

Do compensation processes impair mental health? A meta-analysis

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ABSTRACT

Background: Victims who are involved in a compensation processes generally have more health complaints compared to victims who are *not* involved in a compensation process. Previous research regarding the effect of compensation processes has concentrated on the effect on *physical* health. This meta-analysis focuses on the effect of compensation processes on *mental* health.

Method: Prospective cohort studies addressing compensation and mental health after traffic accidents, occupational accidents or medical errors were identified using PubMed, EMBASE, PsycInfo, CINAHL, and the Cochrane Library. Relevant studies published between January 1966 and 10 June 2011 were selected for inclusion.

Results: Ten studies were included. The first finding was that the compensation group already had higher mental health complaints at baseline compared to the non-compensation group (standardised mean difference (SMD) = −0.38; 95% confidence interval (CI) −0.66 to −0.10; $p = .01$). The second finding was that mental health between baseline and post measurement improved less in the compensation group compared to the non-compensation group (SMD = −0.35; 95% CI −0.70 to −0.01; $p = .05$). However, the quality of evidence was limited, mainly because of low quality study design and heterogeneity.

Discussion: Being involved in a compensation process is associated with higher mental health complaints but three-quarters of the difference appeared to be already present at baseline. The findings of this study should be interpreted with caution because of the limited quality of evidence. The difference at baseline may be explained by a selection bias or more anger and blame about the accident in the compensation group. The difference between baseline and follow-up may be explained by secondary gain and secondary victimisation. Future research should involve assessment of exposure to compensation processes, should analyse and correct for baseline differences, and could examine the effect of time, compensation scheme design, and claim settlement on (mental) health.

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Victims who are involved in a compensation process generally have a worse recovery than victims who are *not* involved in a compensation process.^{1–5} This hampered recovery of victims who claim monetary compensation for the injuries, costs and losses relating to an accident is often explained by the theory that being involved in claims settlement creates an unconscious financial incentive for victims *not* to get better as long as the settlement lasts (*secondary gain*).⁶ Another explanation is that the compensation process is a stressful experience⁷: victims suffer from renewed distress (*secondary victimisation*)⁸ caused by the claims settlement process.

Previous research regarding the effect of compensation has concentrated on investigating the effect on *physical* health, such as the level of pain, disability, disease symptoms, and (more indirectly) return-to-work. Several systematic reviews were conducted regarding the correlation between compensation and physical well-being^{9–11} and also a systematic meta-review has been performed over 11 systematic reviews that all concern the effect of compensation on physical health.¹² Although most studies found an association between compensation and poor health outcomes, the quality of the existing evidence on the association between compensation and worse health outcomes has become the subject of debate.^{13–15}

In contrast to physical health, few studies investigated the association between compensation procedures and *mental* health. Similar to physical health, most studies measuring mental health found that victims who are involved in compensation claims had higher levels of depression, anxiety and post traumatic stress

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disorder (PTSD) than non-compensated victims.^{16–18} However, another study did not find a relation between compensation procedures and mental health.¹⁹ To be able to draw a general conclusion about the effect of compensation procedures on mental health of trauma victims, we conducted a systematic review and meta-analysis. To our knowledge, no meta-analytic study has yet investigated the overall effect of compensation on mental health. Considering the negative effect of the compensation procedure on physical health and the fact that the compensation procedure can be stressful, we hypothesised that victims involved in a compensation process have higher mental health problems compared to victims who are not involved in a compensation process.

Method

Study selection

A literature search was conducted using five electronic databases: PubMed, EMBASE, PsycINFO, CINAHL, and Cochrane library on studies published from 1966 to 10 June 2011. No language restrictions were applied. Search terms included *compensation*, *workers' compensation*, or *litigation*, combined with empirical study designs, i.e. *epidemiological*, *clinical*, *cohort*, *longitudinal*, *follow-up*, *prospective*, *retrospective studies* or *meta-analysis*, combined with type of accidents, i.e. *traffic accidents*, *occupational accidents*, or *medical errors*. We also included *whiplash injuries*, because this injury could be associated with traffic accidents without specifically mentioning the accident. Various synonyms were used for each concept. We used subject heading terms when available. The exact search strategy is available from the authors.

Eligible studies were selected in three steps. First, titles and abstracts were screened and studies were excluded if title and abstract did not meet any of the following inclusion criteria: (1) participants were injured by traffic accidents, occupational accidents, or medical errors; (2) some participants were involved in a compensation process; (3) some other participants were not involved in a compensation process; (4) outcome measure was mental health related (e.g. depression, anxiety, or PTSD); (5) type of study was a follow-up design with at least two measurements (baseline and follow up). In the second step, we retrieved full text articles of the remaining studies. Studies were excluded if they did not fulfil the inclusion criteria mentioned above. We excluded according to the following order: (1) outcome, (2) non exposed group (i.e. non-compensation group), (3) study design, (4) type of accident, and (5) exposed group (i.e. compensation group). If a study was excluded based on one criterion, then the remaining criteria were not investigated further. Finally, we searched the reference lists of the included studies to find additional publications. The study selection was conducted independently by two investigators (NE and LH). Disagreements were resolved by a third investigator (DB).

Data extraction

We extracted information about the number of participants at the start of the study, percentage of males, average age, type of accident, and type of injury. Furthermore, we collected information about the recruitment setting, country, the kind of compensation system (i.e. third party, no fault, worker's compensation, litigation), and we calculated the percentage of participants who were involved in a compensation process (versus not involved in compensation). In addition, we extracted when the baseline and follow-up measurements were conducted, the percentage of participant drop-out, the mental health instruments, and all mental health outcome data. If studies did not report sufficient

data or dichotomous data only, authors of these studies were contacted. If studies did not report standard deviations, we calculated the standard deviations according to guidelines in the Cochrane handbook.²⁰ Finally, we investigated whether studies reported significant differences between cohorts regarding gender, age, education, occupational status before injury, injury severity, and mental health/psychopathology before injury. Data extraction was performed by the primary investigator (NE) and randomly checked by another investigator (DB).

Quality assessment

We used the Newcastle Ottawa Scale (NOS)²¹ to assess the quality of the included studies. The scale is praised for its simplicity of use.²⁰ A disadvantage is its unknown validity.²² We chose this scale because it was recommended for evaluation of cohort studies by the Cochrane Handbook.²⁰

We slightly modified the NOS for this review. We interpreted the item about the representativeness of the exposed cohort as a question about whether the researchers recruited their participants from a valid setting and whether all eligible participants were equally approached to participate. The item about whether the outcome of interest was present at the start of the study was removed. This was done because we wished to investigate whether there is a *difference* in mental health rather than examining the *presence* of a disease or not. Because we removed this item, our NOS contained seven questions.

Furthermore, the item about comparability of cohorts asked for two important factors which need to be equal in both cohorts to be able to compare the cohorts. We decided the most important factors to be: (1) mental health at baseline, because the outcome measure needs to be equal at baseline to draw conclusions about the follow up, and (2) gender, because being female is one of the best predictors of depression, anxiety²³ and PTSD prevalence.^{18,24} The length of follow-up needed to be at least three months, as three months is the median time for recovery from depression²⁵ and it is also the average time needed to recover from PTSD.²⁶ Finally, we decided that the loss to follow-up needed to be less than twenty percent.²⁷

The NOS uses a star system to allow a visual semi-quantitative assessment. High quality studies are awarded a maximum of one star for each item than can be answered affirmatively, except for item 4 to which a maximum of two stars can be allocated. The quality of the studies was assessed independently by two reviewers (NE and DB).

