The impact of income support systems on healthcare quality and functional capacity in workers with low back pain: a realist review

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Abstract
Low back pain (LBP) is a leading cause of work disability. While absent from work, workers with LBP may receive income support from a system such as workers’ compensation or social security. This study examines how and in what contexts income support systems impact the healthcare quality for people with work disability and LBP and their functional capacity. We performed a realist review. Five initial theories about the relationship between income support systems and outcomes were developed, tested, and refined by acquiring and synthesising academic literature from purposive and iterative electronic database searching. This process was supplemented with gray literature searches for policy documents and semistructured interviews with experts in income support, health care, and LBP. Income support systems influence healthcare quality through funding restrictions, healthcare provider administrative burden, and allowing employers to select providers. They also influence worker functional capacity through the level of participation and financial incentives for employers, measures to prove the validity of the worker’s LBP, and certain administrative procedures. These mechanisms are often exclusively context-dependent, and generate differing and unintended outcomes depending on features of the healthcare and income support system, as well as other contextual factors such as socioeconomic status and labour force composition. Research and policy design should consider how income support systems may indirectly influence workers with LBP through the workplace.

Keywords: Low back pain, Realist review, Workers’ compensation, Income support systems

1. Background
Low back pain (LBP) is a prevalent symptom and major contributor to the global burden of disability.1,6,24,25,38 Approximately 540 million people are estimated to have LBP per annum, most of whom are of working age.20,38 The resultant work disability leads to substantial economic burden, with the costs of health care and rehabilitation, wage replacement, and lost productivity cited in the billions of dollars per annum.38 The pain, activity limitation, and participation restriction resulting from LBP can have a significant social and psychological impact, with mental health conditions a common comorbidity.28,80,81,96

If workers suffer from LBP that limits their ability to work, they may seek wage replacement from an income support system.21 Systems such as disability insurance, social security, and workers’ compensation can provide this support. Some income support systems, such as workers’ compensation in Canada and Australia, fund health care for treatment and rehabilitation of LBP, in addition to income support. Others, such as the Netherlands and the United Kingdom fund health care through separate systems.21,22,54 Although income support systems are complex and vary substantially between geographical regions, they are generally defined as systems that provide wage replacement, with or without funding for health care and other services.21,23

Contemporary evidence regarding the management of LBP indicates that good quality health care adopts a biopsychosocial approach, and encourages both staying active and at work where possible.1,19,27,61,67,77 Imaging of acute LBP and treatments such as opioids, injection therapies, and surgery are considered low-value care, have high costs, and, in some cases, are associated with detrimental effects on recovery and return to work.27,84 Healthcare quality therefore influences functional capacity, the ability of an individual to perform activities of daily living and work.22,37,84–86

Predictors of work disability due to LBP have been characterised as falling within 4 domains or “systems” defined in the Sherbrooke Model of Work Disability: personal, workplace, health care, and legislative.55 Our review protocol hypothesised that the legislative system (ie, income support) influences healthcare and workplace systems, which in turn impact healthcare quality and functional capacity. This hypothesis was based on contemporary literature, which suggests that income support systems may be detrimental.17,48,70,71 For example, workers’ compensation recipients take longer to return to work than workers who do not receive workers’ compensation.24,76
2. Methods

We conducted this review and report our findings as per Pawson’s methodology and the Realist And Meta-narrative Evidence Syntheses: Evolving Standards group methodological guidance for realist reviews. This involved the following stages: (1) clarifying scope, identifying review questions, and formulating initial theories, (2) purposive and iterative searching for literature, (3) appraising literature and extracting data, (4) analysing and synthesising data and refining theories, and (5) disseminating review results. In the following section, we provide a summary of the research methodology. Further information on the research methods and realist theory is available in our published review protocol.

2.1. Outcomes

The ability for an individual to perform activities of daily living and work (ie, functional capacity) is an important and frequently measured outcome in researching and understanding LBP. Evidence-based treatments for LBP are well established. There is also a body of literature demonstrating the negative impact of non–evidence-based treatments (ie, poor quality health care) on the functional capacity of those with LBP. Income support systems have also been previously associated with both of these outcomes. Therefore, healthcare quality and functional capacity were selected as the outcomes of this review. Selection of these outcomes was defined in our published review protocol.

2.2. Initial theories

We conducted initial purposive searches, held several collective author discussions, and consulted with experts to develop 5 initial theories to test in this review. These theories were programme theories that described how and in what contexts income support systems may impact healthcare quality and functional capacity. Each theory consisted of an income support system policy that triggered a mechanism: the “nonobservable” yet real process that generates an actual or empirical outcome. This mechanism acted within a set of contextual features, which modified how the mechanism generated the outcome. Initial theories were developed around the Sherbrooke Model of Work Disability, explaining the conceptual interactions between income support, healthcare, and workplace systems. Initial theories were published in our review protocol.

2.2.1. Search strategy

Academic literature was the primary source of information for the refinement of our theories. Gray literature was used to define income support and healthcare system types that provided a macro-level view of policies in the regions in which studies were conducted. This provided us a greater understanding of context in each region.

2.2.2. Gray literature searches

We used an iterative search strategy in this review. First, we conducted searches of the electronic databases Ovid MEDLINE, Cochrane Library, PsycINFO, and CINAHL. Search terms included synonyms based on the terms “low back pain,” “income support,” “workers compensation,” “social security,” “income protection,” “disability support,” “functional capacity,” “work ability,” “return to work,” “quality of care,” and “medical costs.” Search terms were combined with appropriate Boolean operators and truncations adapted to the requirements of each database. Reference lists of included studies were also scanned and Scopus was searched to identify studies that had cited included literature.

2.3. Eligibility criteria

One author (M.D.D.) screened titles and abstracts for eligibility. An additional author (T.L.) screened a random sample of 10% of the titles and abstracts for consistency. We included any literature that described the impact of an income support system on healthcare quality for LBP or on the functional capacity of workers with LBP. Further information on eligibility criteria is available in our protocol.

2.4. Data extraction and appraisal

Data were extracted from each piece of literature by at least 2 authors into a standardised data extraction table within a Microsoft Excel spreadsheet. As well as the characteristics of included studies (such as study region, sample characteristics, and data sources), we also extracted data in relation to each of the 5 initial theories. The relevance and rigour of literature was rated as very, moderately, or less relevant or rigorous. Relevance refers to whether literature contains data that adequately address a theory, and rigour whether or not the data were generated with “credible and trustworthy” methods. These 2 dimensions are typical of a realist review and are often used as a form of quality appraisal, in place of traditional quality assessment or risk of bias tools. Relevance and rigour were not used as eligibility criteria, but were considered when interpreting results and synthesising and refining theories.
2.5. Semistructured interviews

One author (M.D.D.) conducted 4 semistructured telephone interviews with experts in the fields of income support systems, health care, and LBP. Interviews were not intended to be exhaustive but used to test our initial theories and identify important anecdotal or experiential knowledge that might be lacking from traditional literature searches.

Interviews were structured around each of the 5 initial theories; interviewees were asked whether or not they agreed with an initial theory, and why. They were also asked if they thought there were any additional contextual factors or mechanisms that we had not identified. Interviews were analysed with a realist logic of analysis. The Monash University Human Ethics Research Committee provided ethics approval for this project (Project ID 14144, July 2018).

2.6. Data analysis and synthesis

Data generated from the different sources were combined and consolidated into context-mechanism-outcome (CMO) configurations. These CMO configurations were first organised under each of the initial theories. Each member of the review team independently reviewed CMO configurations and theories and then the findings were discussed as a group to deliberate the role of context, the relevance and rigour of evidence, and varying outcome patterns. The review team also decided whether theoretical saturation had been reached and if subsequent further literature searches were required to adequately explain a theory. The first author (M.D.D.) compiled the results of independent review and discussions, and refined the theories and CMO configurations. This synthesis process was performed 4 times, as theories were refined.

