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# Comparing Outcomes for Injured Workers in Virginia, 2016 Interviews

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# SUMMARY OF MAJOR FINDINGS FOR VIRGINIA

This study updates interstate comparisons of the key outcomes achieved by injured workers in Virginia and 14 other states.[1] It reflects a multiyear effort by the Workers Compensation Research Institute (WCRI) to collect and examine data on the outcomes of medical care achieved by injured workers in a growing number of states. The outcomes we examine in this study include:

- Recovery of physical health and functioning
- Return to work
- Earnings recovery
- Access to medical care
- Satisfaction with medical care

Virginia data underlying these comparisons are from 2016 interviews of workers injured in 2013.[2] Table A provides interstate comparisons of key case-mix adjusted outcomes across 15 states.[3] We also indicate whether or not the Virginia value was higher, somewhat higher, similar, somewhat lower, or lower compared with the median[4] of the 15 states.[5] The thresholds we used to arrive at these characterizations are detailed in Chapter 2.

## KEY FINDINGS FOR VIRGINIA

Virginia workers reported outcomes that were in the middle of the range of outcomes observed in the study states on most measures, while they also reported a somewhat higher rate of earnings losses.

***Recovery of physical health and functioning:*** We found that the average recovery of physical health and functioning was similar across the 15 states in our study.

***Return to work:*** Injured workers in Virginia reported rates of return to work that were similar to the median study state. Fourteen percent of Virginia workers with more than seven days of lost time reported never returning to work for at least a one-month period predominantly due to the injury as of three years

[1] The 15 states included in this study are Arkansas, Connecticut, Florida, Georgia, Indiana, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, North Carolina, Pennsylvania, Tennessee, Virginia, and Wisconsin.

[2] In 2016 we conducted interviews with injured workers in six states—Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin. These workers were injured in 2013.

[3] Table A provides a subset of outcome measures in 15 states that represent the core metrics of importance to policymakers and stakeholders seeking to improve the performance of their systems for both injured workers and employers. Chapter 3 provides several other outcome measures.

[4] The median value reflects the observation in the middle of the distribution of the variable. In this case it means that half of the states are above this value and half of the states are below this value.

[5] States are characterized as *higher*, *somewhat higher*, *similar*, *lower*, or *somewhat lower* depending on whether the difference between the state and the median of the study states is meaningful from both policy and statistical perspectives. Details of the thresholds used for these characterizations are provided in Table 2.3. States that are not characterized as higher or lower are also referred to as *in the middle of the range of states* or *typical of the study states.*

postinjury, and 17 percent reported no substantial return to work within one year of the injury.[6] In the median state, these figures were also 14 percent and 17 percent, respectively. Note that 18 percent of Virginia workers responded that they had a second absence from work due to the same injury, similar to the median study state. The percentage of workers who responded that they returned to work too soon was similar to what was observed in the median study state.

The median Virginia worker had a substantial return to work about 12 weeks after the injury.[7] This measure was in the middle of the range of study states.

***Earnings recovery:***[8] Eight percent of injured workers in Virginia reported earning "a lot less" at the time of the interview compared with the time of the injury. This was similar to what we observed in the median of the study states (8 percent).

***Access to medical care:*** Seventeen percent of injured workers in Virginia reported that they had "big problems" getting the services that they or their provider wanted. This was similar to what we observed in a typical study state. Fourteen percent of Virginia workers reported "big problems" getting the primary provider they wanted. This was also similar to the median state, but somewhat lower or lower than five other states in our analysis.

***Satisfaction with medical care:*** About three out of four Virginia workers said that they were "somewhat" or "very" satisfied with their overall workers' compensation medical care (78 percent). However, 14 percent said that they were "very dissatisfied." This was in the middle of the range of states in our analysis.

***Changes in key outcomes between 2013 and 2016 interviews:*** The prior edition of this study was based on 2013 interviews of Virginia workers injured in 2010.[9] Outcomes reported by Virginia workers injured in 2013 (and interviewed in 2016) were similar to the outcomes reported by Virginia workers injured in 2010 (and interviewed in 2013).[10] We observed similar recovery of health and functioning, similar rates of return to work, similar rates of problems getting desired providers and services, similar rates of earning "a lot less" at the time of the interview, and similar rates of satisfaction with overall care, after adjusting for differences in case mix.

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[6] In this study, we use the term *substantial return to work* to refer to workers who returned to work and remained working for at least a month before any subsequent absence from work. We are not saying that working for at least a month is substantial but that working for a month is more substantial than a typical return to work not lasting for at least a month.

[7] We did not report the average duration of time before substantial return to work because it is substantially skewed by long duration among workers who did not experience substantial return to work within three years after the injury.

[8] Other WCRI studies have examined earnings losses and earnings recovery after injuries using administrative information on workers' earnings (e.g., Boden and Galizzi, 1998, 1999, and 2003).

[9] See Savych and Thumula (2016n). The characterization of Virginia remains unchanged for all measures reported in Table A.

[10] Table 4.1 shows how the main outcomes presented in Table A for Virginia changed between injury years 2010 and 2013.

**Table A Key Outcomes in Virginia and Other Study States, Case-Mix Adjusted**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | | VA Compared with 15-State Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Recovery of physical health and functioning**[a] | | | | | | | | | | | | | | | | |
| Improvement in health status from injury to interview | AR | GA | KY | FL | IA | TN | IN | NC | **VA** | MI | WI | MA | MN | PA | CT | |
| | 17 | 17 | 18 | 18 | 18 | 18 | 18 | 18 | **18** | 18 | 18 | 19 | 19 | 19 | 20 | Similar |
| **Return to work (as of 3 years postinjury)** | | | | | | | | | | | | | | | | |
| Percentage never returned to work due to injury | IN | WI | MN | IA | **VA** | NC | CT | MI | AR | PA | FL | TN | KY | MA | GA | |
| | 7% | 8% | 8% | 8% | **10%** | 10% | 10% | 10% | 11% | 11% | 11% | 11% | 13% | 13% | 15% | Similar |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | IN | MN | MI | WI | CT | FL | TN | IA | **VA** | NC | AR | PA | MA | KY | GA | |
| | 10% | 10% | 12% | 12% | 12% | 13% | 14% | 14% | **14%** | 14% | 15% | 15% | 15% | 17% | 18% | Similar |
| Time from injury to first substantial return to work (median weeks)[c] | CT | MN | AR | WI | IA | MA | TN | NC | IN | FL | **VA** | PA | KY | GA | MI | |
| | 9 | 9 | 9 | 9 | 10 | 10 | 11 | 11 | 12 | 12 | **12** | 12 | 13 | 13 | 13 | Similar |
| **Earnings recovery** | | | | | | | | | | | | | | | | |
| Percentage who reported earning "a lot less" due to injury at the time of interview | KY | PA | IN | AR | CT | NC | IA | MI | WI | **VA** | MA | TN | MN | FL | GA | |
| | 6% | 6% | 7% | 8% | 8% | 8% | 8% | 8% | 8% | **8%** | 8% | 9% | 9% | 10% | 11% | Similar |
| **Access to health care** | | | | | | | | | | | | | | | | |
| *Problems getting desired medical services* | | | | | | | | | | | | | | | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | PA | WI | MA | CT | TN | **VA** | AR | MN | MI | IA | GA | NC | IN | KY | FL | |
| | 12% | 13% | 14% | 15% | 16% | **17%** | 17% | 17% | 17% | 18% | 18% | 18% | 18% | 18% | 21% | Similar |
| *Problems getting desired provider* | | | | | | | | | | | | | | | | |
| Percentage reporting "big problems" getting the primary provider they wanted | WI | MN | MA | KY | PA | CT | **VA** | MI | GA | AR | IN | TN | IA | FL | NC | |
| | 10% | 11% | 12% | 13% | 13% | 14% | **14%** | 15% | 16% | 16% | 18% | 18% | 19% | 19% | 21% | Similar |
| **Satisfaction with health care** | | | | | | | | | | | | | | | | |
| *Satisfaction with overall care* | | | | | | | | | | | | | | | | |
| Percentage who were "somewhat" or "very" satisfied | FL | GA | IN | TN | NC | IA | MI | AR | MN | **VA** | PA | CT | KY | MA | WI | |
| | 71% | 73% | 73% | 74% | 74% | 75% | 75% | 76% | 77% | **78%** | 79% | 80% | 80% | 81% | 82% | Similar[c] |
| Percentage who were "very dissatisfied" | WI | MA | KY | CT | PA | **VA** | MN | AR | MI | IA | NC | TN | IN | GA | FL | |
| | 11% | 12% | 13% | 13% | 14% | **14%** | 15% | 16% | 16% | 17% | 17% | 17% | 18% | 18% | 20% | Similar[c] |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher, higher, somewhat lower,* or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3. Details on statistical significance are provided in Table TA.C5.