Data analysis

First, we analysed the baseline measurement to investigate whether victims who start a compensation procedure have a similar mental health score *at baseline* as victims who are not involved in a compensation process. We calculated the pooled standardised mean difference (SMD) and 95% confidence intervals (CI) of the *total* mental health by adding the various mental health outcomes together. When a study included multiple mental health measures, a combined effect size was calculated. If anxiety, depression or PTSD was *higher* in the compensation group than in the non-compensation group, we indicated the effect direction to be negative. For studies measuring SF MCS, the effect direction was negative if the SF MCS was *lower* in the compensation group than in the non-compensation group. A negative effect size indicates that injury victims who are involved in compensation process have more mental health complaints at baseline compared to non compensated victims. The one-study removed analysis was conducted to show the impact of each study on the combined effect. We performed subgroup analyses in which we removed studies with baseline measurements other than directly after the

accident. Besides the *total* mental health, we also calculated the SMDs of the *separate* mental health outcomes (e.g. depression, anxiety and PTSD).

Second, we examined the effect of compensation on mental health by calculating the difference between the baseline-post change score of the compensation group and the baseline-post change score of the non-compensation group. To be able to compute the SMD of this difference between the change scores of the compensation group and the non-compensation group, the correlation between the time points is necessary. As no study reported this correlation, an estimate of the correlation $r = .90$ was used.²⁸ A negative effect size indicates that the compensation group has a smaller increase of mental health compared to the non-compensation group. Similar to the analysis of the baseline measurement, we calculated the pooled SMD effect size of the *total* mental health and we performed a one-study removed analysis. Subgroup analyses were conducted on studies clusters with similar post measurement time points. Finally, we examined the SMDs of the *separate* mental health outcomes.

We chose a random effects model for all analyses because studies were methodologically diverse. An effect size of 0–0.32 is considered to be small, 0.33–0.55 is moderate, and 0.56–1.2 can assumed to be large.²⁹ Statistical heterogeneity was assessed by calculating the Q -statistic and the I^2 -statistic. A significant Q statistic rejects the null-hypothesis of homogeneity. An I^2 value of 0% indicates no observed heterogeneity, 25% is low, 50% is moderate, and 75% is high heterogeneity.³⁰ Publication bias was tested by inspecting the funnel plot. Publications bias is present when studies with a positive effect are published whilst small studies with no effect remain unpublished. A possible publication bias is indicated by an asymmetric funnel plot showing a relationship between the effect size and the standard error.²⁰ Comprehensive Meta-Analysis software (version 2.2.057) was used for all analyses.

Furthermore, the clinical relevance of the study results was assessed. Because the included mental health outcomes have a different scale range, all means were re-calculated into a scale ranging from 0 to 10. We then calculated the difference at baseline and the difference between the pre-post change of the compensation group and the non-compensation group, which was expressed in a percentage. A difference of at least 10% indicates a clinically relevant difference.²⁰

The quality of evidence was examined by the GRADE approach as recommended by the Cochrane handbook.²⁰ Establishment of the quality of evidence involved consideration of (1) study design and risk of bias, (2) directness of evidence, (3) homogeneity or consistency of results, (4) precision of results (small confidence intervals), and (5) publication bias. The GRADE approach specifies four levels of quality: high, moderate, low, very low. Quality of evidence is considered to be high if the included studies fulfil all five factors described above. The quality of evidence is downgraded one, two or three levels if respectively one, two or three of the following limitations apply: (1) limitations in study design, i.e. lack of allocation concealment, lack of blinding, large attrition, selective reporting of outcomes, (2) indirect evidence, e.g. studies address a restricted version of the main review question in terms of population, intervention, control or outcome, (3) heterogeneity without robust explanation, (4) imprecise results, when studies include few participants and have wide confidence intervals, i.e. CI's larger than 0.60, (5) high probability of publication bias.

Results

Study selection

A total of 2634 references were identified using the electronic databases: 700 in PubMed, 1231 in EMBASE, 366 in CINAHL, 294 in

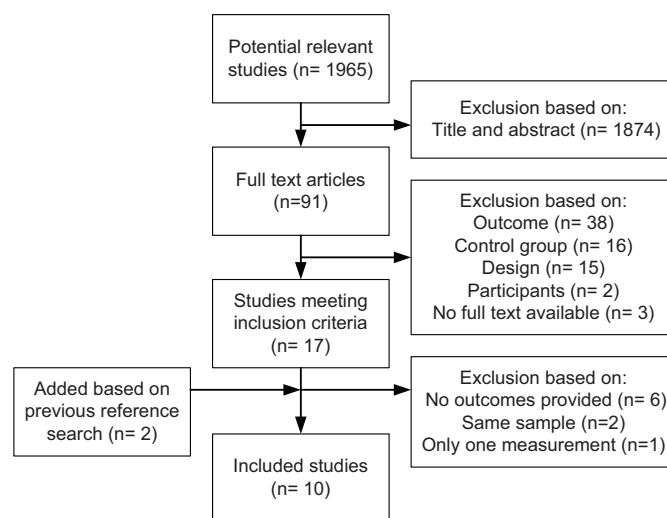


Fig. 1. Flow chart of the study selection.

PsycINFO, and 43 in Cochrane library. After exclusion of 669 duplicates, the 1965 remaining titles and abstracts were inspected. Of the 1965 references, we excluded 1874 based on the information presented in the titles and abstracts. Of the remaining 91 references, full text articles were retrieved. Three references could not be examined because the full text versions could not be retrieved.^{31–33} Furthermore, 71 articles were excluded: 37 did not report a mental health outcome measure, sixteen did not include a non-compensation group, 15 were no prospective cohort study, and two studies did not concern traffic, occupational or medical accidents. Seventeen studies were found to meet our inclusion criteria. Not all 17 selected papers could be included in the meta-analysis: two studies were excluded^{34,35} because they were based on the same original sample as a third study.¹⁷ One study was excluded after contacting the authors because it turned out that the study measured mental health only once.² Six studies were excluded because not all necessary data were provided in the article and the missing data were not retrieved after contacting the author.^{36–41} No additional articles were found after reference search. However, we added two articles that were found in the reference lists of other articles that we read in preparation of this research.^{42,43} These two articles were not selected by our search strategy because the type of accident was not specified in title and abstract. In total, ten studies were included in our meta-analysis. The flow chart of the study selection is displayed in Fig. 1.

Study characteristics

The included studies were all (observational) prospective cohort studies. The total number of participants was 3936, varying from 95 to 1059. Percentage of male gender was 33–100%. Average age ranged from 31.1 to 46.8 years old. Six studies investigated victims of motor vehicle accidents, three studies included victims with injury following various kinds of accidents, and one study investigated back pain caused by work accidents. Six studies were conducted in Australia, two in the USA, and two in the UK. Three studies examined participants who were involved in no fault compensation processes (one of these no fault studies explicitly excluded workers' compensation claims), two studies reported that compensation claims were settled according to a third party compensation system (one of the studies included public liability and worker's compensation), four studies included participants in litigation (one of the litigation studies dealt with common law litigation in combination with workers' compensation), and finally

Table 1
Characteristics of included studies.