2.7. Changes from protocol

Three minor changes were made to the methodology of the review compared to the protocol. First, an eligibility criterion was added before the commencement of full-text screening: literature was excluded if it did not provide explanatory insight or understanding of how an income support system or associated policy, practice, or process impacted healthcare quality or functional capacity. This criterion was retrospectively applied to titles and abstracts from the initial search, but no additional items were included in full-text screening. The necessity of this criterion became apparent when early searches yielded large volumes of literature describing successionist causal models for the role of income support systems in worker functional capacity and healthcare quality. That is, they described simply that an interaction occurs, and did not contribute to the refinement of our theories.

Second, we adapted citation searching during the review (described above) because it was more efficient for iterative searches. Finally, due to time constraints, we conducted 4 semistructured interviews rather than the planned 10 to 15.

3. Results

3.1. Search results

The first round of searching identified \( n = 1156 \) pieces of literature from academic databases (Fig. 1). After duplicate removal, title and abstract, and full-text screening, \( n = 15 \) studies were included. Of the \( n = 92 \) items identified from reference lists of included studies in the second round of searching, \( n = 3 \) pieces of literature were ultimately included. Finally, \( n = 520 \) items were identified from Scopus searches leading to an additional \( n = 4 \) included pieces of literature. Once all 3 search rounds were completed, \( n = 22 \) articles were included.

3.2. Characteristics of included studies

Details of the included studies are shown in Table 1. The majority of studies were conducted in the United States (\( n = 13 \)) and Canada (\( n = 4 \)). Other studies were published variously in Japan (\( n = 1 \)), the United Kingdom (\( n = 1 \)), and Australia (\( n = 1 \)), with a single study including 6 different countries (Denmark, Germany, Israel, the Netherlands, Sweden, and the United States). Most studies solely used administrative data (\( n = 10 \)), 6 used administrative data and other data sources, 5 used questionnaire data alone, whereas 2 reviews used academic literature. The relevance and rigour of each included piece of literature is noted in Table 1.

3.3. Characteristics of included systems

Information on the system types of included studies is described in Table 2. Four studies defined the typology of the disability policy model, employment injury protection scheme, unemployment protection scheme, and healthcare system. There were a limited range of system types because most studies were conducted in North America. Most studies explored the impact of workers’ compensation systems; that is, they explored the “employer liability” type employment injury protection scheme. This system is a cause-based system funded by insurance premiums from employers. Three studies examined other system types, such as social security and disability insurance. These disability-based systems sit within a liberal disability policy model and a social insurance unemployment protection scheme and benefit applicants are typically means-tested.

Most studies were conducted in environments with either a private healthcare system or national health insurance system. Healthcare system type was defined by whether the majority of responsibility for regulation, funding, and service provision was that of the state, societal, or private sectors. The United States is one of a few systems where healthcare regulation, funding, and service provision are predominantly classified as private. Canada and Australia have a national health insurance system in which regulation and funding are performed by the province or state, respectively, with private service provision.

Most included studies (being from North America) had income support and healthcare systems with a degree of commodification, that is, access to welfare and health care are dependent on market position. In the case of health care, this may reflect a need and desire from healthcare workers to provide services in return for income. Commodification of welfare and health care was not present in all studies. For example, the United Kingdom uses a national health service-type healthcare system; regulation, funding, and service provision are all performed by the state, leaving very little commodification.

3.4. Interviews

Interviewed experts were from the United States, Canada, the United Kingdom, and New Zealand and were all primarily research-focussed. The sample did not include individual system actors such as employers, doctors, or workers. Expert interviewee responses to initial theories highlighted the importance
of context, with some providing different explanations for mechanisms compared to others. Summarised responses from expert interviewees are available in the appendix (Appendix Table 3, available online as supplemental digital content at http://links.lww.com/PAIN/B93).

3.5. Analysis and synthesis

Results of the analysis and synthesis are presented below and summarised in Figure 2. Each theory is supported by at least one CMO configuration. Where a single CMO configuration supported a theory, the CMO configuration is reported as the theory.

3.6. Theory 1—income support system role in funding health care

Income support systems that pay for and control health care in regions with commodified healthcare systems can generate adverse healthcare and functional outcomes for workers with LBP due to underlying financial incentives and healthcare professional responses to funding restrictions, as well as healthcare provider peer interactions, and regional socioeconomic factors.

3.6.1. Context-mechanism-outcome configuration 1 (n = 3 pieces of literature)

In regions where income support systems can fund health care that would otherwise be funded by insurance or out-of-pocket payments, healthcare professionals are incentivised to provide unnecessary care.

Regions with a greater number of independent magnetic resonance imaging (MRI) sites had higher rates of early MRI due to potential clinician “self-referral.” Evidence from simulated scenarios demonstrated that private clinicians are more likely to see workers with LBP more often if their health care was funded by an income support system (an employer liability system) than by private insurance or out of their own pocket. In clinical scenarios, physiotherapists treat compensated patients similarly to other patients, but were more likely to suggest ongoing physiotherapy for treatment. It was unclear whether this was due to financial incentives.

Figure 1. Results of searching, screening, and sorting.
| First author (year) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|---------------------|----|------|------|-----------|--------------------|--------------|--------------|-------------------|--------------------------------|
| Anema (2009) | 1 | 1 | 1 | Denmark, Germany, Israel, the Netherlands, Sweden, the United States | Compensation claimants for LBP | Prospective observational | Administrative, questionnaire, policy analysis | Work disability duration | Theory 5—ISS impact on the worker requirement of a medical certificate to receive benefits was not a significant predictor of work. A lack of long-term disability benefits or delayed access to long-term disability benefits was predictive of an earlier return to work. Different treatment options were popular in certain regions |
| Atlas (2007) | 3 | 3 | 3 | The United States | Workers with LBP who were not receiving workers’ compensation | Prospective observational and randomized | Questionnaire, interview, clinical assessment | Compensation status, socioeconomic status, demographic characteristics | Theory 5—ISS impact on the worker socioeconomic characteristics are markedly different between workers receiving and not receiving workers’ compensation for LBP. “Workers receiving workers’ compensation were younger, more likely to be male, non-White, less education, and smokers.” “Workers’ compensation recipients also more likely to retain an attorney, and much less likely to work as a manager or professional.” |
| Atlas (2010) | 1 | 1 | 1 | The United States | Workers with LBP who have not received surgical intervention for LBP | Prospective observational and randomized | Questionnaire | Compensation status, functional and pain status (Oswestry Disability Index, SF-36 Questionnaire) | Theory 1—ISS role in funding healthcare workers. Workers receiving workers’ compensation benefit less from surgical intervention. No differences were found at 2 years between workers’ compensation and nonworkers’ compensation nonoperative workers. “It has been postulated that financial incentives or the adversarial nature of the workers’ compensation system may account for worse outcomes.” There may be other important differences between workers who do and do not receive workers’ compensation for LBP |

