a compensation-related factor and an outcome variable will be biased and inconsistent if reverse causality has not been addressed (Wooldridge 2009); hence, caution is also advised when evaluating the results of prediction studies. Importantly, it is clear that causally-oriented studies are needed.

Longitudinal data have also been applied to test whether the prospect of financial gain alters behaviour. In these studies, the health of claimants before and after the settlement of their compensation claims is compared in order to determine whether the removal of the financial incentive for symptom exaggeration leads to a change in self-reported whiplash symptoms (Maimaris et al., 1988; Sapir & Gorup 2001). Such an approach arguably deals with selection bias, as individuals serve as their own matched controls, although the potential for moral hazard and reverse causation bias is not obviated by this design.

6.3.2 Natural Experiments

Insurance claims data have been used to examine the effects of changes to compensation scheme design using an approach similar to that of quasi- or “natural” experimental studies. Natural experiments arise when the allocation of the treatment of interest (e.g., compensation *per se* or a compensation-related process) is changed, but when other variables that could affect the relationship of interest remain stable (Angrist & Pischke 2009). For such a design to be compelling—for it to enable one to draw a causal interpretation between a treatment and outcome of interest—it must result in an *as-good-as-random* allocation of the treatment across individuals.

A natural experiment to test the compensation hypothesis would result in the intervention and the control groups being identical except for the compensation-related variable(s) of interest, such as the quantum of compensation, for example. If the groups that are exposed to different compensation treatments are not otherwise identical, the natural experiment design fails due to unresolved selection bias, and hence, the effect is spurious.

Some whiplash studies have employed a natural experiment-like design to test the effects of changes to compensation scheme design on recovery. One such study (Cassidy et al., 2000)

examines the effect on the rate and duration of claims of changing from a fault-based compensation system to a no-fault system, and another (Cameron et al., 2008) examines the effect on health outcomes of a suite of changes within a fault-based system. Whether or not these policy changes created *as-good-as-random* allocations of the compensation treatment is questionable, as the observed and unobserved characteristics of the individuals self-selecting to the claimant pool are likely to change when the incentives to claim are altered. If this happens, the natural experiment design becomes less convincing as there are likely to be systematic differences between the pre- and post-change claimant groups, other than those observed. One may, however, argue that selection bias will work to attenuate any observed effect rather than inflate it, as the post-change claimant pool is likely to contain fewer individuals in total (Cameron et al., 2008). If such an argument is compelling and one still finds an association, the effect, *ceteris paribus*, may be to confirm the qualitative result albeit with a quantitative underestimate of the causal effect. These phenomena have not been tested for in studies to date. Of note here also, as illustrated in the study by Cameron (2008), is the difficulty in measuring the effects of discrete compensation-related factors when packages of legislative changes are introduced.

6.3.3 Systematic Reviews

Three systematic reviews addressing the association between compensation and health in whiplash studies (Carroll et al., 2008b; Cote et al., 2001a; Scholten-Peeters et al., 2003) have yielded conflicting results due to differences in study selection criteria (and in particular, the choice of outcome measure), approaches to quality appraisal, and the method of synthesis. None of the reviews is specifically focused on compensation-related factors. An evaluation of the quality of systematic reviews (including the three whiplash reviews) on compensation-related factors and health outcomes (Spearing & Connelly 2011a) concluded, controversially (Spearing & Connelly 2011b; Cassidy et al., 2011), that there is no high quality evidence in support of the compensation hypothesis in existing systematic reviews.

6.4 Discussion / Conclusions

This paper describes the methodological issues in compensation research, namely, measurement bias, reverse causation bias, and selection bias, which have frustrated efforts to determine whether a causal association exists between compensation-related factors and health. While checklists of causal criteria (Hill 1965) are sometimes applied in this pursuit, they are thought to over-simplify

the process of distinguishing causal associations: an empirically-based approach is more robust (Rothman & Greenland 2005). In the social sciences, empirical solutions to the problem of inferring causality from observational data include the exploitation of natural experiments, as described earlier, and/or the use of econometric techniques (Wooldridge 2009; Angrist & Pischke 2009). The objective of these approaches is to account for the problem of reverse causality, and to rule out the possibility that the problems of observational data (namely, selection bias and measurement error) are driving an observed association between two variables.

Different approaches to overcoming the methodological problems inherent in compensation research must be considered, regardless of the lack of a common language (Gunasekara et al., 2008) and of common tools for establishing causality (Pearl 2009). The need for high quality evidence about the health effects of compensation-related factors is reinforced by the potentially modifiable nature of compensation schemes: if studies are able to confirm or refute the compensation hypothesis, scheme design can be altered accordingly to positively influence (or to avoid negatively influencing) the trajectory of recovery from compensable injuries such as whiplash.

KEY POINTS

1. There is a prevailing view that compensation-related factors lead to worse health outcomes after whiplash; however, important sources of bias are present which hinder the interpretation of the results of existing studies.
2. Causal interpretations of negative associations between compensation and health outcomes are unjustified unless the possibility that health could influence decisions about compensation is satisfactorily addressed.
3. It is important to raise awareness of the limitations of current research on the compensation hypothesis and to apply techniques that will resolve the major sources of bias in future studies.

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