Study	Participants, accident, injury (<i>n</i> , mean age, %male)	Recruitment setting, country	Intervention Compensation system (% in compensation)	Measurement points (% drop out)	Instrument
Benight et al. ⁴⁸	Victims of MVA (163, 40.2, 37%)	Hospital emergency room Colorado, USA.	Litigation (12%)	7 days a.i. 3 months (57%)	IES-R
Blanchard et al. ¹⁷	Victims of MVA (158, 35.4, 32%)	Seeking acute medical attention. New York, USA.	Lawyer (yes/no) No-fault system (37%)	1–4 months a.i. 6 months 12 months (17%)	BDI STAI-state CAPS IES
Bryant and Harvey ⁴⁴	Victims of MVA (171, 31.1, 57%)	Hospital Sydney, Australia	Legal proceedings (69%)	1 month a.i. 6 months 24 months (38%)	BDI CIDI STAI-state
Ehlers et al. ¹⁸	Victims of MVA (1059, 33.4, 54%)	Hospital emergency department Oxford, UK	Compensation claim (46%)	3 months a.i. 12 months (26%)	Foa
Gabbe et al. ³	Victims of RTA (56%), fall or other cause (44%) Orthopedic trauma (1033, 37.8, 68%)	Two trauma centres Victoria, Australia	No-fault compensation claim (exclusive workers' compensation) (64%)	Pre-injury 12 months (31%)	SF12 MCS
Littleton et al. ⁴⁹	Victims of RTA (95, 36.7, 39%)	Two hospital emergency department Australian Capital Territory	Third party compensation claim (inclusive public liability and workers' compensation) (33%)	a.s.a.p. a.i. 6 months 12 months (14%)	SF36 MCS HADS A HADS D
Mason et al. ⁴³	Victims of falls (28%), RTA (18%), assaults (13%), sporting injury (13%) or other (28%) (210, 33.4, 100%)	Hospital Sheffield, UK	Litigation (38%)	6 months a.i. 18 months (54%)	IES-R
O'Donnell et al. ⁴	Victims of MVA (63.5%), falls (17%), assaults (9%), work (0.5%) or other (10%). (601, 39.1, 72%)	Two trauma hospitals Victoria, Australia	No fault compensation claim (exclusive private health insurance and victims of crime) (64%)	Pre-injury 24 months (35%)	HADS A HADS D CAPS
Sterling et al. ⁵⁰	Victims of MVA Whiplash injury (155, 36.9, 37%)	Hospital emergency dep. and primary care practices Queensland, Australia	Third party compensation claim (55%)	<1 months a.i. 3 months 6 months 12 months (41%)	Foa
Suter ⁴²	Victims of work accidents vs. victims injured outside work Chronic back pain. (291, 46.8, 41%)	Pain treatment and rehabilitation centre Perth, Australia	Workers' compensation Common law litigation (50%)	At intake 24 months (31%)	Zung

Abbreviations: a.i.: after injury; a.s.a.p.: as soon as possible; BDI: Beck's Depression Inventory; CAPS: Clinical Administered PTSD Scale; CIDI: Composite International Diagnostic Interview; HADS-A/HADS-D: Hospital Anxiety and Depression Scale; IES R: Impact of Event Scale (Revised); SF: Short Form Health Survey; MCS: Mental Component Score; STAI: State-Trait Anxiety Inventory; MVA: Motor Vehicle Accident; RTA: Road Traffic Accident.

one study only mentioned to deal with 'compensation claims' without specification. The percentage of participants involved in compensation ranged from 12% to 69%. (Two studies included participants whose compensation was settled.^{17,44} These settled claims were excluded in the calculation of percentage of participants involved in compensation procedures. One study considered a group of private health insurance claims to belong to the compensation group,⁴ but we assigned the health insurance claimants to the non-compensation group, consistent with the current debate on this topic.^{45–47})

Baseline measurement varied from pre-injury status (measured in retrospect) to 6 months after injury and post measurement varied from 3 months to 24 months after baseline. Attrition ranged from 14% to 57%. Five studies measured depression outcomes (BDI, HADS-D, or Zung), four studies had anxiety as outcome measure (HADS-A or STAI-state), seven studies reported PTSD outcomes (CAPS, CIDI, Foa, or IES(-R)), and two studies examined a mental component score (MCS) of the SF-36 or SF-12. Almost all studies included or provided continuous data except for one study which reported dichotomous data.¹⁸ The characteristics of the included studies are described in Table 1.

With respect to differences between cohorts, we found that seven studies analysed gender differences between cohorts but none of them found significant differences between cohorts.^{3,4,17,42,43,48,49} Three studies found that the non-compensation group was significantly older than the compensation group,^{3,4,42} whereas four studies did not find age differences.^{17,44,48,49} Two studies showed that the non-compensation group enjoyed a higher education than the compensation group,^{4,48} versus three studies that reported no difference in education level.^{3,42,49} Regarding occupational status, one study showed that the percentage of participants working before the injury was higher in the compensation group compared to the non-compensation group,⁴ versus two studies that indicated non-significant differences in pre-injury working status.^{3,17} Injury severity was found to be similar between cohorts in four studies^{4,17,44,49} and only one study reported that the compensation group contained more severe injuries than the non-compensation group.³ Finally, one study reported a lower percentage of past history of psychiatric disorder in the compensation group than in the non-compensation group,⁴ versus two studies that found no difference in previous psychological well-being or psychopathology.^{3,48}

Table 2

Quality assessment based on the adapted Newcastle Ottawa Scale.

Study	NOS item						
	1. External validity	2. NC = C group	3. Exposure secure	4. Control factors	5. Outcome blind	6. Follow up >3 months	7. Follow up >20%
Benight et al. ⁴⁸	X	X	–	XX	–	X	–
Blanchard et al. ¹⁷	X	X	–	–	–	X	X
Bryant and Harvey ⁴⁴	X	X	–	X	–	X	–
Ehlers et al. ¹⁸	X	X	–	–	–	X	–
Gabbe et al. ³	X	X	–	XX	–	X	–
Littleton et al. ⁴⁹	X	X	–	XX	–	X	X
Mason et al. ⁴³	X	X	–	–	–	X	–
O'Donnell et al. ⁴	X	X	–	XX	–	X	–
Sterling et al. ⁵⁰	X	X	–	–	–	X	–
Suter ⁴²	X	X	–	–	–	X	–

Study quality

The study quality was assessed by the NOS. A maximum of eight stars was allocated to the individual studies. All studies fulfilled the criterion of external validity (item 1): all studies recruited their participants from a valid setting (mostly trauma hospitals, one rehabilitation centre⁴²) and all eligible participants were equally approached to participate. All non-compensation groups were recruited from the same population as the compensation group (item 2), although in one study the compensation group consisted of work related back pain whereas the non-compensation group consisted of people who were injured outside the workplace.⁴²

None of the studies measured the exposure to compensation procedures in an accurate way (item 3). In general, studies just asked their participants whether they were involved in compensation or litigation or had contacted a lawyer. Consequently, the compensation group could also include, e.g. participants with private health insurance claims and victims of crime.⁴ Another problem with ascertainment of exposure was that involvement in compensation was often only asked at baseline, whereas it is plausible that some participants switch cohorts during the study (e.g. they drop the claim because they are not eligible or they decide to start compensation later on because they suffer from their injury longer than expected). Thus we could not award stars regarding item 3.