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| First author (year) (ref) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|--------------------------|----|------|------|-----------|--------------------|--------------|--------------|-------------------|--------------------------------|
| Bartys (2017)<sup>a</sup> | 1  | ●●   | ●●●  | Multiple  | Critical appraisal of various forms of literature—sample not applicable Literature review Literature | Work disability, work participation | | | Theory 1—ISS role in funding health care Some healthcare professionals may avoid workers in receipt of income support due to a perceived insufficient funding for the necessary labour involved with compensated workers Theory 2—ISS demands on HCPs Healthcare professionals “generally regard” work issues as outside their “professional remit,” and may not address them due to “a lack of financial incentive, a lack of time and standard procedures, and increasing job demands” Theory 5—ISS impact on the worker When workers with LBP are required to prove their disability and “defend legitimacy” of LBP they may have worse outcomes More benevolent wage replacement may reduce the likelihood of returning to work Certain administrative hurdles and rules of systems may be detrimental to worker recovery |
| Carnide (2018)<sup>b</sup> | 3  | ●    | ●●●  | Canada    | Workers’ compensation claimants for LBP in a single Canadian province Total claimants n = 97,124 | Retrospective cohort | Administrative | Opioid, non-steroidal anti-inflammatory (NSAID, and skeletal muscle relaxant (SMR) prescription | Theory 1—ISS role in funding health care Rigorous analysis of opioid prescribing patterns preinjury and postinjury in compensated workers similar or lower than in the United States This could reflect greater reimbursement of injury-related prescriptions in U.S. compensation systems; however, WorkSafeBC also attempted to limit opioid prescriptions during the same period |
| First author (year) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|--------------------|----|------|------|-----------|-------------------|--------------|--------------|-------------------|---------------------------------|
| Cassidy (2003)     | 2  | 3    | 4    | Canada    | Motor vehicle accident claimants with LBP | Prospective cohort | Administrative, questionnaire | Work disability duration, functional and pain status (SF-36 Questionnaire), mood (CES-D Questionnaire) | Theory 5—Switch from tort to no-fault system decreased 6-month incidence of claims from 256 per 100,000 adults to 175 and 177 per 100,000 adults in first and second following months. Switch from tort to no-fault systems associated with decrease in median time to claim closure from 505 days to 216 and 203 days in first and second following months, respectively. "Adversarial environment" associated with tort law thought to delay claim closure and recovery. "When benefits are tied to pain and suffering, the insurance system acts in opposition to modern rehabilitation methods that emphasise mobility and ability over pain and disability." |
| Fujii (2012)       | 1  | 2    | 3    | Japan     | Japanese citizens who had experienced any LBP | Prospective observational | Questionnaire | Demographic characteristics, receipt of compensation for LBP, duration and severity of LBP | Theory 5—ISS impact on the worker. Receipt of workers’ compensation and motor vehicle accident compensation significantly associated with chronic LBP (adjusted odds ratio [aOR] 3.27, 95% CI 2.56-4.16), and aOR 1.85, 95% CI 1.36-2.50, respectively. Workers’ compensation recipients more likely than motor vehicle accident compensation recipients to have chronic LBP. |
| Graves (2018)      | 1  | 3    | 4    | The United States | Workers’ compensation claimants for LBP in the U.S. state of Washington | Interrupted time-series | Administrative | Healthcare costs, healthcare utilization, disability status | Theory 1—ISS rule in funding health care. Utilization review programme reduced the proportion of MRI provided to workers with LBP (21.2% to 15.6%), increased the mean duration between injury and first MRI, and reduced spinal injections. Programme did not change proportion of surgery. There was a significant negative trend in disability duration after the implementation of the review programme. There was also a significant increase in the proportion of workers who received radiographs after the implementation of the review programme (2.46%, 95% CI 1.24, 3.67). Trends observed in this study may reflect a national long-term decline in advanced imaging utilization. |
| First author (year) (ref) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|---------------------------|----|------|------|-----------|-------------------|--------------|--------------|-----------------|-------------------------------|
| Gum (2013)34              | 3  | ●    | ●●   | The United States | Workers who underwent spinal fusion and received workers' compensation or disability compensation | Case-control study | Questionnaire | Pain, functional status (Oswestry Disability Index, SF-36 Questionnaire) | Theory 5—ISS impact on the worker: Workers receiving workers' compensation have significantly worse functional outcomes compared to matched controls than disability compensation cases compared to matched controls after lumbar spinal fusion for LBP. Workers' compensation seems to have a negative influence on recovery from spinal fusion for LBP compared to disability compensation. |

| Jamison (1988)46          | 1  | ●●   | ●●   | The United States | Workers referred to single pain centre in the United States | Prospective observational | Questionnaire, physical examination | Pain, functional status (activities possible), healthcare utilization | Theory 5—ISS impact on the worker: Workers receiving disability benefits (unlimited time benefits) use more narcotic pain medication and sedatives, and experienced worse recovery than workers receiving time-limited compensation or no compensation. |

| Laliberte (2017)50        | 1  | ●●   | ●    | Canada | Physical therapy professionals | Cross-sectional | Questionnaire | (Hypothetical) healthcare delivery (wait time, treatment frequency, treatment duration, treatments) | Theory 1—ISS role in funding health care: In a clinical scenario, patient insurance status did not influence wait time and treatment duration. However, workers insured by workers’ compensation would be treated significantly more frequently than those insured by private insurance or out-of-pocket payments. |

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| First author (year) (ref) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|--------------------------|----|------|------|------------|-------------------|--------------|--------------|-------------------|--------------------------------|
| Pransky (2015)           | 66 | 1    |      | The United States | Workers’ compensation claimants for LBP from several states in the United States | Retrospective cohort | Administrative | Healthcare utilization (MRI within 30 days after onset of LBP) | Theory 1—ISS role in funding health care. Workers’ compensation cost containment efforts were not associated with MRI use in the first 30 days of the onset of LBP. It was hypothesized that cost containment efforts could a reactive approach to increasing medical costs in workers’ compensation schemes. A greater state percentage of MRI sites that are not linked to a hospital (ie, independent) was positively associated with rate of early MRI (within 30 days). It was hypothesized that this could be due to “self-referral” from healthcare providers who have a financial stake in the MRI site. Lower median income was associated with increased early imaging. It was hypothesized that lower median income could indicate lower patient education level and subsequently reduced capacity to “understand complex explanations.” This could ultimately lead to the “less time-and-effort-consuming” option of referring workers to imaging for their LBP. Greater severity associated with early MRI use (smaller association than other factors) Per capita rate of physicians and orthopaedic surgeons, income inequality, wage replacement rate, state average malpractice premium, and number of MRI sites per million population were not significant in the final model Theory 3—Employer choice of HCP Cost containment score was not predictive of early MRI use in the fully adjusted model This composite score contained whether the employer or insurer could choose healthcare |

Total n = 5359
Received early MRI n = 1590
Did not receive early MRI n = 3769

(continued on next page)
| First author (year) (ref) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|---------------------------|----|------|-----|-----------|-------------------|--------------|--------------|-----------------|--------------------------------|
| Schonstein (2002)69       | 1  |      |     | Australia | Physiotherapists treating compensated workers with LBP | Retrospective case review of NOC forms | Administrative | Work-focused health care (quality of treatment goals) | Theory 2—ISS demands on HCPs. Treatment goals made by physiotherapists were of mixed quality with reference to clinical practice guidelines, despite “emphasis from WorkCover”. Hypothesised that some physiotherapists not believe that “achieving return to work is an integral part of their physiotherapy role” (Theory 2) |
| Shraim (2015)70           | 1  |      |     | The United States | Workers’ compensation claimants for LBP from several states in the United States | RETROSPECTIVE COHORT | Administrative | Work disability duration, medical costs | Theory 1—ISS role in funding health care. Mean length of disability for workers with LBP was 2.5 days greater (95% CI 1.4, 3.6) in states that had medical fee schedules. It was hypothesised that healthcare providers responded to fee schedules with income maintenance strategies. Theory 3—Employer choice of HCP. Mean length of disability for workers with LBP was 6.1 days greater (95% CI 5.0, 7.2) in states with initial treating provider choice. It was hypothesised that if employers choose the healthcare provider, they will choose medical providers who are familiar with the workplace and provide care “oriented to achieving timely and sustained return to work, thus reducing incentives for excessive and inappropriate medical care” |
| Shraim (2017)71           | 1  |      |     | The United States | Workers’ compensation claimants for LBP from several states in the United States | Retrospective cohort | Administrative | Work disability duration, medical costs | Theory 5—ISS impact on the worker. Higher state unemployment rate is associated with increased average length of disability in workers with LBP. It was suggested that injured workers who live in areas of higher unemployment may experience more challenges. Lower neighbourhood median household income is associated with increased average length of disability in workers with LBP |