States in the table are shown in ascending order of the value of each measure.

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from injury to the time of the interview.

[c] The value does not meet the policy importance threshold, although the difference is statistically significant.

# 1

# INTRODUCTION

Two key dimensions of the performance of workers' compensation systems are (1) the postinjury outcomes achieved by injured workers and (2) the costs paid by employers. Information about the costs paid by employers is generally available to policymakers when legislative changes are considered. Objective measures of worker outcomes are less frequently available, leaving policymakers to fill in the blanks with anecdotes. This study fills this void by measuring the following worker outcomes:

- Recovery of physical health and functioning
- Return to work
- Earnings recovery
- Access to medical care
- Satisfaction with medical care

This study updates interstate comparisons of worker outcomes across 15 states.[1] This helps policymakers and system stakeholders benchmark the performance of different state systems in order to identify and prioritize opportunities to improve system performance. The study is a reflection of an ongoing, multiyear effort by the Workers Compensation Research Institute (WCRI) to collect and examine data on outcomes of injured workers.

To accomplish this objective, we performed several phases of data collection across different states:

- Phase 1: Eight states (Indiana, Massachusetts, Michigan, Minnesota, North Carolina, Pennsylvania, Virginia, and Wisconsin)
- Phase 2: Four states (Iowa, Arkansas, Connecticut, and Tennessee)
- Phase 3: Three states (Florida, Georgia, and Kentucky)
- Phase 4: Six of eight states that were initially included in Phase 1 (Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin)[2]

In subsequent phases, we plan to collect data from new states and revisit states from earlier phases that had significant system reforms in order to measure the impact of those reforms on worker outcomes.

Apart from benchmarking system performance, the measures of worker outcomes can also be used to accomplish a number of other objectives. For instance, in past studies we identified factors that may help public officials, payors, and health care providers to better predict which cases are more likely to have poorer

[1] See Savych and Thumula (2016a–o) for the prior edition of interstate comparisons of worker outcomes.

[2] Minnesota and Pennsylvania will be included in subsequent phases.

outcomes.[3] Furthermore, future studies will also evaluate the impact of selected reforms on worker outcomes by measuring outcomes before and after those reforms.

## ORGANIZATION OF THIS REPORT

The rest of this report is organized as follows. Chapter 2 summarizes the data and methods used, providing information about the survey process, the sample, representativeness, response rates, and response biases. It also details criteria for comparing states on worker outcomes.

Chapter 3 reports worker outcome measures for Virginia and 14 other states. It shows outcomes after adjusting for a number of important differences between states in the mix of cases that enter workers' compensation systems.[4]

Chapter 4 examines how outcomes in Virginia changed between 2010 and 2013 injuries (interviews with injured workers in 2013 and 2016, respectively).

Chapter 5 discusses policy interpretations and implications of the comparisons presented in this report.

The technical appendices provide additional information about data and methods.

[3] See Savych, Thumula, and Victor (2014a–d and 2015a–d) and Thumula, Savych, and Victor (2014a–d).

[4] Readers interested in unadjusted outcome measures in Virginia may refer to the databook available at https://www.wcrinet.org/images/uploads/files/VA_databook16.pdf.

# 2

# DATA AND METHODS

This chapter provides a brief overview of the survey methodology and the approaches used to analyze the data. In addition, the chapter presents information on the validity and plausibility of the survey results—data cleaning and representativeness. This chapter also defines key concepts and criteria used for comparing states on worker outcomes that will be used throughout subsequent chapters.

## KEY CONCEPTS

We use the terms defined here frequently in this report. The reader should become familiar with these definitions before reading Chapters 3 or 4 and may want to refer back to this section when reading those chapters. Careful review of these definitions will help the reader understand key concepts and results presented in the study.

**Claim:** All claims in the study involved more than seven days of lost time. Each claim in the sample received an income benefit payment and medical care paid for under workers' compensation. The case may have been compensable or may have had compensability in dispute but received a settlement payment to resolve that dispute. Claims filed that received no payments were not included.

**Earnings losses; earnings recovery:** The worker's report of whether he or she earned "a lot less" at the time of the interview compared with his or her preinjury earnings. Workers who returned to work were asked if they were earning more, the same, or less than before the injury. If a worker said "less," they were asked if it was "a lot less" or "a little less." Workers who earned the same or more were considered to have recovered to the level of their preinjury earnings—hence we describe this as *earnings recovery*.

**Recovery of health and functioning:** The estimated difference between the worker's self-reported health status (as measured by responses to the SF-12v2® instrument) just after the injury and at the time of the interview (about three years after the injury).

**Injury severity:** The estimated difference between the worker's self-reported health status (SF-12v2® score) before the injury and just after the injury.

**Primary provider:** The medical professional who, according to the worker, made the decisions about the care that the worker needed and either provided that care or directed the worker to someone who could provide it.

**Substantial return to work:** The worker returned to work and remained working for at least a month before any subsequent absence from work. This measure is intended to exclude very brief periods of return to work, which are typically included in empirical studies of return to work.

**Worker (respondent):** The person who sustained the work injury and was surveyed to provide information for this study.

## SURVEY DATA AND METHODS

The outcomes reported in this study are based on telephone interviews with 8,515 injured workers from 15 states (including 416 Virginia workers injured in 2013 and 443 Virginia workers injured in 2010) using a structured survey instrument.[1] The interviews were conducted by Mathematica Policy Research (MPR). Workers who suffered a workplace injury in 2010 in eight states (Indiana, Massachusetts, Michigan, Minnesota, North Carolina, Pennsylvania, Virginia, and Wisconsin) were interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee who were injured in 2011 were interviewed in 2014. Arkansas workers who were injured in 2010 and 2011 were interviewed in 2014.[2] Workers in Florida, Georgia, and Kentucky who were injured in 2012 were interviewed in 2015. In 2016, we revisited six of the first eight states and interviewed workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin who were injured in 2013.

In this study, we have a diverse set of 15 states that represent states across the spectrum of medical and indemnity costs. These 15 states also differ from each other on other various dimensions, including provider choice, fee schedules, utilization review, determinants of indemnity benefits, limits on indemnity benefits, approaches for compensating permanent consequences of injury, dispute resolution approaches, and level of attorney involvement.[3] This study is an ongoing effort, and we plan to include more states in subsequent phases.

The surveys were conducted, on average, about three years after these workers sustained their injuries.[4] Interviewing workers several years after their injuries allows us to better measure the intermediate-term consequences of the injury—impacts not discernible earlier in the life of the claim. In particular, it allows us to better assess the recovery of health and functioning and return-to-work outcomes.

We started with initial samples of about 1,600 workers per state. The sampled claims all involved workers with more than seven days of lost time. These claims were from both insured and self-insured employers. In Connecticut, Indiana, Michigan, Minnesota, Pennsylvania, Tennessee, Virginia, and Wisconsin, state agencies provided the workers' names and the contact information we needed to draw the sample. In Arkansas, Florida, Georgia, Iowa, Kentucky, Massachusetts, and North Carolina, the state agency requested that WCRI obtain data from insurers and employers to draw the sample. We oversampled *more financially serious* cases because they occur less often. The criteria for *more financially serious* was the amount paid or incurred for each claim or duration of temporary disability payments.[5] And we weighted the responses in each stratum[6] to

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[1] A copy of the survey can be found at https://www.wcrinet.org/images/uploads/files/wcri_sample_2014_survey.pdf.