Four studies did not find or corrected for differences regarding both mental health at baseline and gender and thus these studies earned two stars^{3,4,48,49} and one study found no baseline mental health difference but did not measure gender thus was awarded one star (item 4).⁴⁴ No study was awarded a star for mental health

outcome assessment (item 5), because questionnaires were often filled out by the participants themselves rather than by an independent blind physician or record linkage. (Three studies did use a clinical structured interview to ascertain PTSD but the authors did not describe whether the clinician was blind.)^{4,17,44} All studies met the criterion of a follow-up of three months or longer (item 6). Finally, only two studies lost less than 20% of participants in the follow-up (item 7).^{17,49} The allocation of stars to the individual studies can be found in Table 2. Considering the unsecure assessment of exposure to the compensation process and the lack of independent blind assessment of mental health, it was found that the overall study quality was limited.

Mental health at baseline

The compensation group had higher mental health complaints at baseline compared to the non-compensation group (SMD = –0.38; 95% CI –0.66 to –0.10; $p = .01$). The SMD indicated a moderate effect size and the clinically relevant difference was 7.8%. However, heterogeneity was high ($Q = 86.6$; $p < .01$; $I^2 = 89.6\%$). The one-study removed analysis indicated that all studies had a significant impact on the total mental health at baseline, of which the study by Gabbe et al.³ had the largest impact. Without this study, the mental health difference between compensation and non-compensation increased a little bit compared to the overall difference (SMD = –0.47; 95% CI –0.64 to –0.30; $p < .01$). Removal of this study somewhat reduced the heterogeneity, but heterogeneity was still significant and moderate ($Q = 18.7$; $p = .02$; $I^2 = 57.2\%$). Forest plot of the overall mental health at baseline measurement can be found in Fig. 2.

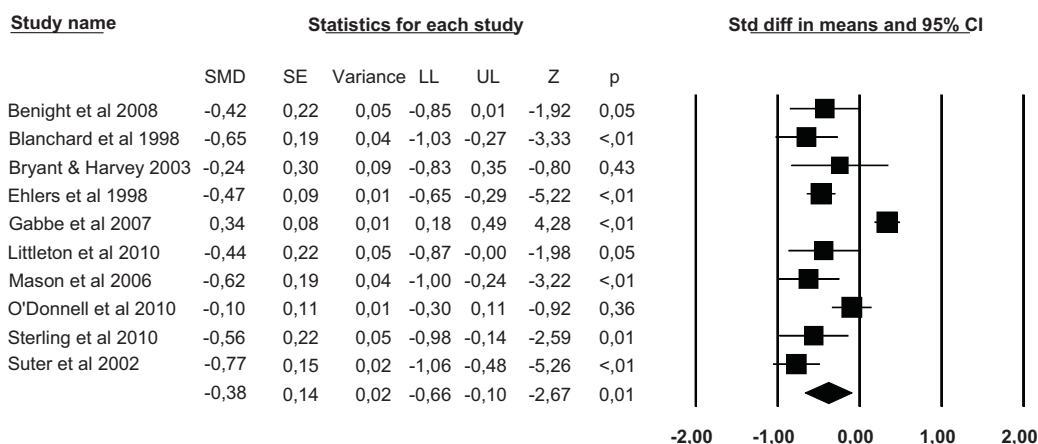


Fig. 2. Forest plot of standardised effect sizes of compensation compared to non-compensation at baseline measurement. SE = standard error, LL = lower limit, UL = upper limit.

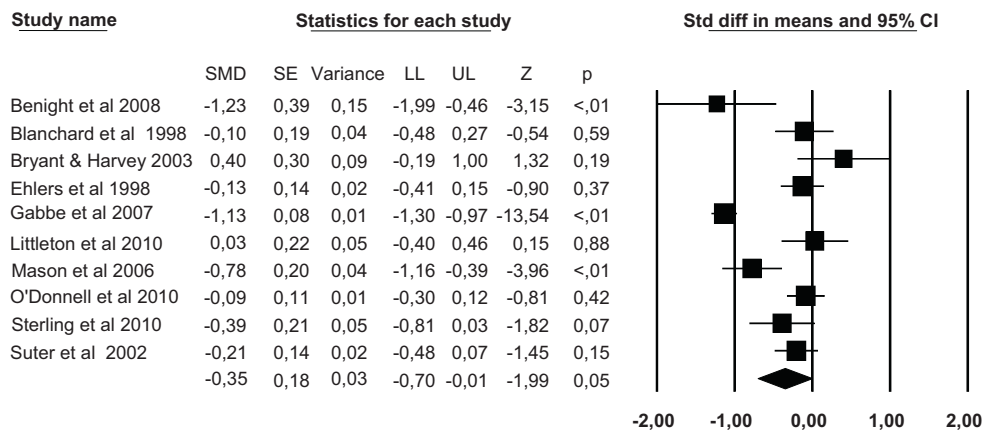


Fig. 3. Forest plot of standardised effect sizes of the difference between pre-post score of the compensation group compared to the non-compensation group. SE = standard error, LL = lower limit, UL = upper limit.

We further investigated whether subgroup analyses of the different baseline measurements (i.e. pre-injury, directly after the accident, and six months after the accident) could reduce heterogeneity. First, we removed the two PTSD outcomes that were measured not until six months after the accident.^{43,44} This slightly decreased the difference in mental health between cohorts compared to the *overall* difference at baseline (SMD = -0.35; 95% CI -0.65 to -0.05; $p = .02$) but heterogeneity was still high ($Q = 81.7$; $p < .01$; $I^2 = 90.2\%$). In the second subgroup analysis, the two studies measuring pre-injury baseline scores were removed,^{3,4} which increased the mental health difference (SMD = -0.54; 95% CI -0.65 to -0.43; $p < .01$) and resulted in a homogeneous pooled SMD ($Q = 5.1$; $p = .65$; $I^2 = 0.0\%$).

Analyses of the separate mental health outcomes showed that at baseline the compensation group was more depressed (SMD = -0.42; 95% CI -0.69 to -0.15; $p < .01$) and suffered from more PTSD symptoms (SMD = -0.47; 95% CI -0.65 to -0.28; $p < .01$) compared to the non-compensation group. The compensation group was slightly more anxious (SMD = -0.22; 95% CI -0.50 to 0.07; $p = .13$) although this result was not significant. The pooled effect size of the two studies measuring SF MCS showed that the compensation and non-compensation group scored similar on the SF MCS scale (SMD = -0.05; 95% CI -0.84 to 0.75; $p = .91$). Heterogeneity tests for depression ($Q = 12.4$; $p = .02$; $I^2 = 67.7\%$), PTSD ($Q = 14.0$; $p = .03$; $I^2 = 57.1\%$) and SF MCS ($Q = 12.0$; $p < .01$; $I^2 = 91.7\%$) were significant and moderate to high. Heterogeneity test for anxiety ($Q = 7.0$; $p = .07$; $I^2 = 57.1\%$) was not significant, but the non-significance was marginal and the I^2 statistic indicated a moderate observed heterogeneity. We could not perform subgroup analyses on different types of compensation systems because there was too much variety in compensation systems.