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| First author (year) (ref) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|--------------------------|----|------|------|-----------|-------------------|--------------|--------------|-------------------|-------------------------------|
| Simmonds (1996)72        | 2  | ●●● | ●    | The United States | Physical therapists (PTs) PTs at acute care hospitals n = 20 PTs at rehabilitation centres n = 21 PTs at private physiotherapy clinics n = 21 | Double-blind RCT | Questionnaire | Physical assessment (ie, range of movement), degree of disability, need for healthcare | Theory 1—ISS role in healthcare funding PTs more likely to be recommended workers’ compensation workers to physiotherapy and expect worse outcomes—this may be due to an unconscious bias Theory 2—ISS demands on HCPs Among physical therapists, knowledge of patient compensation status did not affect judgement of physical assessments Workers’ compensation workers expected to have worse outcomes, |
| Sinnott (2009)73         | 1  | ●●● | ●●● | The United States | Workers’ compensation claimants for LBP from the U.S. state of California | Retrospective cohort | Administrative | Disability status (chronic disability ≥ 91 days of work disability) | Theory 2—ISS demands on HCPs Delays in claim acceptance and treatment increased the likelihood that a low back injury can become chronic. System allows delays of up to 90 days. It was hypothesised that systems could control this delay, and thus affect treatment outcomes Healthcare providers who see less workers’ compensation workers ultimately produce worse outcomes |
| Wasiak (2006)82          | 1  | ●   | ●●● | The United States | Workers’ compensation claimants for LBP from several states in the United States Claimants who received chiropractic services n = 8894 All other claimants n = 4840 | Retrospective cohort | Administrative | Healthcare utilization (visits per person, services per person, and person-mean services per visit) | Theory 1—ISS role in healthcare funding Amount of reimbursement is positively associated with costs and number of visits to chiropractic care. Fee schedules showed no association. Specific features such as limits on number of visits demonstrated reduced medical costs. It was hypothesised that the level of reimbursement for services triggered a “perverse” response by chiropractors “in response to price controls” |
| Watson (2004)83          | 1  | ●   | ●●  | The United Kingdom | Persons unemployed for >6 months receiving incapacity benefit or unemployment benefit with LBP >6 months Incapacity benefits (ie, medically determined) n = 39 Unemployment benefits (not medically determined) n = 45 | Prospective cohort | Questionnaire, interview, physical examination | Work status, functional status/disability (Roland Morris Disability Questionnaire), pain (VAS), psychological measures, physical measures | Theory 5 No significant differences in any functional, work disability, or employment outcomes between the 2 types of benefits Benefit type (either unemployment or medically determined benefit) does not predict long-term outcomes in those with chronic LBP |

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### Table 1 (continued)

| First author (year) (ref) | ST | Rel. | Rig. | Region(s) |
|--------------------------|----|------|------|-----------|
| Webster (2009)87          | 1  | ⚫⚫⚫⚫ | ⚫⚫⚫⚫ | The United States |

Workers’ compensation claimants for LBP from several states in the United States

Claimants who received at least one early opioid prescription proportion = 21.3%

Total claimants n = 8262

| Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|--------------------|--------------|--------------|-------------------|--------------------------------|
|                    | Retrospective cohort | Administrative | Healthcare utilization (early opioid prescription; <15 days postinjury) | Theory 1—ISS role in healthcare funding Workers’ compensation cost containment efforts were positively associated with prescribing opioids for LBP in the first 15 days of treatment (PR 1.12, 95% CI 1.02, 1.24). It was hypothesised that healthcare providers responded to cost containment efforts with income maintenance strategies. The number of physicians per capita was negatively associated with early opioid prescribing (<15 days). It was hypothesised that higher physician concentrations result in greater peer-to-peer interaction, with more communication of information and peer influences related to the risks of opioid use in working populations. Household inequality for each state was positively associated with a higher rate of prescribing opioids. It was suggested that this could reflect “less access to quality medical care in high poverty areas,” such as those found in “economically unequal states.” It was also suggested that, in combination with lower physicians per capita, opioids may be prescribed in the absence of appropriate services. |

Theory 2—ISS demands on HCPs Current guidelines indicate that management of LBP should focus on staying active and staying at work. However, doctors are highly likely to give sickness certification to workers with LBP—which is counter to the evidence. “Unfortunately, healthcare professionals are not always willing to adjust their recommendations and treatment strategies.” Several studies targeting doctors with updated knowledge about back pain and various treatment interventions have been.

| Werner (2009)88 | 2  | ⚫⚫⚫ ⚫ | Multiple |

Critical appraisal of various forms of literature—sample not applicable

Characteristics of sick-listed worker, sick-listing person, workplace, cultural, economic conditions

Theory 2—ISS demands on HCPs Current guidelines indicate that management of LBP should focus on staying active and staying at work. However, doctors are highly likely to give sickness certification to workers with LBP—which is counter to the evidence. “Unfortunately, healthcare professionals are not always willing to adjust their recommendations and treatment strategies.” Several studies targeting doctors with updated knowledge about back pain and various treatment interventions have been.

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Income support systems that attempt to control payments for healthcare in regions with private healthcare systems encourage healthcare providers to seek income maintenance strategies. This can lead to overtreatment, use of low-value treatments, and worse functional outcomes.

Income support systems implement policy mechanisms and tools to control healthcare expenditure with strategies such as medical fee schedules, utilization review programs, limiting treating provider choice, and number of services. However, these restrictions on healthcare payments can lead to either no change in healthcare quality outcomes, diversion to other treatment options, or negative healthcare quality outcomes such as increased opioid prescribing, possible additional healthcare services, and poorer functional outcomes such as increased length of disability.

This strategy was only demonstrated in studies from regions with private healthcare systems, where such a strategy is both necessary and potentially productive.

### Table 1 (continued)

| First author (year) (ref) | ST | Rel. | Rig. | Region(s) | Sample/Sample size | Study design | Data sources | Outcomes measured | Relevant results to each theory |
|--------------------------|----|------|------|-----------|---------------------|--------------|--------------|-------------------|--------------------------------|
| Wong (2014)              | 3  | ●●● | ●●  | Canada    | Yearly aggregates of lost-time claims for LBP in Canada | System dynamics model | Administrative | Submitted and accepted lost-time claims for LBP | Theory 4—ISS incentives for employers |
|                          |    |      |      |           |                     |              |              |                   | The local income support system provides a greater weighting to lost-time claims (with higher costs) than no-lost-time claims (with lower costs) in determining whether a firm is administrated a surcharge or refund for their payments for workers’ compensation coverage. This coincides with legislation aimed to increase worker accommodation. No-lost-time claims increased could be a reporting issue though. |

CI, confidence interval; LBP, low back pain; MRI, magnetic resonance imaging; Rel., relevance; Rig., rigour; ●●●, relevant/rigorous; ●●, moderately relevant/rigorous; ●, less relevant/rigorous; ST, search tranche; SSDI, social security and disability insurance.
and return to work as part of their role may focus solely on evidence to suggest clinicians who do not see work issues focussed knowledge.88 Expert interviewees agreed with income support systems, quality of care was unlikely to be also aligned with statements from expert interviewees that satisfaction workers may lead to worse worker outcomes, 73 and status was unlikely to affect clinical decision-making.72 This increased demands, and lack of financial incentive, time, and issues and income support systems because of the perceived literature that healthcare professionals may not address work decision-making authority. 8 However, as single study also further explained that employers in their respective countries have little to no influence on health care. Further U.S. literature measured the effect of limiting treatment provider choice as part of a composite cost containment score. Although cost containment was shown to have an adverse effect on healthcare quality and work outcomes, it was not possible to isolate treating provider choice from the composite measure, and it is unclear how initial treating provider choice contributed to this outcome.66,87 This aligned with results from interviews. The experts suggested this theory might hold, although experts further explained that employers in their respective countries have little to no influence on health care. Further U.S. literature measured the effect of limiting treatment provider choice as part of a composite cost containment score. Although cost containment was shown to have an adverse effect on healthcare quality and work outcomes, it was not possible to isolate treating provider choice from the composite measure, and it is unclear how initial treating provider choice contributed to this outcome. 66,87

**3.7. Theory 2—income support system demands on healthcare providers**

**3.7.1. Context-mechanism-outcome configuration 5 (n = 5 pieces of literature)**

Healthcare providers may not see work-focussed care as within their scope of practice. When income support systems impose administrative demands on healthcare providers, they lack incentives and motivation to engage the income support system and worker in a work-focussed manner, leading to poorer work outcomes.