[2] Because Arkansas is a smaller state, we had to sample workers injured in 2010 and 2011 in order to get a similar number of completed surveys as in other states.

[3] Readers interested in learning more about system features in study states may refer to other WCRI publications, including the workers' compensation laws and medical cost containment national inventories (WCRI and IAIABC, 2012, 2014, and 2016; Tanabe, 2011, 2013, and 2015).

[4] Average duration from the injury to interview: Arkansas (3.3 years), Connecticut (2.9), Florida (2.9), Georgia (2.9), Indiana (2.8), Iowa (2.9), Kentucky (3.0), Massachusetts (2.8), Michigan (2.9), Minnesota (2.9), North Carolina (2.8), Pennsylvania (2.8), Tennessee (2.9), Virginia (3.0), and Wisconsin (2.8). Note that the interviews could have occurred from 29 to 52 months from the date of injury in Arkansas and from 29 to 40 months from the date of injury in the other 14 states. For example, in Indiana the injury dates are from February through September 2010, and the interviews were conducted between March and May 2013, so the interviews could have occurred from 30 to 40 months from the date of injury. We tested whether the outcomes reported varied with the time between the injury and the interview and found no significant differences. See Technical Appendix D for more details.

[5] Claims were considered to be *more* financially serious when there were more than 20 weeks of temporary disability payments or incurred indemnity benefits were over $6,000 for 2010 injuries evaluated as of March 2011. The incurred indemnity benefits threshold was adjusted for inflation for subsequent injury years.

[6] *Stratum* defines a group of injured workers with selected characteristics from which we draw a random sample of cases.

represent the percentages of *more* and *less* financially serious claims in the state. This weighting helps ensure that respondents in each state reflect the overall sample of claims with more than seven days of lost time. We applied an additional stratum of weighting to bring the average medical cost of the respondents in line with the average medical cost of all injured workers with more than seven days of lost time in two states.[7] Before this adjustment, respondents, on average, had 22 and 29 percent higher medical costs per claim than the population of injured workers in Michigan (2013 injuries) and Minnesota (2010 injuries).[8] The differences were less than 20 percent or not statistically significant in other survey states.

Readers can refer to Technical Appendix A for detailed documentation of the survey process, samples, response rates, and data cleaning.

#### REPRESENTATIVENESS OF RESPONDENTS

The response rates varied from 25 to 31 percent across the 15 states.[9] To assess representativeness of the respondents, we did two sets of comparisons:

- We compared the characteristics and claim costs of workers who responded to the survey with state-level values.[10]
- We compared the characteristics and claim costs of workers who responded to the survey with those in the sample who did not respond, either because they were not contacted or refused to be interviewed.

Table 2.1 and Table TA.A6 in Technical Appendix A show the similarities and differences in characteristics of workers, their injuries, and their claims.[11] These tables show that the survey respondents were reasonably representative of the population of injured workers in each state on almost all measures.[12]

[7] Differences in medical costs could arise from differences in the severity of the injury, the nature of providers used, and the attributes of the workers that influence the demand for medical care, in addition to a variety of other factors. Therefore, if we do not correct for these differences by reweighting, we may be at a risk of over- or understating the outcomes related to these factors.

[8] The estimates of average medical costs for the statewide population are from a large administrative claims database at WCRI. For Minnesota workers injured in 2010, we observed that the difference in the average medical cost between respondents and the overall state was more pronounced in the *less* financially serious stratum. Therefore, we further categorized the *less* financially serious claims into claims with medical payments of less than or equal to $10,000 and medical payments of more than $10,000. We then weighted the responses by bringing the proportion of respondents in the three groups—the *more* financially serious and the two *less* financially serious groups of claims—in line with the proportion of claims in Minnesota. For Michigan workers injured in 2013, we observed large differences between respondents and the overall state in both the *less* and *more* financially serious strata. We categorized claims in each stratum into two groups depending on whether their medical payments were higher or lower than the median medical payment across all Michigan claims in the stratum. We then weighted the responses by bringing the proportion of respondents in the four groups in line with the proportion of claims in Michigan. After weighting, the average medical cost per claim among respondents in these two states was similar to that in the statewide population.

[9] We computed the overall response rate by dividing the number of completed surveys by the number of sampled cases. The response rates were 30 percent in Arkansas; 30 percent in Connecticut; 25 percent in Florida; 26 percent in Georgia; 31 and 30 percent in Indiana for 2010 and 2013 injuries, respectively; 31 percent in Iowa; 26 percent in Kentucky; 25 and 26 percent in Massachusetts for 2010 and 2013 injuries; 31 percent in Michigan for both 2010 and 2013 injuries; 28 percent in Minnesota; 26 and 25 percent in North Carolina for 2010 and 2013 injuries; 26 percent in Pennsylvania; 30 percent in Tennessee; 25 and 26 percent in Virginia for 2010 and 2013 injuries; and 31 and 30 percent in Wisconsin for 2010 and 2013 injuries.

[10] The state-level estimates come from a large claims database at WCRI that contains 45–66 percent of the claims in each state. The state-level values for average medical cost per claim and average indemnity cost per claim were externally validated against reports from the insurance rating bureaus in each state (Telles, 2013).

[11] For brevity, Table 2.1 includes the comparisons for Virginia workers injured in 2013 and interviewed in 2016. Table TA.A6 in Technical Appendix A provides the representativeness results for all other states and injury years included in this study.

[12] In Table 2.1, we note if the respondents are significantly different from the population on a measure at the 5 percent significance level with an asterisk (*).

Compared with the population of injured workers in their respective states, the respondents were similar in many attributes. Respondents were slightly different in terms of age (slightly older), tenure (slightly longer job tenure), marital status (fewer single), and wages (slightly higher) in a majority of states. There were small differences in the industry mix of respondents compared with the state mix. The tables also suggest that in many states, respondents generally had somewhat more serious injuries—more fractures, fewer lacerations and contusions, and higher surgery rates than the general population of injured workers. As we mentioned in the previous section, respondents in Michigan (injury year 2013) and Minnesota (injury year 2010) had 22 and 29 percent higher medical costs per claim than the statewide population. Medical costs and surgery rates tend to reflect differences in the severity of the injury, the nature of providers used, and the attributes of the workers that influence the demand for medical care, in addition to a variety of other factors. Therefore, in states where survey respondents had substantially higher medical costs and/or surgery rates than the average for the state population, one may expect that the average injury severity might be higher for the state sample and that the outcomes related to injury severity may be overstated. Therefore, we weighted the data in Michigan and Minnesota to make the average medical costs of respondents comparable to the statewide population. Average medical costs of respondents were also 14–15 percent higher than the statewide population in Wisconsin (injury year 2010), Indiana (injury year 2013), and Virginia (injury year 2013). In Connecticut, Florida, Georgia, Kentucky, Massachusetts, and North Carolina, the average permanent partial disability (PPD)/lump-sum payment per claim for the respondents was lower than the state average. We tested whether weighting the data to bring the surgery rate and the average medical and PPD/lump-sum payment of the respondents in line with the claim population in these states affects the measured values of worker outcomes. We reestimated the outcomes by reweighting the data and observed that the reweighted estimates were very similar to the outcomes reported in this study.[13] In the end, we decided not to weight the data on surgery rates, medical payments, and PPD/lump-sum payments.

#### REFUSALS AND RESPONSE BIAS

Table 2.2 and Table TA.A7 reinforce the conclusion that those who refused to be interviewed generally had similar demographic and claim characteristics to those who agreed to be surveyed. The differences between respondents and refusals were not statistically significant at the 5 percent significance level,[14] with very few exceptions.

#### INVALID PHONE NUMBERS AND RESPONSE BIAS

We were hardly surprised to find that not every telephone number yielded a usable interview because people move from time to time. Invalid phone numbers are inevitable when conducting a survey of injured workers nearly three years after their injuries occurred. We found that 16–41 percent of workers we sampled had invalid phone numbers at the time of interview.

Workers for whom we had invalid phone numbers had personal and/or claim characteristics that

[13] The differences with and without reweighting were within 1 percentage point on all measures across all states.