Mental health between baseline and post measurement

Between baseline and post measurement, the mental health in the compensation group improved less compared to the non-compensation group (SMD = -0.35; 95% CI -0.70 to -0.01; $p = .05$). The SMD was classified to be a moderate difference, although the clinically relevant difference was only 2.3%. Heterogeneity was high ($Q = 108.9$; $p < .01$; $I^2 = 91.7\%$). The one-study removed analysis indicated that several studies had a significant impact on the total mental health change, of which the study by Bryant and Harvey⁴⁴ had the largest impact. Removal of this study resulted in a small increase of the mental health difference between cohorts (SMD = -0.43; 95% CI -0.78 to -0.07; $p = .02$) but heterogeneity was still high ($Q = 99.9$; $p < .01$; $I^2 = 92.0\%$). The forest plot of the effect of compensation on mental health can be found in Fig. 3.

We further examined whether subgroup analyses of three different post measurements (i.e. 6, 12, and 24 months after the baseline measurement) could reduce heterogeneity. First, we analysed the four studies that conducted the post measurement after six months.^{17,44,49,50} We did not find a significant mental health difference between the compensation group and the non-compensation group between baseline and six months, although there could be a trend of significance that the mental health in the compensation group improved more than the non-compensation group (SMD = 0.33; 95% CI -0.07 to 0.71; $p = .10$). Heterogeneity was moderate ($Q = 9.2$; $p = .03$; $I^2 = 67.2\%$). The second subgroup analysis concerned the five studies with post measurements after 12 months.^{3,17,18,49,50} This analysis revealed that the mental health of the compensation group improved less compared to the non-compensation group, but this difference was not significant (SMD = -0.36; 95% CI -0.91 to 0.20; $p = .21$) and heterogeneity was high ($Q = 65.9$; $p < .01$; $I^2 = 93.9\%$). Finally, we examined the effect of compensation after 24 months.^{4,42} (A third study also measured PTSD after 24 months, but we did not include this study in the 24 months analyses because their PTSD baseline measurement was conducted after 6 months.)⁴⁴ We found that compensation did not have an effect on mental health after 24 months (SMD = -0.13; 95% CI -0.29 to 0.04; $p = .13$). The pooled SMD was homogeneous ($Q = 0.5$; $p = .49$; $I^2 = 0.0\%$). However, this finding needs to be interpreted with caution considering the fact that this analysis only included two studies. Removal of the pre-injury studies somewhat decreased the difference between pre-post change between compensation and non-compensation group (SMD = -0.26; 95% CI -0.51 to 0.02; $p = .04$) compared to the overall pooled effect size, but it did not reduce heterogeneity ($Q = 21.6$; $p < .01$; $I^2 = 67.6\%$).

The analysis of the separate mental health outcomes showed that groups had a similar small decrease in symptoms of depression (SMD = -0.08; 95% CI -0.32 to 0.17; $p = .55$), anxiety (SMD = -0.10; 95% CI -0.45 to 0.24; $p = .56$), PTSD (SMD = -0.23; 95% CI -0.50 to 0.03; $p = .09$), and small increase of well-being measured by SF MCS (SMD = -0.51; 95% CI -1.76 to 0.74; $p = .42$). Heterogeneity was significant and moderate to high for all: depression ($Q = 10.0$; $p = .04$; $I^2 = 60.1\%$), anxiety ($Q = 10.1$; $p = .02$; $I^2 = 70.2\%$), PTSD ($Q = 28.6$; $p < .01$; $I^2 = 75.5\%$) and SF MCS ($Q = 29.7$; $p < .01$; $I^2 = 96.6\%$). The results of all analyses are summarised in Table 3.

Publication bias

The possibility of publication bias was examined by inspecting the funnel plot. As several studies drew conclusions about the

Table 3

Meta-analyses of studies examining the effect of compensation on mental health.

Analysis	N _{studies}	SMD	95% CI	Q	I ² %
Baseline measurement					
Total mental health	10	−0.38**	−0.66 to −0.10	86.6***	89.6
Gabbe et al. ³ excluded	9	−0.47***	−0.64 to −0.30	18.7*	57.2
Baseline 6 months excluded	9 ^a	−0.35*	−0.65 to −0.05	81.7***	90.2
Baseline pre-injury excluded	8	−0.54***	−0.65 to −0.43	5.1	0.0
Depression	5	−0.42***	−0.69 to −0.15	12.4*	67.7
Anxiety	4	−0.22	−0.50 to 0.07	7.0	57.1
PTSD	7	−0.47***	−0.65 to −0.28	14.0*	57.1
SF MCS	2	−0.05	−0.84 to 0.75	12.0***	91.7
Difference baseline-post					
Total mental health	10	−0.35*	−0.70 to −0.01	108.9***	91.7
Bryant and Harvey ⁴⁴ excl	9	−0.43*	−0.78 to −0.07	99.9***	92.0
Post 6 months	4	0.33	−0.07 to 0.71	9.2*	67.2
Post 12 months	5	−0.36	−0.91 to 0.20	65.9***	93.9
Post 24 months	2	−0.13	−0.29 to 0.04	0.5	0.0
Baseline pre-injury excluded	8	−0.26*	−0.51 to −0.02	21.6**	67.6
Depression	5	−0.08	−0.32 to 0.17	10.0*	60.1
Anxiety	4	−0.10	−0.45 to 0.24	10.1*	70.2
PTSD	7	−0.23	−0.50 to 0.03	28.6***	75.5
SF MCS	2	−0.51	−1.76 to 0.74	29.7***	96.6

^a In total two PTSD outcomes were excluded,^{43,44} but Bryant and Harvey⁴⁴ also measured BDI and STAI, thus nine studies were included.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

effect of compensation at post measurement without analysing or controlling for the baseline difference, we studied both the funnel plot of the post measurements (Fig. 4A) and the funnel plot of the differences between pre–post change (Fig. 4B). Visual inspection of the funnel plots indicated that studies with both large and small standard errors were scattered on both sides of the pooled SMD (centre line). However, the plots were not completely normal as some studies did not fit within the guidelines of the plot. Closer

inspection showed that the deviant studies in the funnel plot of post measurements (Fig. 4A) were different from the outlying studies in the funnel plot of the difference between pre–post change (Fig. 4B), which was probably caused by high heterogeneity.

Clinical relevance

The clinical relevance was determined by expressing the standardised mean difference in terms of a percentage. At baseline, the mean mental health of the compensation group was 7.8% lower than the mean mental health of the non-compensation group. At follow-up, there was a 10.1% mental health difference at the expense of the compensation group. Consequently, between baseline and post measurement, the mental health was found to increase 2.3% less in the compensation group compared to the non-compensation group. Only the mental health at follow-up met the 10% criterion for clinical relevance, but both the difference at baseline and the change between baseline and follow-up were less than 10%, thus were not clinically important. (These percentages should be used with caution because the mental health scales which the percentages are based on are not ratio scales. These percentages were provided as a practical ‘translation’ of the study results.)

Quality of evidence

The quality of evidence as assessed by the GRADE approach. First, the quality of study designs (as assessed by the NOS) was limited, i.e. no blind assessment, unsecure exposure, and a majority of studies having a loss to follow up of more than 80%, which implies bias. Additionally, all studies were observational studies, for which we already should downgrade the quality of evidence with two levels. Second, studies used direct outcome measures for mental health and populations were direct related to the research question. Third, the results of the main analyses were heterogeneous because of the variety of measurement points, mental health outcomes, and compensation systems. Fourth, results were probably imprecise as most confidence intervals were larger than 0.60. Finally, there is a possibility of publication bias. In conclusion: based on the five GRADE aspects, the quality of evidence was downgraded to the lowest level.