Work-focussed health care is acknowledged as important for recovery among workers with LBP among workers with LBP, yet some clinicians do not address this. Evidence from a review suggests healthcare professionals regard work issues as beyond their “professional remit.” There was also evidence to suggest clinicians who do not see work issues and return to work as part of their role may focus solely on clinical issues. A lack of experience with workers’ compensation workers may lead to worse worker outcomes, and minimal willingness to change practices based on new work-focussed knowledge. Expert interviewees agreed with literature that healthcare professionals may not address work issues and income support systems because of the perceived increased demands, and lack of financial incentive, time, and decision-making authority. However, a single study also suggested that knowledge of patient workers’ compensation status was unlikely to affect clinical decision-making. This also aligned with statements from expert interviewees that even if healthcare providers are not incentivized to engage income support systems, quality of care was unlikely to be affected.

**3.8. Theory 3—employer choice of healthcare provider**

**3.8.1. Context-mechanism-outcome configuration 6 (n = 3 pieces of literature)**

Where income support systems allow the employer to choose the workers’ healthcare provider in regions with income support systems funded by employers, the employer is incentivized by wage replacement and insurance premiums to choose the healthcare provider that will return the worker to work the fastest.

In the United States, the length of disability was lower when the employer could choose healthcare providers, which was attributed to selection of work-focussed healthcare providers who were familiar with the workplace. This aligned with results from interviews. The experts suggested this theory might hold, although the employer is likely to focus on wage replacement duration as a function of total premium costs and not healthcare quality. Experts further explained that employers in their respective countries have little to no influence on health care. Further U.S. literature measured the effect of limiting treatment provider choice as part of a composite cost containment score. Although cost containment was shown to have an adverse effect on healthcare quality and work outcomes, it was not possible to isolate treating provider choice from the composite measure, and it is unclear how initial treating provider choice contributed to this outcome. 66,87

**3.9. Theory 4—employer incentives**

**3.9.1. Context-mechanism-outcome configuration 7 (n = 2 pieces of literature)**

Where income support systems require employer involvement in worker rehabilitation, penalties for noncompliance incentivise employers.
There was limited LBP-specific literature available for this theory, although expert interviewees suggested that it may be possible. A single trial found that the introduction of an employer-based peer adviser led to a 49% reduction in LBP-related sick leave.^{88} Legislation to increase worker functional accommodation was followed by an increase in healthcare costs associated with no-loss-time claims.^{95} Experts suggested that a financial incentive may work in their own respective systems; however, the motivation would be for employers to return workers to work and reduce their financial burden, not to improve their functional capacity. Another expert pointed to a lack of financial incentive or motivation for employers to be involved in worker recovery in

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There are limitations in the available literature for this theory, as expert interviewees suggested that it may be possible. A single study found that the introduction of an employer-based peer adviser resulted in a 49% reduction in LBP-related sick leave.\(^\text{88}\) Legislation to increase worker functional accommodation was followed by an increase in healthcare costs associated with no-loss-time claims.\(^\text{95}\) Experts suggested that a financial incentive might work in their respective systems; however, the motivation would be for employers to return workers to work and reduce their financial burden, not to improve their functional capacity. Another expert pointed to a lack of financial incentive or motivation for employers to be involved in worker recovery in
some regions. A third expert suggested that some employers may just “tick the boxes” to meet legislative requirements until they can terminate the worker’s employment.

3.10. Theory 5—income support system impact on the worker

Where income support systems with more generous benefits require workers with LBP to meet administrative requirements and prove the validity of their disability, workers feel unsupported and are not incentivized to return to work.

3.10.1. Context-mechanism-outcome configuration 8

Income support systems that require workers to prove their injury when they have a poorly defined, stigma-attached condition such as LBP feel an ongoing need to prove they are genuinely disabled. This in turn contributes to inappropriate use of health care and ongoing time away from work. (n = 5 pieces of literature).

Where workers are required to prove they are disabled due to their LBP and “defend their legitimacy,” they may have worse work outcomes. It is possible that the presence of financial incentives motivate workers to have their disability recognised. Interviewed experts suggested that where workers have to prove their LBP causes disability (ie, cause-based systems), they may seek tests that are more complex and treatments to legitimize their pain with the income support system or employer. Workers funded by workers’ compensation tended to have worse functional outcomes than workers funded by disability pensions or disability insurance (ie, where a specific cause is not required), and motor vehicle accident insurance.29,34,46 In a motor vehicle accident compensation system, a switch from a tort to no-fault scheme significantly reduced claims for LBP as well as the median duration of disability.19 These data conflicted with a single study. However, the latter study compared types of benefits in a region with a disability-based income support system, making comparisons challenging.83 It was hypothesised that the adversarial environment associated with tort law may delay claim closure. Experts also noted that LBP tends to carry more stigma than other “more credible” conditions, and that the associated residual pain issues and diagnostic uncertainty can frustrate workers. Nevertheless, one study comparing multiple countries demonstrated that requirement for medical certification to receive benefits was not a significant predictor of engagement in return to work.5

3.10.2. Context-mechanism-outcome configuration 9 (n = 4 pieces of literature)

Income support systems that offer more generous benefits or who step down benefits in response to return to work activities reduce the incentive for workers to seek functional improvement, contributing to increased work absence.

Both literature and interviewed experts suggested that more “benevolent” wage replacement reduced the incentive for workers to return to work.5 Wage replacement that offered a higher proportion of the workers’ preinjury earnings and reductions in benefits during scenarios such as partial return to work acted as disincentives to return to work. Conversely, a single trial only found differences in return to work between workers who do and do not receive workers’ compensation when they had surgical intervention for their LBP; no differences were found in those conservatively managed.45 The authors acknowledged the potential role of financial incentives, but hypothesized that there may be other important differences between compensated and noncompensated workers. Another study of a similar cohort also identified significant differences in socioeconomic characteristics of workers who did and did not receive workers’ compensation.5 The authors suggested these should be considered when attempting to causally link compensation and worker outcomes. An international-comparative study also suggested that the absence of long-term disability benefits, or delayed access to them, was predictive of earlier return to work.3 The U.S. interviewee also explained that to avoid long-term liability associated with indefinite claims in some U.S. states, workers’ compensation bodies had begun paying lump sums to some workers; however, the effect of this was unknown.

3.10.3. Context-mechanism-outcome configuration 10 (n = 1 piece of literature)

Income support systems that include certain administrative requirements that result in waiting periods or delays and cause the worker to feel unsupported and frustrated, leading to worse functional and recovery outcomes.

Certain “rules and practices” of the system such as “right to case appeal” and “slow or dissatisfactory case management” have been cited as detrimental to worker recovery.5 Interviewed experts suggested such features and waiting periods may stop the worker from working, and that if the worker feels unsupported during these periods, they may be less likely to ultimately return to work. One expert also pointed to requirements for approval for certain healthcare providers or volumes of health care by some income support systems, possibly leading to worse functional outcomes.

4. Discussion

This realist review sought to understand how and in what contexts income support systems impact healthcare quality and functional capacity in workers with LBP. We have found those healthcare providers, employers, and workers’ responses to income support system policies and features can impact healthcare quality and worker functional capacity. These effects are context-specific and only operate in certain types of income support and healthcare systems or in workers with certain sociodemographic features. Although contemporary literature has previously identified the impact of income support systems on these outcomes, we believe this review provides a new understanding of the causes of these events.

4.1. Trends in included literature and theories

Several trends emerged in the included literature. The use of a successionist model of causality meant the majority of included studies treated income support systems as single entities or statuses, which may miss certain nuances inherent to large systems such as income support. The majority of included literature also did not discuss context in detail, or even at all. In particular, there was limited discussion of the context of parallel systems or regions. For example, few pieces of literature investigating income support systems also described the local healthcare system despite the potentially important relationship between the two. Finally, we found that most literature originated in regions with similar system types.