[14] Some tables in this analysis present statistical significance levels for certain findings. For example, in the bias tests in Table 2.2, we look for evidence that those who refused to be interviewed had different demographic characteristics from those who agreed to be surveyed. In particular, we examine whether any differences were due to chance or because of a true difference between the two groups. Statistical methods are designed to determine the likelihood that the observed difference between the cases could have occurred just because of a sampling variation. If this probability is lower than a specified threshold (e.g., 5 percent), the finding is said to be statistically significant at that level.

suggested they had less severe injuries and were more likely to relocate than respondents. Their paid medical costs were 8–29 percent lower than those of respondents in all 15 states (see Table 2.2 and Table TA.A7). In most states, workers with invalid phone numbers were somewhat more likely to have lacerations and contusions (less severe injuries) and less likely to have had surgery. They were more likely than respondents to be single, tended to be slightly younger, and had lower preinjury wages and less tenure on the job.

We did not adjust for the differences in claim characteristics between workers with invalid phone numbers and respondents because (1) respondents are representative of the population of claims in each state and (2) we compare worker outcomes across states after controlling for these characteristics.

**Table 2.1 Analysis of Representativeness Based on Administrative Claims Data in Virginia**

| | Virginia 2013/2015 | | |
|---|---|---|---|
| | **Average for State** | **Average for Sample** | **Respondents** |
| **Worker characteristics** | | | |
| Age (mean years) | 43 | 43 | 46* |
| Female (percentage of claims) | 38 | 36 | 42 |
| Single (percentage of claims) | 51 | 48* | 43* |
| Tenure with employer (mean years) | 6 | 6 | 7* |
| Weekly wage (mean) | $705 | $709 | $737 |
| **Industry (percentage of claims)** | | | |
| Manufacturing | 12 | 14 | 15 |
| Construction | 10 | 11 | 8 |
| Clerical/professional | 7 | 10* | 10* |
| Trade | 18 | 16* | 17 |
| High-risk services | 28 | 28 | 28 |
| Low-risk services | 15 | 14 | 17 |
| Other | 9 | 8 | 5* |
| **Type of injury (percentage of claims)** | | | |
| Neurologic spine pain | 7 | 7 | 6 |
| Back and neck sprains, strains, and non-specific pain | 15 | 14 | 13 |
| Fractures | 12 | 14* | 16* |
| Lacerations and contusions | 12 | 12 | 10 |
| Inflammations | 7 | 6 | 8 |
| Other sprains and strains | 25 | 25 | 25 |
| Upper extremity neurologic (carpal tunnel) | 0 | 0 | 0 |
| Other injuries | 22 | 22 | 22 |
| **Claim costs and characteristics** | | | |
| Medical payment (mean) | $17,162 | $16,837 | $19,619* |
| Indemnity payment (mean) | $10,672 | $9,682* | $9,842 |
| Open claims (percentage of claims) | 26 | 22* | 26 |
| PPD or lump-sum payment (percentage of claims) | 15 | 15 | 15 |
| Lump-sum payment (percentage of claims) | 12 | 12 | 10 |
| Defense attorney involved (percentage of claims) | 23 | 22 | 21 |
| Vocational rehabilitation services (percentage of claims) | 4 | 3 | 4 |
| PPD or lump-sum payment (mean) | $25,705 | $22,635* | $22,170 |
| Lump-sum payment (mean) | $30,732 | $26,429* | $26,873 |
| Duration of temporary disability (mean weeks) | 15 | 14 | 15 |
| **Type of medical treatment received (percentage of claims)** | | | |
| Major surgery | 31 | 30 | 33 |
| Chiropractic care | 1 | 1 | 1 |

*Notes:* Underlying data come from the WCRI Detailed Benchmark/Evaluation (DBE) database. All values are for claims with more than seven days of lost time. 2013/2015 refers to workers injured in 2013 and evaluated as of March 2015. The DBE contains 45–66 percent of the claims in each state. The state-level values for average medical cost per claim and average indemnity cost per claim were externally validated against reports from the insurance rating bureaus in each state (Telles, 2013).

* Different from the state average at the 5 percent significance level.

*Key:* PPD: permanent partial disability.

**Table 2.2 Analysis of Response Bias Based on Administrative Claims Data in Virginia**

| | Virginia 2013/2015 | | |
|---|---|---|---|
| | **Respondents** | **Refusals** | **Invalid Phone Number** |
| **Worker characteristics** | | | |
| Age (mean years) | 46 | 47 | 41* |
| Female (percentage of claims) | 42 | 33* | 32* |
| Single (percentage of claims) | 43 | 45 | 52* |
| Tenure with employer (mean years) | 7 | 7 | 5* |
| Weekly wage (mean) | $737 | $763 | $633* |
| **Industry (percentage of claims)** | | | |
| Manufacturing | 15 | 15 | 14 |
| Construction | 8 | 9 | 13* |
| Clerical/professional | 10 | 16 | 7 |
| Trade | 17 | 14 | 15 |
| High-risk services | 28 | 24 | 32 |
| Low-risk services | 17 | 14 | 12 |
| Other | 5 | 8 | 7 |
| **Type of injury (percentage of claims)** | | | |
| Neurologic spine pain | 6 | 10 | 5 |
| Back and neck sprains, strains, and non-specific pain | 13 | 9 | 16 |
| Fractures | 16 | 14 | 14 |
| Lacerations and contusions | 10 | 11 | 15* |
| Inflammations | 8 | 2* | 6 |
| Other sprains and strains | 25 | 26 | 23 |
| Upper extremity neurologic (carpal tunnel) | 0 | 0 | 0 |
| Other injuries | 22 | 27 | 21 |
| **Claim costs and characteristics** | | | |
| Medical payment (mean) | $19,619 | $14,999* | $14,827* |
| Indemnity payment (mean) | $9,842 | $8,741 | $10,452 |
| Open claims (percentage of claims) | 26 | 18* | 20* |
| PPD or lump-sum payment (percentage of claims) | 15 | 10 | 17 |
| Lump-sum payment (percentage of claims) | 10 | 7 | 15 |
| Defense attorney involved (percentage of claims) | 21 | 15 | 25 |
| Vocational rehabilitation services (percentage of claims) | 4 | 1 | 3 |
| PPD or lump-sum payment (mean) | $22,170 | $24,894 | $26,561 |
| Lump-sum payment (mean) | $26,873 | $30,148 | $30,128 |
| Duration of temporary disability (mean weeks) | 15 | 13 | 14 |
| **Type of medical treatment received (percentage of claims)** | | | |
| Major surgery | 33 | 32 | 26* |
| Chiropractic care | 1 | 1 | 1 |

*Notes:* Underlying data come from the WCRI Detailed Benchmark/Evaluation (DBE) database. All values are for claims with more than seven days of lost time. 2013/2015 refers to workers injured in 2013 and evaluated as of March 2015.

* Different from the respondents at the 5 percent significance level.

*Key:* PPD: permanent partial disability.

## MEASURING HEALTH STATUS, RECOVERY, AND INJURY SEVERITY

In this section, we provide a brief discussion of how we measure physical health and functioning and whether the metrics are valid. Readers can refer to Technical Appendix B for a more thorough discussion of the measurement of health status.