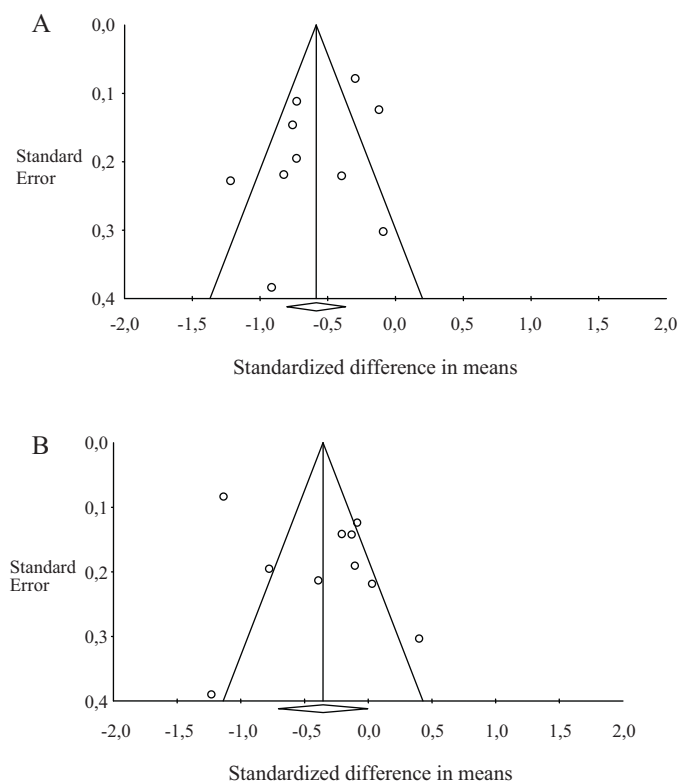


Fig. 4. Funnel plot of the studies investigating the association between compensation and mental health. (A) Post measurement; (B) difference between pre–post measurement.

Discussion

This study investigated the association between being involved in a compensation process and mental health. First, we found that the compensation group had already higher mental health complaints at baseline compared to victims who were not involved in compensation. However, heterogeneity was high. The subgroup analyses revealed that removal of the two studies that conducted a pre-injury baseline measurement removed heterogeneity and increased the mental health difference between compensation and non-compensation group at baseline. Conducting subgroup analyses on the individual mental health outcomes depression, anxiety, and PTSD only removed heterogeneity for anxiety, but the results for depression, PTSD and SF MCS were still heterogeneous.

The second finding was that the mental health between baseline and post measurement increased less in the compensation group compared to the non-compensation group. This finding was consistent with our hypothesis and with previous meta-analyses about the effect of compensation on physical health.^{9,11,51} Heterogeneity was high. Subgroup analyses of three different post measurements (i.e. 6, 12 and 24 months) somewhat reduced heterogeneity, which may indicate that only similar time frames should be compared. Duration of the compensation process might have an effect on mental health as suggested by Littleton et al.⁴⁹ who found that the mental health improved the first six months and deteriorated between 6 and 12 months. Cotti et al.⁸ also reported the suffering increased when the compensation process lasted for more than one year, whereas Harris et al.¹¹ did not find a difference in length of follow-up. However, our subgroup analyses on different post measurements were not significant and the number of studies was small so we could not draw conclusions about the effect of time. Subgroup analyses of the separate mental health outcomes did not reduce heterogeneity.

Although we found significant differences both at baseline and between baseline and post measurement, the findings should be interpreted with caution considering the fact that the quality of evidence was very low because of limited study quality (uncertain assessment of exposure and assessment of outcome), heterogeneity (different compensation systems, outcome measures, and measurement points), imprecision (large confidence intervals), and possible publication bias.

Upon taking a closer look at the mental health differences between cohorts expressed in percentages, i.e. at least 7.8% at baseline, 10.1% at follow-up, and 2.3% between baseline and follow-up, the mental health difference at baseline explained three-quarters of the effect of compensation at post measurement. Considering this large contribution of the difference at baseline, it is remarkable that the previous meta-analyses about the effect of compensation on physical health and also several of the included studies in the current meta-analysis analysed post measurement only, rather than the change between baseline and post measurement. This could imply that the reported effect of compensation in previous meta-analyses and individual studies is overestimated. The health at baseline may be an additional element in the discussion about the quality of the existing evidence on the association between compensation and worse health outcomes.^{12,14,15}

The mental health difference at baseline may be explained by a selection bias.⁵² One study suggested that the compensation group could have more severe injuries than the non-compensation group.⁴² However, only one of the five studies which analysed injury severity between cohorts reported more severe injuries in the compensation group.³ We also did not find a strong indication for cohort differences regarding gender, age, education, working status before injury, or mental health differences/psychopathology before injury, because for each variable we found more studies

indicating non-significant differences between cohorts than those indicating significant differences. One study provided another explanation for the mental health difference at baseline: the authors suggested that having decided to start compensation causes victims to portray themselves more distressed at the initial assessment¹⁷; participants might have developed a 'compensation mindset' already at baseline. However, another study did not consider early symptom exaggeration to be a plausible explanation for differences at one month after accident; according to this study there is an increased likelihood that litigation has an effect on psychological adjustment rather than the converse being the case (p. 227).⁴³ The final explanation for the difference at baseline is that the compensation group may experience more anger, frustration and blame about the accident⁵³; two studies for example showed that the compensation group mainly consisted of car crashes, whereas the non compensation group mainly consisted of falls.^{3,4} More research is needed to investigate the cause of the difference at baseline.

The finding that the mental health between baseline and post measurement improved less in the compensation group compared to the non-compensation group may be explained twofold: most of the included studies suggested that victims in compensation could perpetuate or exacerbate their symptoms because of financial incentive (secondary gain), and all included studies indicated that victims in compensation could be stressed by the compensation process (secondary victimisation⁸). The latter is caused by the numerous assessments⁴⁹ and thus repeated confrontation with the traumatic history,^{17,43} delayed funds¹⁸ and financial risks, and the often adversarial relationship between client and the insurance agency.^{4,43} In some studies it was also argued that the compensation group could have suffered more severe injuries,⁴² severe crashes,³ previous psychopathology,^{4,43} and psychological vulnerability.⁴⁹ However, as we argued with respect to the baseline difference, we did not find a strong indication for differences between groups. Finally, the compensation effect could be explained by confounding variables⁵² such as lawyer involvement,² or blame, anger and injustice⁴⁹ and being 'not at fault'.⁵³

Strengths and limitations

The strength of this study is that this is the first meta-analysis about the association between compensation and health that investigates the difference in health at baseline and the difference between baseline and post measurement. An additional strength is that we assessed the quality of evidence and clinical relevance.

The major limitation of the study is the poor quality of evidence because of limited study quality, heterogeneity, imprecision and possible publication bias. Also we were unable to perform valid subgroup analyses because of the small number of included studies. The final limitation is that we could have missed eligible studies by defining the type of accident in the search strategy.