Several theoretical themes were also present. We found the prevailing mechanisms were economic incentives. The role of economic incentives in the income support and healthcare system settings has long been documented.11,13,35,49,52 Most policies of income support systems rely on the responses of actors to economic incentives. In some cases, economic incentives lead to contradictory behaviour from system actors. For example, the income
maintenance strategy, theorised by some included studies, was thought to be a direct response to attempts to reduce healthcare costs.

### 4.2. Supporting evidence from work disability literature not specific to people with low back pain

We identified some evidence that was ineligible for inclusion, but may have contributed to the development and refinement of our theories. This evidence was usually excluded because the sample did specifically include workers with LBP. For the most part, work disability literature not specific to LBP aligns with our already established theories. For example, healthcare providers have previously found difficulties with workers’ compensation systems and the return to work process in workers who had “multiple injuries, gradual onset or complex illnesses, chronic pain, and mental health conditions.” In some cases, healthcare providers were found to refuse to treat compensated workers, citing additional “clinical complexities” and “time and financial burdens.” Such evidence aligns with our established Theory 2. However, additional insights indicate that differences in doctors’ roles within systems may affect work outcomes. Financial incentives may be used successfully to influence healthcare provider adoption of occupationally focussed healthcare programs, and fee schedules can achieve intended cost-containment objectives. Furthermore, a shift of funding income support responsibility from the state to employers was found to be beneficial for worker return to work times. There is also evidence to suggest that specific financial incentives for employers may encourage actions such as claim reporting time.

The impact of the income support system directly on the worker is also well documented, and aligns with our Theory 5. Evidence exploring the mechanisms and contexts in which benefit generosity may have incentive effects and impact work disability outcomes has previously been published. Evidence to suggest that receipt of financial compensation is associated with worse functional outcomes. More specifically, the administrative and legal aspects of income support systems may be generally detrimental to recovery and most interactions with income support systems resulted in “significant psychosocial consequences for injured workers.”

However, we sought to identify and understand the impact of income support systems specifically on outcomes of workers with LBP because this is the greatest contributor to disability worldwide. In the majority of cases, it is not possible to identify a specific pathoanatomic cause of LBP, and the diagnosis of nonspecific LBP typically depends upon ruling out much rarer specific and/or serious causes. The subjective nature and causative ambiguity of LBP seems to lend itself to a certain amount of stigma or challenged integrity, that is not reflected in other musculoskeletal conditions such as osteoarthritis. This may lead to particular challenges for a worker seeking wage replacement from a cause-based system. The U.S. interviewee even suggested that worker attempts “to prove the legitimacy of their pain and disability” might lead to greater utilisation of tests such as imaging, as reflected in Theory 5.

### 4.3. The role of context and system types

The mechanisms identified in the review were conceptually reliant on underlying contextual factors. There is likely substantial complexity to the number and layer of contextual factors not elucidated in this review. However, we were able to understand the theoretical influence that some high-level contextual factors, such as system typology, had over some mechanisms. For example, the income maintenance behaviour demonstrated by healthcare providers seems to be reliant on a commodified healthcare system type.

Healthcare system type is one feature of a larger policy landscape. Some included literature suggested that different income support system types (i.e., cause-based or disability-based systems) might lead to different outcomes. In one circumstance, disability-based systems such as unemployment benefits seemed to have better outcomes than time-limited benefits. Furthermore, it has previously been suspected that the tightening of U.S. workers’ compensation policies lead workers to move to social security disability insurance. That is, a move from cause-based systems to a disability-based system. However, identifying causality for this inter-system movement has previously been debated.

High-level system features may also have the potential to affect how policy mechanisms in neighbouring systems react; incentives for physician performance (i.e., pay-for-performance) may function more effectively in regions within more commodified welfare systems. There is potential for future research into the role of such contextual factors.

### 4.4. Strengths and limitations

Realist reviews are a relatively new methodology, and provide a novel and contemporary understanding of how and in what contexts social programmes such as income support function. We believe the understanding of the role of income support systems in the population of workers with LBP benefits from the use of this methodology.

A strength of our realist review is that we used transparent methods and published our protocol including our initial theories in an open peer-reviewed journal. Our protocol was peer-reviewed by 2 experts in realist reviews. As is customary for realist reviews, we used an iterative search strategy and searched both academic and gray literature. We also documented all changes to our protocol including their justification.

We also recognise several limitations of this review. We treated context at a very high level. By opting for system typologies, rather than more detailed features, we avoided the impact of policy changes over time and differences in local applications. However, this did prevent a more detailed understanding of the policy setting. Several includes studies measured disability duration or compensated time loss, or the cessation of time loss. Although frequently used as a proxy for return to work, the cessation of time loss is not always an accurate representation of functional capacity; workers may stop receiving wage replacement from an income support system without having returned to their pre-LBP functional capacity.

Included literature was published between 1988 and 2018. There has been substantial development the evidence-base for LBP, as well as in the design of income support systems, during this time. We did not account for this temporality issue in our review. Our literature searches were also constrained to health and medical databases. Although preliminary searches of economic databases did not identify eligible LBP-specific articles, several potentially important non-LBP-specific articles were noted. There was also a lack of included studies exploring LBP in military populations. Although substantially different to the “general” population of workers in included studies, the inclusion of military personnel with LBP would have provided a more comprehensive cohort.

Finally, we also had a small and relatively homogenous sample of expert interviewees. Although interviews were not the primary activity of this review, we could have benefited from a larger and more role-diverse sample.
4.5. Recommendations for future research

Realist reviews are an expanding research methodology. A realist understanding can provide a nuanced understanding of the impact of social programmes and phenomena. Future research of the health and work ability of people accessing and interacting with income support systems, including those with LBP, should use both realist review and realist evaluation methods. We believe this will provide new insights into the role of income support systems, which have global and context-dependent ramifications.

Future research should also explore how the mechanisms identified in this review might generate outcomes in different contexts. Although we are able to theorise how system typologies may enable or disable our mechanisms, we lacked the literature to explore how this might occur. A broader realist review of income support system funding in general may be able to answer such questions. We also found that included studies rarely reported on local policies or system design. This aligns with previous research that has found that income support systems are generally defined poorly in research studies. A greater understanding of context is likely to benefit future research by refining where and when policy research is generalizable.

We found a paucity of literature regarding the impact of income support system policies on the employer in cases where workers have LBP. This may be due to challenges associated with research methodologies in this cohort, or simply an under-researched area. We recommend future exploration of the impact of policies, such as financial incentives, on employers of workers with LBP. We recommend additional policy research to examine how policies may have population-scale impact on persons and workers with LBP. This could be achieved by investigating the influence of policies in existing administrative data, a method used by several studies included in this review.

Finally, we identified several important tranches of literature, particularly in economic literature databases, which may have added to the explanation of our theories, but were not specific to LBP. Future research should consider expanding to additional musculoskeletal conditions.

4.6. Recommendations for future policy development

Although we acknowledge that policy development for LBP should be context-dependent, we can make some broad recommendations. First, a biopsychosocial approach, rather than a more typical economic approach, should be considered when developing policies.

The findings from our review confirm that there is interaction between different systems. Disabled workers typically engage a healthcare and income support system simultaneously; they may require treatment from the healthcare system to return to work, using wage replacement from the income support system in the interim. Any future policy development should therefore explore how policies within one system may affect other systems. We also identified research of conditions other than LBP to suggest that the policies of one income support system may affect another income support system. Future policy development should not be performed in “silos,” and instead consider wider societal and intersystem ramifications.

4.7. Conclusion

This realist review has provided an understanding of how and in what contexts income support systems impact healthcare quality for and functional capacity of workers with LBP. This impact occurs through multiple underlying context-dependent mechanisms triggered by financial incentive and control policies, regulatory procedures, and administrative events. Future research would benefit from using realist review methods, and should make efforts to define relative contextual factors local to research. Future policy development should focus on understanding the biopsychosocial aspects of LBP, and how income support systems may interact with one another and with other systems such as health care.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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Ethics approval and consent to participate: The Monash University Human Research Ethics Committee (MUHREC) approved the semistructured interviews performed in this review, Project ID 14144 (July 2018).