In the survey, workers were asked the questions from the 12-Item Short Form Health Survey, Version 2 (SF-12v2®) about their physical health. The SF-12v2® is one of the most widely used tools to measure the health status of an individual.[15] The physical questions include a mix of questions about general health and specific limitations on function. The answers to the questions are combined into a scaled score from 0 to 100. A higher score indicates better health. The scores are scaled so that the average score in the population is 50.[16]

Examples of the questions about physical health include:

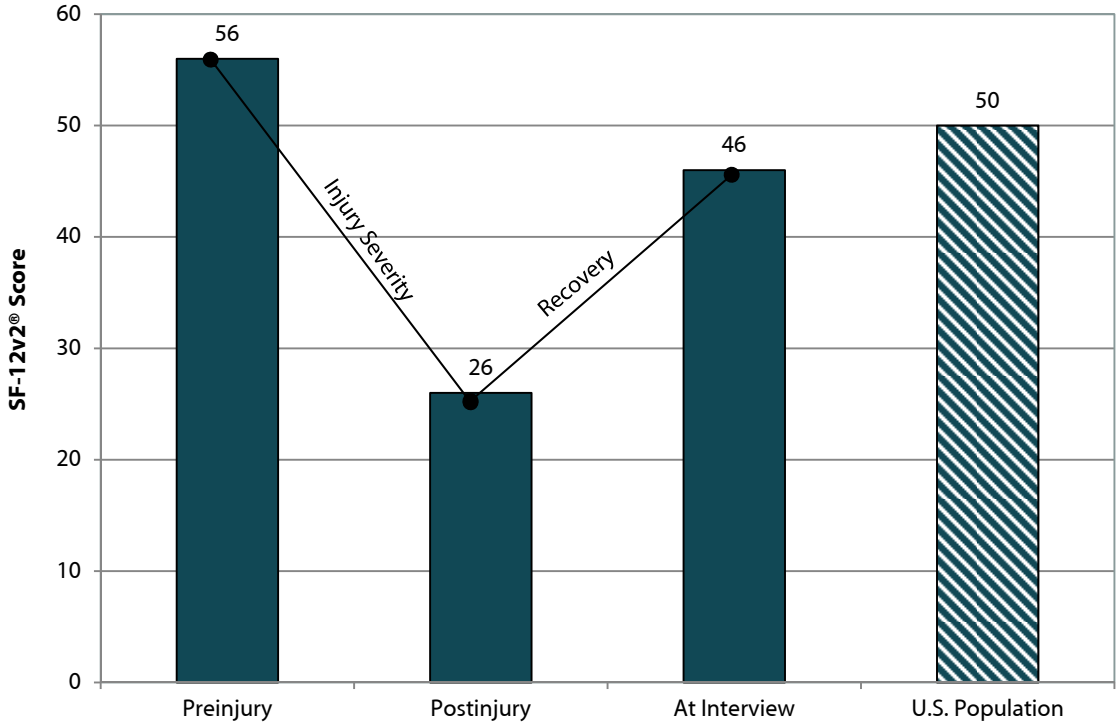
- Does your health limit you in moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?
  - Yes, limited a lot
  - Yes, limited a little
  - No, not at all
- Does your health limit you in climbing several flights of stairs?
- In the past four weeks, did you accomplish less than you would have liked at work or at home because of your health?

Workers were asked the SF-12v2® questions about three points in time. They were asked to recall their health in the four weeks prior to their injuries and in the week after their injuries, and they were asked the same questions about their health at the time of the interview. Figure 2.1 shows how we construct measures of injury severity and recovery from injury. The measure of preinjury health and functioning grounds our understanding of the measures of severity and recovery. The difference between the worker's preinjury health status (SF-12v2® score) and health status after the injury provides the measure of severity. The difference between the worker's health status after the injury and at the time of the interview (about three years after the injury) is the measure of the worker's recovery.

[15] For more information about the SF-12v2® and its widespread use and acceptance, see https://campaign.optum.com/optum-outcomes/what-we-do.html.

[16] It is also scaled so that each 10 points represents one standard deviation in the distribution of scores.

**Figure 2.1 Illustration of How We Measure Severity and Recovery**




*Notes:* Underlying data for the preinjury, postinjury, and at-interview scores in this figure are the sample of Indiana workers injured in 2010 and interviewed in 2013. Similar scores were seen in the other 14 states. All workers surveyed experienced more than seven days of lost time. SF-12v2® scores range from 0 to 100. A higher score indicates better health. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

*Source:* Figure for average of U.S. population is from Ware, Keller, and Kosinski (1998).

The physical health and functioning outcome measures showed plausible patterns. The following are a few examples of how the workers' responses were consistent with expectations:

- The average preinjury scaled scores for physical health and functioning were consistent across the 15 study states (56–58 points) and higher than average for the general U.S. population (50 points). One would expect an employed population to have higher scores than the general U.S. population. These scores were similar to the average SF-12® score in a study of a "healthy" population.[17]
- The average postinjury scores were lower than the preinjury scores (reflecting injury severity), and the average at-interview scores were higher than the postinjury scores (reflecting some recovery). Since not all workers achieve full recovery, we expected (and found) that the state average score at interview was below the average score prior to the injury. This does not mean that all workers at the time of the interview had a lower health and functioning score than at the time before the injury—some workers may have fully recovered and their pre- and postinjury health scores may be similar, while other workers may have not fully recovered.[18]

[17] A special study of a "healthy" British population, defined as persons with no longstanding illness, found that the average SF-12® score was 55 (Airey et al., 1999, tab. 3.12).

[18] Note that it is not appropriate to divide the measure of average recovery by the measure of average severity to determine the percentage of health and functioning that workers recovered. Both of these measures are derived by taking the difference of a scaled score at different points in time. See Technical Appendix B for more details about how the injury severity and recovery measures are constructed.

- One would expect to see higher medical costs for workers who reported more severe injuries. We observed that medical costs increased with medical severity. When compared with workers with less than 25 points of severity, the mean and median medical costs of workers who had severity between 25 and 39 points were 24 and 31 percent higher, respectively. Workers with reported severity of 40 points or over had 61 percent higher average medical costs and 62 percent higher median medical costs than those with less than 25 points of severity.[19]

## METHODS TO OBTAIN REGRESSION ADJUSTED OUTCOMES

The basic approach underlying our comparisons of outcomes in Chapters 3 and 4 is a statistical technique that controls for differences in demographic, injury, workplace, and local area characteristics across states and over time.[20] A full and detailed explanation of the statistical models used for this analysis and the full set of regression results are included in Technical Appendices C and D. These methods are widely used in health services research to control for underlying differences in case mix that could be associated with higher or lower outcomes.[21] For example, we know from previous studies that older workers face more difficulty in returning to work than do younger workers. If, for example, there were substantially more older workers in Wisconsin than in Massachusetts, we might observe that fewer workers returned to work in Wisconsin than in Massachusetts when the difference was due largely to the difference in the average age of respondents in the two states.

Essentially, we want our comparisons of outcomes to be based on a similar group of respondents, and we want our assessment of differences in outcomes to be a reflection of differences in state system features rather than a reflection of differences in the underlying characteristics of the respondents.[22] We control for age, gender, marital status, education, interview language, tenure, wage, part-time status, firm size, industry, metro or non-metro location, county unemployment rate, preinjury health status, comorbidities, injury severity, injury type, trust in the workplace, state, and injury year.[23] Some of these variables are derived from administrative records, while others are observed only in workers' responses to the survey (for details, see Table TA.C2).

For a more detailed description of the data and methods used in this study, please refer to the technical appendices—survey data and methods (Technical Appendix A), measurement of physical health and functioning (Technical Appendix B), details of regression adjustment of outcomes (Technical Appendix C), and regression estimates (Technical Appendix D).

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[19] Pooling data across the 15 states and injury years, we observed that the average medical cost per claim for workers with less than 25 points of severity, 25 to 40 points, and 40 points or higher was $11,709, $14,474, and $18,841, respectively. The median medical cost per claim for the three groups was $6,287, $8,207, and $10,164, respectively.

[20] Outcomes that are not adjusted for these characteristics are provided in a databook that can be accessed at https://www.wcrinet.org/images/uploads/files/VA_databook16.pdf.

[21] By *case mix* we refer to the distribution of demographic, injury, workplace, and local area characteristics. We use the term case mix for convenience and do not mean that we controlled only for worker characteristics.

[22] Analysis states differ from each other on many dimensions of workers' compensation system features, including provider choice, fee schedules, utilization review, determinants of indemnity benefits, limits on indemnity benefits, approaches for compensating permanent consequences of injury, and dispute resolution approaches. Readers interested in learning more about system features in study states may refer to other WCRI publications, including the workers' compensation laws and medical cost containment national inventories (WCRI and IAIABC, 2012, 2014, and 2016; Tanabe, 2011, 2013, and 2015).

[23] State-year dummies mainly reflect differences across states and time in system features and cultural norms, as well as other state-year-specific variables that we did not control for in the regression.