Implications

The results of this study imply that the legal professionals and psychologist should be alert at the occurrence of mental health problems in victims involved in the compensation process and should realise that these mental health problems may be caused or worsened by a stressful compensation process. Although it is not established whether, to what extent, and which elements of the claims settlement process contribute to mental health problems, this study adds some weight to the arguments made in legal literature for changes to the claims settlement process, e.g. making it less stressful by enhancing client centred claims settlement,⁵⁴ information supply, communication,^{55,56} and by paying more attention to non-pecuniary needs.⁵⁷ Victim support services and

psychologists on their turn could broaden their services by being sensitive to the anti-therapeutic issues that victims could encounter during the compensation process, and by addressing these issues in addition to the 'regular' trauma assistance if necessary.⁵⁸

Future research

More research is necessary to be able to draw a conclusion about the effect of compensation on mental health. First of all, more primary studies with high quality study designs are needed,¹² especially with respect to the assessment of exposure to compensation: researchers should thoroughly describe the kind of legal compensation system, including procedures and processes,¹⁵ and should accurately determine the involvement in compensation. It might also be interesting to assess whether the compensation for psychological injury is part of the claim, because such a claim element could correlate with mental health outcome. The outcome should preferably be measured at standardised time points: directly after the accident and then ideally at 6, 12 and 24 months after the accident, possibly complemented with an indication of pre-injury health status. Researchers may pay more attention to the comparability of cohorts: it is advisable to analyse differences at baseline and to control for baseline differences in order to allow more solid conclusions about the effect of compensation processes as such. Study designs such as randomised controlled trials are neither ethical nor possible,³ but a potential improvement regarding design would be to create matched controls for the compensation group.¹¹ Large prospective cohort studies are essential.

Second, more research is needed to study which elements of the compensation process may hamper recovery.⁵⁹ Researchers could further investigate whether compensation process *duration* has an effect on health as was also suggested by Littleton et al.⁴⁹ and Cotti et al.⁸ Also, it could be valuable to conduct more studies across different jurisdictions³ and to compare the elements of the different *compensation scheme designs* considering the fact that no fault systems were found to be related to better health outcomes compared to third party systems.^{60,61} Finally, a meta-analysis could be performed to draw a general conclusion about the effect of claim *settlement* on health as some studies reported that claim settlement improves health,^{5,62} whereas others do not find a relation between claim settlement and health.^{17,44,63} More knowledge about which elements of the compensation process impair the health of claimants would enable to improve health of victims involved in compensation processes.

Conclusion

The main research question of this article was 'Do compensation processes impair mental health?'. We *carefully* conclude that the compensation process *slightly* impairs mental health. The compensation process as such only *slightly* impaired mental health because three-quarters of the mental health complaints at post measurement was already present at baseline. We conclude *carefully* because the quality of evidence was very limited, mainly due to low quality study designs and heterogeneity caused by different compensation systems and various measurement points. We hope more large prospective cohort studies with standardised time points and thoroughly described compensation systems will be conducted in the future to be able to draw more solid conclusions about the effect of compensation on health.

Conflict of interest

All authors declare that they do not have any conflict of interest.

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References

- Bhandari M, Busse JW, Hanson BP, Leece P, Ayeni OR, Schemitsch EH. Psychological distress and quality of life after orthopedic trauma: an observational study. *Canadian Journal of Surgery* 2008;**51**(1):15–22.
- Harris IA, Young JM, Jalaludin BB, Solomon MJ. The effect of compensation on general health in patients sustaining fractures in motor vehicle trauma. *Journal of Orthopaedic Trauma* 2008;**22**(4):216–20.
- Gabbe BJ, Cameron PA, Williamson OD, Edwards ER, Graves SE, Richardson MD. The relationship between compensable status and long-term patient outcomes following orthopaedic trauma. *Medical Journal of Australia* 2007;**187**(1):14–7.
- O'Donnell ML, Creamer MC, McFarlane AC, Silove D, Bryant RA. Does access to compensation have an impact on recovery outcomes after injury? *Medical Journal of Australia* 2010;**192**(6):328–33.
- Miller H. Accident neurosis. *British Medical Journal* 1961;**1**:919–98.
- Shuman DW. The psychology of compensation in tort law. *Kansas Law Review* 1994;**43**:39–77.
- Murgatroyd DF, Cameron ID, Harris IA. Understanding the effect of compensation on recovery from severe motor vehicle crash injuries: a qualitative study. *Injury Prevention* 2011;**17**(4):222–7.
- Cotti A, Magalhães T, Pinto da Costa D, Matos E. Road traffic accidents and secondary victimisation: the role of law professionals. *Medicine and Law* 2004;**23**:259–68.
- Binder LM, Rohling ML. Money matters: a meta-analytic review of the effects of financial incentives on recovery after closed-head injury. *American Journal of Psychiatry* 1996;**153**(1):7–10.
- Scholten-Peeters GG, Verhagen AP, Bekkering GE, van der Windt DA, Barnsley L, Oostendorp RA, et al. Prognostic factors of whiplash-associated disorders: a systematic review of prospective cohort studies. *Pain* 2003;**104**(1/2):303–22.
- Harris I, Mulford J, Solomon M, van Gelder JM, Young J. Association between compensation status outcome after surgery: a meta-analysis. *JAMA* 2005;**293**(13):1644–52.
- Spearing NM, Connelly LB. Is compensation "bad for health"? A systematic meta-review. *Injury* 2010;**41**(7):683–92.
- [13]. Spearing NM, Connelly LB. Response to Cassidy JD, et al. [Letter to the editor]. *Injury* 2011;**42**(4):429–30.
- Cassidy JD, Bendix T, Rasmussen C, Carroll L, Cote P. Re: Spearing and Connelly. Is compensation bad for your health? A systematic meta-review. *Injury* 2011;**42**:15–24 [Letter to the editor]. *Injury* 2011;**42**(4):428–9.
- Grant G, Studdert DM. Poisoned chalice? A critical analysis of the evidence linking personal injury compensation processes with adverse health outcomes. *Melbourne University Law Review* 2009;**33**(3):865–85.
- Mayou R, Bryant B, Ehlers A. Prediction of psychological outcomes one year after a motor vehicle accident. *American Journal of Psychiatry* 2001;**158**(8):1231–8.
- Blanchard EB, Hickling EJ, Taylor AE, Buckley TC, Loos WR, Walsh J. Effects of litigation settlements on posttraumatic stress symptoms in motor vehicle accident victims. *Journal of Traumatic Stress* 1998;**11**(2):337–54.
- Ehlers A, Mayou RA, Bryant B. Psychological predictors of chronic posttraumatic stress disorder after motor vehicle accidents. *Journal of Abnormal Psychology* 1998;**107**(3):508–19.
- Mayou R, Bryant B, Duthie R. Psychiatric consequences of road traffic accidents. *BMJ* 1993;**307**(6905):647–51.
- Higgins JPT, Green S. *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011], 2011, The Cochrane Collaboration, 2011. Available from www.cochrane-handbook.org.
- Wells GA, Shea B, O'Connell D, Peterson J, Welch V, Losos M. The Newcastle-Ottawa Scale (NOS) for assessing the quality if nonrandomized studies in meta-analyses. http://www.ohri.ca/programs/clinical_epidemiology/oxford.htm [cited 2011 July].
- Stang A. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *European Journal of Epidemiology* 2010;**25**(9):603–5.
- Seedat S, Scott KM, Angermeyer MC, Berglund P, Bromet EJ, Brugha TS, et al. Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. *Archives of General Psychiatry* 2009;**66**(7):785–95.
- Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry* 1995;**52**(12):1048–60.