Availability of data and material: Literature included in this review is available through the relevant journals. Transcripts of interviews conducted in this review are not publicly available.

Appendix A. Supplemental digital content

Supplemental digital content associated with this article can be found online at http://links.lww.com/PAIN/B93.

Supplemental video content

A video abstract associated with this article can be found at http://links.lww.com/PAIN/B92.

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References

[1] Agency for Clinical Innovation (ACI). Management of people with acute low back pain. Chatswood, Australia: ACI, 2016.

[2] Ammi M, Fortier G. The influence of welfare systems on pay-for-performance programs for general practitioners: a critical review. Soc Sci Med 2017;178:157–66.
[3] Anema JR, Schellart AJ, Cassidy JD, Loisel P, Veerman TJ, van der Beek AJ. Can cross country differences in return-to-work after chronic occupational back pain be explained? An exploratory analysis on disability policies in a six country cohort study. J Occup Rehabil 2009;19:419–26.

[4] Atlas SJ, Tosteson TD, Blood EA, Skinner JS, Pransky GS, Weinstein JN. The impact of workers’ compensation on outcomes of surgical and nonoperative therapy for patients with a lumbar disc herniation: SPORT. Spine (Phila Pa 1976) 2010;35:89–97.

[5] Atlas SJ, Tosteson TD, Hanscom B, Blood EA, Pransky GS, Abu WA, Andersson GB, Weinstein JN. What is different about workers’ compensation patients? Socioeconomic predictors of baseline disability status among patients with lumbar radiculopathy. Spine (Phila Pa 1976) 2007;32:2019–26.

[6] Australian Institute of Health and Welfare (AIHW). Back Problems - What role do GPs play in treating back problems? 2017 Available at: https://www.aihw.gov.au/reports/arthritis-ather-muscloskeletal-conditions-back-problems/what-role-do-gps-play-in-treating-back-problems. Accessed May 15, 2018.

[7] Bambra C. Worlds of welfare and the health care discrepancy. Soc Pol Soc 2005:4:31–41.

[8] Bartsy S, Frederiksen P, Bendix T, Burton K. System influence on work disability due to low back pain: an international evidence synthesis. Health Policy 2017;121:903–12.

[9] Bohm K, Schmid A, Gotze R, Landwcher C, Rothgang H. Five types of OECD healthcare systems: empirical results of a deductive classification. Health Policy 2013;113:258–69.

[10] Bohm K, Schmid A, Gotze R, Landwcher C, Rothgang H. Classifying OECD healthcare systems: a deductive approach. In: Trans:State working papers. Bremen: Wandel, 2012.

[11] Bolduc D, Fortin B, Labrecque F, Lanoie P. Workers’ compensation, moral hazard and the composition of workplace injuries. J Hum Resour 2002:37:623–52.

[12] Brijnath B, Mazza D, Kosny A, Buncsi S, Singh N, Ruseckaite R, Collie A. Is surgical vs medical treatment of lumbar radiculopathy different? A validity-driven approach generated the personal and societal burden of low back pain: development of a conceptual and measurement model. Arthritis Res Ther 2011;13:R52.

[13] Burkhauer RV, Daly MC, de Jong PR. During the dutch disease: lessons for United States disability policy. Michigan: Michigan Retirement Research Center, University of Michigan, 2008.

[14] Busija L, Buchbinder R, Osborne RH. A grounded patient-centered approach generated the personal and societal burden of osteoarthritis model. J Clin Epidemiol 2013:66:994–1005.

[15] Camnide N, Hogg-Johnson S, Furlan AD, Cote P, Koes BW, Karppinen J, Koesloot M, van Tulder M, Anema JR, Chou R, Cohen SP, Menezes Costa L, Croft P, Ferreira M, Ferreira PH, Fritz JM, Genevay S, Schoene M, Smeets RJ, Turner JA, Wooll F, A. Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet 2018;392:165–63.

[16] Froud R, Patterson S, Eldridge S, Seal S, Pincus T, Rajendran D, Fossum C, Underwood M. A systematic review and meta-synthesis of the impact of low back pain on people’s lives. BMC Musculoskelet Disord 2014;15:50.

[17] Fujii T, Matsudaira K, Oka H. The association between compensation and chronic disabling back pain. J Orthop Sci 2012;17:694–9.

[18] Gauden BM. 2017 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet 2018;392:1789–838.

[19] Grant G, Studdert DM. Poisoned chalice? A critical analysis of the evidence linking personal injury compensation processes with adverse health outcomes. Melb Univ Law Rev 2009;35:865–1032.

[20] Graves JM, Fulton-Kehoe D, Janvik JG, Franklin GM. Health care utilization and costs associated with adherence to clinical practice guidelines for early magnetic resonance imaging among workers with acute occupational low back pain. Health Serv Res 2014;49:645–65.

[21] Guo X, Burton JF, Jr. The impact of workers’ compensation on outcomes of surgical and nonoperative therapy for patients with a lumbar disc herniation: SPORT. Spine (Phila Pa 1976) 2013;38:443–8.

[22] Guo X, Burton JF. Workers’ compensation: recent developments in moral hazard and benefit payments. ILR Rev 2010;63:340–55.

[23] Harris IA, Traeger A, Stanford R, Maher CG, Buchbinder R. Lumbar spine fusion: what is the evidence? Intern Med J 2018;48:1430–4.

[24] Hartvigsen J, Vaccarino ML, Koenig J, Pransky S, G. Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet 2018;392:165–63.

[25] Hartvigsen J, Cherkin D, Foster NE, Maher CG, Underwood M, van Tulder M, Anema JR, Chou R, Cohen SP, Menezes Costa L, Croft P, Ferreira M, Ferreira PH, Fritz JM, Genevay S, Gross DP, Hancock MJ, Hoy D, Karppinen J, Koes BW, Kosterg A, Louw Q, Öberg B, Peul WC, Pransky G, Schoene M, Smeets RJ, Turner JA, Wooll F. Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet 2018;392:165–63.

[26] Hartvigsen J, Cherkin D, Foster NE, Maher CG, Underwood M, van Tulder M, Anema JR, Chou R, Cohen SP, Menezes Costa L, Croft P, Ferreira M, Ferreira PH, Fritz JM, Genevay S, Gross DP, Hancock MJ, Hoy D, Karppinen J, Koes BW, Kosterg A, Louw Q, Öberg B, Peul WC, Pransky G, Schoene M, Smeets RJ, Turner JA, Wooll F. What low back pain is and why we need to pay attention. Lancet 2018;391:2565–67.

[27] Hoy D, March L, Brooks P, Blyth F, Wooll F, Bain C, Williams G, Smith E, Vos T, Barendregt J, Murray C, Burstein R, Buchbinder R. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 2014;73:988–74.

[28] International Labour Organization (ILO). Database of national labour, social security and related rights legislation (NATLEX). 2017. Available at: http://www.ilo.org/dyn/natlex/natlex4home.asp?lang=en. Accessed May 14, 2017.

[29] International Labour Organization (ILO). Employment protection legislation database (EPLex). 2017. Available at: http://www.ilo.org/.../en.".

[30] International Labour Organization (ILO). Employment protection legislation database (EPLex). 2017. Available at: http://www.ilo.org/dyn/eplex/termmain/home. Accessed May 14, 2017.

[31] International Labour Organization (ILO). Information system on international labour standards (NORMLEX). 2017. Available at: http://www.ilo.org/dyn/normlex/en:enp?NORMLEXPUB1:1:000:. Accessed May 14, 2017.

[32] International Labour Organization (ILO). Occupation Health and Safety Standards. 2017. Available at: http://www.ilo.org/dyn/en.proc/eg/en?14100:1000:0::NO:::. Accessed May 14, 2017.

[33] International Labour Organization (ILO). World Social Protection Report 2017-18Universal social protection to achieve the sustainable development goals. Geneva, 2017.