## CRITERIA FOR COMPARING STATES ON WORKER OUTCOMES

We characterize an individual state's performance by comparing its outcomes to the median of the study states or to other states. We often use the terms *higher, somewhat higher*, *lower, somewhat lower*, and *typical* or *similar* for such comparisons.[24] These terms are summarized in Table 2.3. States are characterized as *higher* or *lower* (including *somewhat higher* and *somewhat lower*) if the difference between the state and the median of the 15 study states satisfies two conditions: (1) the difference is large enough to be meaningful from the policy perspective (i.e., greater than a pre-determined threshold that we chose for the variable), and (2) the difference is significant from the statistical perspective.[25] For instance, for measures expressed in percentage terms, *higher* means 5 or more percentage points above the median, *somewhat higher* means 3 to 4 percentage points above the median, *lower* means 5 or more percentage points below the median, *somewhat lower* means 3 to 4 percentage points below the median, and *similar* means within 3 percentage points above or below the median state's value. We used 5- and 10-point thresholds for recovery measures[26] and two- and four-week thresholds for the time from injury to first substantial return to work (Table 2.3). We used similar thresholds for comparisons of outcomes reported by workers injured in 2010 and 2013.

Our choice of thresholds for these comparisons reflects our desire to highlight differences between the state and the median (or a neighboring state) and changes over time that are meaningful. We realize that these specific thresholds may not satisfy the needs of all system stakeholders. If the states differ by 3 or 4 percentage points, some policymakers may consider the differences to be meaningful and some may not. The choice may also depend on the underlying variation in measures across the 15 states. If the measure varies from 7 to 15 percent, a 3 percentage point difference is unlikely to be perceived as insignificant from a policy perspective. Since we provide specific estimates for each of the states, readers can apply their own thresholds that they view as appropriate for each of the measures.

We typically found that when two measures are different from the policy perspective (i.e., the difference is greater than a threshold of 3 percentage points), they are also different from the statistical perspective. For instance, 10 percent of workers in Minnesota did not achieve a substantial return to work within three years after the injury. This was lower than what we found in a typical study state (14 percent). This difference is meaningful from the policy perspective (4 percentage points lower) and significant from the statistical perspective.

However, there are two reasons why we characterize a state as similar to the median state even though the differences meet the thresholds in Table 2.3. First, these differences are sometimes not statistically significant at the 10 percent significance level. Note that those differences may still be statistically significant at a different statistical significance level. Second, the differences presented in tables may be smaller than our threshold due to rounding. What appears as a 3 percentage point difference in rounded numbers may be a 2.5 percentage

[24] Note that we use the following phrases interchangeably to refer to states that are not characterized as higher or lower in this report—*similar to the median state* or *in the middle of the range of states* or *typical of the study states.*

[25] Any differences between states that are not statistically significant at the 10 percent level are characterized in our tables as *similar.* The reader should remember that differences that are not statistically significant in this analysis might be significant in an analysis with a larger sample size.

[26] We characterized states within 5 points above or below the median state's recovery score as similar in this study. Our choice was driven by the consideration that SF-12® scores are scaled so that each 5 points represents one-half of a standard deviation in the distribution of scores and because a 5 point difference in scores was suggested as a minimally important difference in SF-12® and SF-36® scores following certain diagnoses and interventions. For example, Clement, MacDonald, and Simpson (2014) identified that the minimal clinically important difference in the physical component of the SF-12® score was 4.5 after a total knee arthroplasty. Angst, Aeschlimann, and Stucki (2001) found that the minimal clinically important difference ranged from 3.3 to 5.3 points on the physical function dimension and 7.2 to 7.8 points on the bodily pain dimension in patients with osteoarthritis.

point difference in underlying estimates. We identify both of these types of occurrences with notes in our tables, and we provide detailed information for making our comparisons in Table TA.C5.[27]

We sometimes also observe that a 1 or 2 percentage point difference between the state and median values is statistically significant at the 10 percent significance level. We do not want to highlight such comparisons since they may not be meaningful from the policy perspective—a 1 percentage point difference in rates of return to work may not justify a different policy approach. In those cases we call the two measures similar. Detailed information used to construct characterizations of differences across states is provided in Table TA.C5.

**Table 2.3 Terms We Use to Describe a State's Performance**

| Multistate Values | Comparison with Median State or Other States | | |
|---|---|---|---|
| | **Percentage Measures (e.g., % "very dissatisfied" with overall care)** | **Recovery of Physical Health and Functioning[a]** | **Time from Injury to First Substantial Return to Work (median weeks)** |
| Higher | 5 or more percentage points above median/other state | 10 or more points of SF-12v2® score above median/other state | 4 or more weeks above median/other state |
| Somewhat higher | 3 to 4 percentage points above median/other state | 5 to 9 points of SF-12v2® score above median/other state | 2 to 3 weeks above median/other state |
| Lower | 5 or more percentage points below median/other state | 10 or more points of SF-12v2® score below median/other state | 4 or more weeks below median/other state |
| Somewhat lower | 3 to 4 percentage points below median/other state | 5 to 9 points of SF-12v2® score below median/other state | 2 to 3 weeks below median/other state |
| Typical or similar | Within 3 percentage points from median/other state | Within 5 points of SF-12v2® score of median/other state | Within 2 weeks from median/other state |

[a] Increase in the SF-12v2® score from the week after the injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[27] Table TA.C5 provides the statistical significance levels from tests of difference between outcomes for Virginia and the 15-state median. These tests examine whether the differences were due to chance or because of a true difference between the two groups. Statistical methods are designed to determine the likelihood that the observed difference between the cases could have occurred just because of sampling variation. If this probability is lower than a specified threshold (e.g., 10 percent), the finding is said to be statistically significant at that level.

# 3

# WORKER OUTCOMES IN VIRGINIA

This chapter provides a comparison of worker outcomes across 15 study states, including Virginia. Virginia data underlying these comparisons are from 2016 interviews of workers injured in 2013.[1] We examine the key outcomes that policymakers commonly seek to measure:

- Recovery of physical health and functioning
- Return to work
- Earnings recovery
- Access to medical care
- Satisfaction with medical care

We also present several measures that provide state-specific context behind some of the worker outcome measures presented above.

These worker outcome measures, when combined with measures of cost and other metrics, give policymakers and system stakeholders powerful information about system performance. Other WCRI studies supplement information presented in this study by examining, among other things, medical costs, system litigiousness, timeliness of payment (see Savych, 2016a and 2017), medical prices (Yang and Fomenko, 2016), and prices for outpatient surgeries (Fomenko and Yang, 2016; Savych, 2016b).

## RECOVERY OF HEALTH AND FUNCTIONING

Table 3.1 compares the average self-reported preinjury health and functioning score, as well as self-reported severity and recovery scores, of injured workers in Virginia with the values in the 14 other states as well as the median state.[2]

- Average physical health and functioning before the injury did not vary much across the 15 states in our study—it was between 56 and 58 points of the SF-12v2® score.
- Average injury severity was also similar across all 15 states. It varied between 28 and 32 points of the SF-12v2® score.
- Average recovery of physical health and functioning was also similar among these 15 states. The average

[1] In 2016 we conducted interviews with injured workers in six states—Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin. These workers were injured in 2013.

[2] Severity and recovery scores were constructed based on workers' responses to SF-12v2® questions asked about three points in time. The difference between the worker's health status (SF-12v2® score) before the injury and after the injury provides the measure of severity. The difference between the worker's health status after the injury and at the time of the interview (about three years after the injury) is the measure of the worker's recovery. Readers can refer to Chapter 2 and Technical Appendix B for a more thorough discussion of the measurement of health status, severity, and recovery.

recovery score in Virginia was in the middle of the range of the study states at 18 (scores ranged from 17 to 20; a higher score means better recovery).