25. Spijker J, de Graaf R, Bijl RV, Beekman AT, Ormel J, Nolen WA. Duration of major depressive episodes in the general population: results from The Netherlands Mental Health Survey and Incidence Study (NEMESIS). *British Journal of Psychiatry* 2002;181:208–13.
26. Rothbaum BO, Foa EB, editors. *Subtypes of posttraumatic stress disorder and duration of symptoms*, in *Posttraumatic Stress Disorder DSM-IV and Beyond*, Davidson, JRT Foa, EB. Washington, DC: American Psychiatric Press; 1992.
27. Taggart DP, D'Amico R, Altman DG. Effect of arterial revascularisation on survival: a systematic review of studies comparing bilateral and single internal mammary arteries. *Lancet* 2001;358(9285):870–5.
28. Hesser H, Weise C, Rief W, Andersson G. The effect of waiting: a meta-analysis of wait-list control groups in trials for tinnitus distress. *Journal of Psychosomatic Research* 2011;70(4):378–84.
29. Lipsey MW, Wilson DB. The efficacy of psychological, educational, and behavioral treatment. Confirmation from meta-analysis. *American Psychologist* 1993;48(12):1181–209.
30. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *British Medical Journal* 2003;327(7414):557–60.
31. Braimoh G. Gender and level of compensation among work injury chronic pain sufferers and motor vehicle accident chronic pain sufferers: Perceptions of pain level, disability, and depression. *Dissertation Abstracts International Section B The Sciences and Engineering* 2007;67(8-B).
32. Husband SD. MMPI characteristics of litigious versus non-litigious female motor vehicle accident victims. *Dissertation Abstracts International* 1989;50(10-B).
33. Mendelson G. *Psychiatric aspects of personal injury claims*. IL, England: Charles C Thomas, Springfield; 1988.
34. Blanchard EB, Hickling EJ. The role of litigation in the remission of MVA-related PTSD. *After the crash: psychological assessment and treatment of survivors of motor vehicle accidents*. 2nd ed. Washington, DC, USA: American Psychological Association; 2004. p. 183–197.
35. Blanchard EB, Hickling EJ, Taylor AE, Loos WR, Forneris CA, Jaccard J. Who develops PTSD from motor vehicle accidents? *Behaviour Research and Therapy* 1996;34(1):1–10.
36. Mayou R, Bryant B. Psychiatry of whiplash neck injury. *British Journal of Psychiatry* 2002;180:441–8.
37. Mayou R, Tyndel S, Bryant B. Long-term outcome of motor vehicle accident injury. *Psychosomatic Medicine* 1997;59(6):578–84.
38. Mayou RA, Ehlers A, Bryant B. Posttraumatic stress disorder after motor vehicle accidents: 3-year follow-up of a prospective longitudinal study. *Behavior Research Therapy* 2002;40(6):665–75.
39. Mayou R, Bryant B. Outcome of 'whiplash' neck injury. *Injury* 1996;27(9):617–23.
40. Yang Z, Lowe AJ, de la Harpe DE, Richardson MD. Factors that predict poor outcomes in patients with traumatic vertebral body fractures. *Injury* 2010;41(2):226–30.
41. Brison RJ, Hartling L, Pickett W. A prospective study of acceleration–extension injuries following rear-end motor vehicle collisions. *Journal of Musculoskeletal Pain* 2000;8(1/2):97–113.
42. Suter PB. Employment and litigation: improved by work, assisted by verdict. *Pain* 2002;100(3):249–57.
43. Mason S, Turpin G, Woods D, Wardrope J, Rowlands A. Risk factors for psychological distress following injury. *British Journal of Clinical Psychology* 2006;45(2):217–30.
44. Bryant RA, Harvey AG. The influence of litigation on maintenance of posttraumatic stress disorder. *Journal of Nervous and Mental Disease* 2003;191(3):191–3.
45. Studdert DM, Luntz H, Grant G. Does access to compensation have an impact on recovery outcomes after injury? [Letter to the editor] *MJA* 2010;193(3):189.
46. Glozier NS, Large M. Does access to compensation have an impact on recovery outcomes after injury? [Letter to the editor] *MJA* 2010;193(3):188–9.
47. Gabbe BJ, Harris IA, Collie A, Cameron PA. Does access to compensation have an impact on recovery outcomes after injury? [Letter to the editor] *MJA* 2010;193(3):188.
48. Benight CC, Cieslak R, Molton IR, Johnson LE. Self-evaluative appraisals of coping capability and posttraumatic distress following motor vehicle accidents. *Journal of Consulting and Clinical Psychology* 2008;76(4):677–85.
49. Littleton SM, Cameron ID, Poustie SJ, Hughes DC, Robinson BJ, Neeman T, et al. The association of compensation on longer term health status for people with musculoskeletal injuries following road traffic crashes: emergency department inception cohort study. *Injury* 2010;41(7):904–10.
50. Sterling M, Hendrikz J, Kenardy J. Compensation claim lodgement and health outcome developmental trajectories following whiplash injury: a prospective study. *Pain* 2010;150(1):22–8.
51. Koljonen P, Chong C, Yip D. Difference in outcome of shoulder surgery between workers' compensation and nonworkers' compensation populations. *International Orthopaedics* 2009;33(2):315–20.
52. Grimes DA, Schulz KF. Bias and causal associations in observational research. *Lancet* 2002;359(9302):248–52.
53. Littleton SM, Hughes DC, Poustie SJ, Robinson BJ, Neeman T, Smith PN, et al. The influence of fault on health in the immediate post-crash period following road traffic crashes. *Injury* 2011. [Epub ahead of print].
54. Binder D, Bergman P, Price S. Lawyers as counselors: a client-centered approach. *New York Law School Law Review* 1990;35:29–86.
55. Winick BJ. Using therapeutic jurisprudence in teaching lawyering skills: meeting the challenge of the new ABA standards. *St Thomas Law Review* 2005;17:429–81.
56. Sternlight JR, Robbenolt J. Good lawyers should be good psychologists: insight for interviewing and counseling clients. *Ohio State Journal on Dispute Resolution* 2008;23(3):437–548.
57. Akkermans, AJ. Reforming personal injury claims settlement: paying more attention to emotional dimension promotes victims recovery, February 26, 2009, Available at SSRN: <http://ssrn.com/abstract=1333214>.
58. Brom D, Kleber RJ, Hofman MC. Victims of traffic accidents: incidence and prevention of post-traumatic stress disorder. *Journal of Clinical Psychology* 1993;49(2):131–40.
59. Cameron P, Gabbe B. The effect of compensation claims on outcomes after injury. *Injury* 2009;40(9):905–6.
60. Cassidy JD, Carroll LJ, Cote P, Lemstra M, Berglund A, Nygren A. Effect of eliminating compensation for pain and suffering on the outcome of insurance claims for whiplash injury. *New England Journal of Medicine* 2000;342(16):1179–86.
61. Cameron ID, Rebbeck T, Sindhusake D, Rubin G, Feyer AM, Walsh J, et al. Legislative change is associated with improved health status in people with whiplash. *Spine (Phila Pa 1976)* 2008;33(3):250–4.
62. Guest GH, Drummond PD. Effect of compensation on emotional state and disability in chronic back pain. *Pain* 1992;48(2):125–30.
63. Mendelson G. Compensation neurosis revisited: outcome studies of the effects of litigation. *Journal of Psychosomatic Research* 1995;39(6):695–706.