[34] International Social Security Association (ISSA). ISSA homepage. 2018 Available at: https://www.iss.org/en. Accessed May 14, 2018.

[35] Jamison RN, Matt DA, Bougatsos C, Jones CT, O’Connor D. Effectiveness of time-limited vs unlimited compensation on pain behavior and treatment outcome in low back pain patients. J Psychosom Res 1988;32:277–83.

[36] Kilgour E, Kosny A, McKenzie D, Collie A. Interactions between injured workers and their employers in workers’ compensation systems in studies of return to work: a systematic mapping study. J Occup Rehabil 2018;28:740–5.

[37] King J, Lutfiye M, Tomlin S, Yaran B, Russell E, MacEachen E, Neils B, Koehoem M, Beaton D, Furlan A, Cooper J. The role of health-care providers in the workers’ compensation system and return-to-work process: final report. Institute for Work & Health Ontario, 2016.
Sinnott P. Administrative delays and chronic disability in patients with Simmonds M, Kumar S. Does knowledge of a patient’s workers’ Schraim M, Cifuentes M, Willetts JL, Marucci-Wellman HR, Pransky G. Schonstein E, Kenny DT, Maher CG. WorkCover’s physiotherapy forms: Schmid F, Lord N. The impact of physician fee schedule introductions in Organisation for Economic Co-operation and Development (OECD). Murgatroyd DF, Casey PP, Cameron ID, Harris IA. The effect of financial McInerney M, Simon K. The effect of state workers’ compensation programs on the use of federal social security disability insurance. Ind Relations 2012;51:57–88.

Loisel P, Bucchinder R, Hazzard R, Keller R, Scheel I, van Tulder M, Lippel K and Lötters F, Public insurance systems: a comparison of cause-based and disability-based income support systems. In: Loisel P, Anema JR, editors. Handbook of work disability, prevention and management. New York: Springer, 2013. p. 183–202.

Loisel P, Buchbinder R, Hazzard R, Keller R, Scheel I, van Tulder M, Webster B. Prevention of work disability due to musculoskeletal disorders: the challenge of implementing evidence. J Occup Rehabil 2006;15:507–24.

Manzano A. The craft of interviewing in realist evaluation. Evaluation 2016; 22:342–60.

Mclnerney M, Simon K. The effect of state workers’ compensation program changes on the use of federal social security disability insurance. Ind Relations 2012;51:57–88.

Microsoft Corporation. Microsoft excel 2016. Redmond: Microsoft Corporation, 2018.

Molnar A, O’Campo P, Ng E, Mitchell C, Muntaner C, Renahy E, St John A, Shankardass K. Protocol: realist synthesis of the impact of unemployment insurance policies on poverty and health. Eval Program Plan 2015:48.1–9.

Murgatroyd DF, Casey PP, Cameron ID, Harris IA. The effect of financial compensation status influence clinical judgments? J Occup Rehabil 2015;25:267–78.

Sinnott P, Administrative delays and chronic disability in patients with acute occupational low back injury. J Occup Environ Med 2009;51: 690–9.

Steensma IA, Busse JW, Talusso D, Davilmar A, Lee H, Furlan AD, Amick B III, Hogg-Johnson S. Predicting time on prolonged benefits for injured workers with acute back pain. J Occup Rehabil 2015;25:267–78.

Steensna IA, Munhall C, Irvin E, Oranye N, Passmore S, Van Eerd D, Mahood Q, Hogg-Johnson S. Systematic review of prognostic factors for return to work in workers with sub acute and chronic low back pain. J Occup Rehabil 2017;27:369–81.

Steensna IA, Verbeek JH, Heymants MW, Bongers PM. Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: a systematic review of the literature. Occup Environ Med 2005;62: 851–60.

Stockenhedal M, Kjaer P, Hartvigsen J, Kongsted A, Aaboee J, Andersen M, Andersen MO, Fouirier G, Hagaard B, Jensen M, Jensen L, Karbo T, Kimby O, Melbye M, Morsel-Carlsen L, Nordsteen J, Palisson R, Tust F, Rost Silbye P, Vaagholt M. National Clinical Guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy. Eur Spine J 2017;26:60–75.

The European Commission. Mutual information system on social protection (MISSOC). 2018 Available at: https://www.missoc.org/. Accessed June 15, 2018.

United States of America Social Security Administration (SSA). Social security programs throughout the world. 2017. Available at: https://www.ssa.gov/policy/docs/progdesc/ssptw/. Accessed February 5, 2018.

Walker BF, Muller R, Grant WD. Low back pain in Australian adults: the economic burden. Asa Pac J Public Health 2003;15:79–87.

Wasiak R, Kim J, Pransky G. Work disability and costs caused by recurrence of low back pain: longer and more costly than in first episodes. Spine (Phila Pa 1976) 2006;31:219–25.

Wasiak R, McNeeely E. Utilization and costs of chiropractic care for work-related low back injuries: do payment policies make a difference? Spine J 2006;6:146–53.

Watson PJ, Main CJ. Influence of benefit type on presenting characteristics and outcome from an occupationally oriented rehabilitation programme for unemployed people with chronic low back pain [corrected] [published erratum appears in PHYSIOTHERAPY 2004 Jun;90(2):110]. Physiotherapy 2004;90:4–11.

Webster BS, Bauer AZ, Choi Y, Cifuentes M, Pransky GS. Liatrogenic consequences of early magnetic resonance imaging in acute, work-related, disabling low back pain. Spine (Phila Pa 1976) 2013;38: 1039–46.

Webster BS, Choi Y, Bauer AZ, Cifuentes M, Pransky G. The cascade of medical services and associated longitudinal costs due to nonadherent magnetic resonance imaging for low back pain. Spine (Phila Pa 1976) 2014;39:1433–40.

Webster BS, Cifuentes M. Relationship of early magnetic resonance imaging for work-related acute low back pain with disability and medical utilization outcomes. J Occup Environ Med 2010;52:900–7.

Webster BS, Cifuentes M, Verma S, Pransky G. Geographic variation in opioid prescribing for acute, work-related, low back pain and associated factors: a multilevel analysis. Am J Ind Med 2009;52:162–71.

Werner EL, Cote P. Low back pain and determinants of sickness absence. Eur J Gen Pract 2009;15:74–9.

Westhorp G. Realist impact evaluation: an introduction. London: CDI Research and Policy in Development, Australian Government Department of Foreign Affairs and Trade, 2014.

Westhorp G. Understanding mechanisms in realist evaluation and research. In: Doing realist research, Emmel N, editor. London: SAGE Publications Ltd, 2018. p. 41–58.

Wickizer TM, Franklin G, Fulton-Kehoe D, Gluck J, Mootz R, Smith-Weller Z, Frost Silbye P, Vaagholt M. National Clinical Guidelines for non-surgical treatment of workers with acute back pain. J Occup Rehabil 2017;27:369–81.

Wong JJ, McGregor M, Mior SA, Loisel P. Examination of the relationship between theory-driven policies and allowed lost-time back claims in workers’ compensation health care: a population-based study. Med Care 2011;49:1055–60.

Wong G, Greenhalgh T, Westhorp G, Buckingham J, Pawson R. RAMES publication standards: realist syntheses. J Adv Nurs 2013; 69:1005–22.

Wong G, Greenhalgh T, Westhorp G, Pawson R. RAMESES project on disability standards for realist synthesis. London, 2014.

Wong G, Westhorp G, Pawson R, Greenhalgh T. Realist synthesis—RAMESES training materials. London: University of London, 2013.

Wong JJ, McGregor M, Mior SA, Loisel P. Examination of the relationship between theory-driven policies and allowed lost-time back claims in workers’ compensation health care: a population-based study. J Manipulative Physiol Ther 2014;37:7–21.

Young AE, Wasiak R, Gross DP. Recurrence of work-related low back pain and disability: association between self-report and workers’ compensation data. Spine (Phila Pa 1976) 2013;38:2279–86.