**Table 3.1 Average Injury Severity and Recovery of Health and Functioning in 15 States**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | | VA Compared with 15-State Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mean SF-12v2® Physical Health and Functioning Score[a]** | | | | | | | | | | | | | | | | |
| Preinjury health and functioning score | MN | CT | WI | PA | NC | IA | AR | TN | IN | KY | **VA** | FL | MI | MA | GA | |
| | 56 | 56 | 56 | 56 | 56 | 57 | 57 | 57 | 57 | 57 | **57** | 57 | 58 | 58 | 58 | Similar |
| Injury severity (more negative is more severe) | CT | IA | WI | MN | PA | AR | TN | NC | MA | IN | GA | **VA** | MI | KY | FL | |
| | -28 | -28 | -28 | -29 | -30 | -30 | -30 | -30 | -31 | -31 | -31 | **-31** | -32 | -32 | -32 | Similar |
| Recovery of health and functioning (more positive is better recovery) | AR | GA | KY | FL | IA | TN | IN | NC | **VA** | MI | WI | MA | MN | PA | CT | |
| | 17 | 17 | 18 | 18 | 18 | 18 | 18 | 18 | **18** | 18 | 18 | 19 | 19 | 19 | 20 | Similar |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time.

Measures of preinjury health and functioning and injury severity are not case-mix adjusted. The measure of recovery of health and functioning is case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher, higher, somewhat lower,* or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3. Details on statistical significance are provided in Table TA.C5.

[a] SF-12v2® scores range from 0 to 100. A higher score indicates better health. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

## RETURN TO WORK

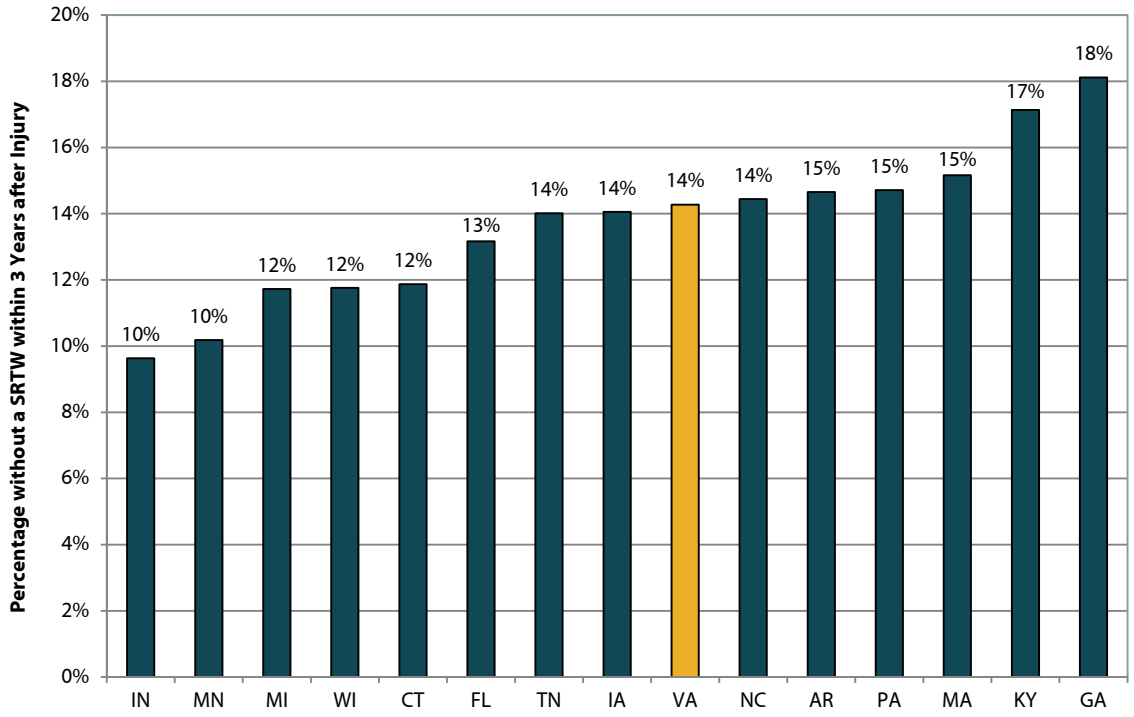
A commonly expressed goal of workers' compensation systems is to return injured workers promptly to employment. This section discusses multiple measures designed to capture various aspects of return to work that may be relevant to policymakers and stakeholders across states. One of these measures captures the percentage of workers who had a return to work. However, a prompt return to work may not meet the goals of the workers' compensation system if the worker is unable to remain in his/her job for longer than a brief period. To address this concern, we asked workers about the sustainability of their first return to work—whether they returned to work for at least one month.[3] We then asked those who had returned to work for at least a month whether they had any subsequent work absences that were due to their injuries, and whether they returned to work too soon. This section also shows the time between the injury and when workers were able to achieve a return to work that lasted at least a month.

Fourteen percent of workers in Virginia reported not having a substantial return to work predominantly due to the injury, which was in the middle of the range of the study states (Figure 3.1). There were large differences (10–18 percent) among the states in the share of workers who either never returned to work or

[3] We do not mean to imply that one month back at work implies a successful return to work. We use this to distinguish from the conventional measure—any return to work, however brief. Certainly, one could consider other periods as indicators of a meaningful and sustained period of return to work. Had we selected a longer or shorter period, the proportion of persons responding that they were unable to return to work due to their injuries would have been greater or smaller, respectively.

returned to work but never worked for at least a month predominantly due to the injury.[4] Compared with Virginia, two states (Indiana and Minnesota) had a somewhat lower proportion of workers without substantial return to work.[5] A similar proportion of workers reported not having a substantial return to work in all other study states.

**Figure 3.1 Percentage of Workers Who Never Returned to Work or Returned to Work but Never Sustained Employment for at Least a Month Due to the Injury**




*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

*Key:* SRTW: substantial return to work.

- Table 3.2 highlights several other dimensions of return-to-work outcomes:
  - Thirteen percent of workers in Virginia reported not working at the time of the interview (on average about three years after the injury) due to injury. This was similar to the median of the study states. Across the study states, between 11 and 16 percent of workers reported not working at the time of the interview.
  - Ten percent of Virginia workers reported that they had never returned to work predominantly due to their injuries. This was similar to the median study state.

[4] In this study, we use the term *substantial return to work* to refer to workers who returned to work and remained working for at least a month before any subsequent absence from work. We are not saying that working for at least a month is substantial but that working for a month is more substantial than a typical return to work not lasting for at least a month.

[5] As we show in Table TA.C6, the differences between Virginia and these states are also statistically significant.

**Table 3.2 Additional Return-to-Work Outcomes in Virginia and Other Study States, Case-Mix Adjusted**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | | VA Compared with 15-State Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Return to work (as of 3 years postinjury)** | | | | | | | | | | | | | | | | |
| Percentage not working at interview due to injury | MN | WI | IN | IA | **VA** | MI | FL | NC | CT | TN | AR | MA | PA | KY | GA | |
| | 11% | 11% | 12% | 13% | **13%** | 13% | 14% | 15% | 15% | 15% | 16% | 16% | 16% | 16% | 16% | Similar |
| Percentage never returned to work due to injury | IN | WI | MN | IA | **VA** | NC | CT | MI | AR | PA | FL | TN | KY | MA | GA | |
| | 7% | 8% | 8% | 8% | **10%** | 10% | 10% | 10% | 11% | 11% | 11% | 11% | 13% | 13% | 15% | Similar |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | IN | MN | MI | WI | CT | FL | TN | IA | **VA** | NC | AR | PA | MA | KY | GA | |
| | 10% | 10% | 12% | 12% | 12% | 13% | 14% | 14% | **14%** | 14% | 15% | 15% | 15% | 17% | 18% | Similar |
| Time from injury to first substantial return to work (median weeks)[b] | CT | MN | AR | WI | IA | MA | TN | NC | IN | FL | **VA** | PA | KY | GA | MI | |
| | 9 | 9 | 9 | 9 | 10 | 10 | 11 | 11 | 12 | 12 | **12** | 12 | 13 | 13 | 13 | Similar |
| Percentage with no substantial return to work 1 year postinjury due to injury | IN | MN | WI | CT | IA | MI | FL | MA | PA | **VA** | AR | TN | NC | KY | GA | |
| | 11% | 12% | 13% | 14% | 15% | 16% | 16% | 17% | 17% | **17%** | 17% | 17% | 18% | 20% | 22% | Similar |
| **Among workers with return to work that lasted at least a month** | | | | | | | | | | | | | | | | |
| Percentage with substantial return to work who had second absences due to the same injury | MA | NC | AR | WI | FL | IA | PA | GA | TN | IN | MI | **VA** | KY | MN | CT | |
| | 13% | 13% | 13% | 14% | 14% | 14% | 14% | 16% | 16% | 16% | 16% | **18%** | 18% | 18% | 19% | Similar |
| Percentage reporting that they returned to work too soon | FL | GA | NC | TN | MA | **VA** | CT | KY | MN | PA | MI | AR | WI | IA | IN | |
| | 31% | 36% | 37% | 37% | 38% | **39%** | 39% | 39% | 39% | 40% | 41% | 41% | 42% | 43% | 45% | Similar |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher*, *higher*, *somewhat lower*, or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3. Details on statistical significance are provided in Table TA.C5.

[a] For workers who did not have a substantial return to work at the time of the interview, we assigned duration equal to the number of weeks between the injury and the interview.

We further asked those who had returned to work for at least a month whether they had any subsequent work absences that were due to their injuries and whether they felt that they returned to work too soon (Table 3.2).

- Of those who had a substantial return to work in Virginia, 18 percent had a second absence from work due to the same injury—in the middle of the range of the study states. In other states this measure ranged from 13 to 19 percent.
- Thirty-nine percent of workers in Virginia who had a substantial return to work reported that they returned to work too soon, which was similar to what was observed in the median of the 15 states. Across all states, we found that workers who had a second absence were much more likely to indicate that they had returned to work too soon after their injuries—66 percent of workers across the 15 study states who had a second absence responded that they returned to work too soon, compared with 35 percent of those who did not have a second absence.

Another set of return-to-work measures pertains to the speed at which injured workers were able to return to work. The speed of return to work should be related to the time required for the worker to heal sufficiently and for an opportunity to arise to return to work (at the preinjury job or another job). The specific outcome measures for speed of first substantial return to work are the median time from injury to

substantial return to work (Table 3.2) and the distribution of weeks from injury to return to work among those with substantial return to work (Table 3.3).

- Virginia was in the middle group of states on the measure of time before substantial return to work—a typical worker took 12 weeks before substantial return to work (Table 3.2). Five study states (Connecticut, Minnesota, Arkansas, Wisconsin, and Iowa) had a lower duration of time before substantial return to work.[6]
- In Virginia, 23 percent of workers with a substantial return to work had at least three months away from work. Across other states, between 16 and 27 percent of workers who had a substantial return to work spent at least three months away from work (Table 3.3).

**Table 3.3 Distribution of Speed of Initial Return to Work for Those Who Returned to Work and Remained Working for at Least a Month**

| | MN | WI | AR | IA | CT | FL | MA | TN | IN | NC | PA | VA | GA | KY | MI | High | Low | Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **% of workers by duration from injury to initial return to work that lasted at least a month (among those with such a return to work)** | | | | | | | | | | | | | | | | | | |
| < 5 weeks | 51% | 48% | 48% | 47% | 46% | 44% | 44% | 43% | 42% | 41% | 40% | **39%** | 38% | 36% | 34% | 51% | 34% | 43% |
| 5 weeks to < 3 months | 34% | 35% | 35% | 36% | 36% | 36% | 36% | 37% | 37% | 37% | 38% | **38%** | 38% | 39% | 39% | 39% | 34% | 37% |
| 3 months to < 6 months | 9% | 10% | 10% | 10% | 11% | 11% | 11% | 12% | 12% | 12% | 13% | **13%** | 13% | 14% | 15% | 15% | 9% | 12% |
| 6 months to < 1 year | 5% | 5% | 5% | 5% | 6% | 6% | 6% | 6% | 6% | 7% | 7% | **7%** | 8% | 8% | 9% | 9% | 5% | 6% |
| 1 year or longer | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 3% | 3% | **3%** | 3% | 3% | 4% | 4% | 2% | 2% |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

Sorted by increasing percentage of workers with five or more weeks before substantial return to work.

The surveys also provide information for stakeholders interested in examining whether injured workers in their states were able to go back to their preinjury employers and their preinjury jobs or whether they had to look for a new employer (Table 3.4). These measures provide state-specific context for the outcomes presented in the report and are not case-mix adjusted. The measures are based on responses of those workers who had a substantial return to work.

- Among Virginia workers who returned to work and remained working for at least a month, 26 percent had different job duties at the at-injury employer or a new employer predominantly due to the injury (Table 3.4).

[6] As we show in Table TA.C6, the differences between Virginia and these states are also statistically significant.

**Table 3.4 Workers Changing Employers or Duties at the Time of Return to Work**

| | Virginia | 15 Study States | | |
|---|---|---|---|---|
| | | High | Low | Median |
| **Among those who returned to work and remained working for at least a month:** | | | | |
| Changed employer due to injury | 7% | 10% | 2% | 5% |
| Had different occupation or job duties at the at-injury employer or new employer due to injury | 26% | 37% | 19% | 26% |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time.

Measures presented in this table are not adjusted for differences in case mix. These measures provide state-specific context to measures provided in other tables and are not the focus of interstate comparisons.

## EARNINGS RECOVERY

The surveys inquired about workers' earnings losses by asking workers whether they were earning "a lot less" than their preinjury earnings predominantly due to the injury. Note that workers were given three choices in the survey—"more," "less," or "the same." If they said "less," they were asked if it was "a little less" or "a lot less."[7]

- In Virginia, 8 percent of workers reported that their earnings at the time of the interview were "a lot less" than their earnings at the time of the injury, predominantly due to the injury. This was similar to what we observed in the median of the study states (8 percent). Note that for the majority of states we did not find much variation in this measure—in most states, between 7 and 9 percent of workers reported earning "a lot less" at the time of the interview (Table 3.5).

**Table 3.5 Earnings Recovery in 15 States**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | | VA Compared with 15-State Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Percentage who reported earning "a lot less" due to injury at the time of interview | KY | PA | IN | AR | CT | NC | IA | MI | WI | **VA** | MA | TN | MN | FL | GA | |
| | 6% | 6% | 7% | 8% | 8% | 8% | 8% | 8% | 8% | **8%** | 8% | 9% | 9% | 10% | 11% | Similar |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher*, *higher*, *somewhat lower*, or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3. Details on statistical significance are provided in Table TA.C5.

[7] In this report, we present the percentage of workers who reported earning "a lot less" at the time of the interview predominantly due to their injuries because of the policy interest in workers who might have suffered the largest earnings losses.

## ACCESS TO CARE

Access to care is another worker outcome measure important to system stakeholders. We measure access to care by asking workers whether they had problems getting the care they or their primary provider wanted. Workers were given three choices to answer whether they had problems getting the care they or their primary provider wanted: "no problems," "small problems," or "big problems." Although the majority of workers in our study states reported "no problems" getting the care they or their primary provider wanted (Table 3.6), a substantial number of workers reported having "big problems" getting desired services.

- In Virginia, 17 percent of workers reported "big problems" getting the care that they or their primary provider wanted. This result was in the middle of the range of states studied. It was lower than what was observed in Florida, where 21 percent of workers reported having "big problems" accessing services. In contrast, 12–13 percent of workers in Pennsylvania and Wisconsin reported having "big problems."[8]

**Table 3.6 Access to Care in Virginia and Other Study States, Case-Mix Adjusted**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | | VA Compared with 15-State Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Problems getting desired medical services** | | | | | | | | | | | | | | | | |
| Percentage reporting "no problems" getting services they or their primary provider wanted | FL | KY | IN | NC | GA | IA | MI | MN | AR | **VA** | TN | CT | MA | WI | PA | |
| | 65% | 68% | 68% | 68% | 69% | 69% | 70% | 70% | 70% | **71%** | 71% | 72% | 74% | 77% | 77% | Similar |
| Percentage reporting "big problems" getting services they or their primary provider wanted | PA | WI | MA | CT | TN | **VA** | AR | MN | MI | IA | GA | NC | IN | KY | FL | |
| | 12% | 13% | 14% | 15% | 16% | **17%** | 17% | 17% | 17% | 18% | 18% | 18% | 18% | 18% | 21% | Similar |
| **Problems getting desired provider** | | | | | | | | | | | | | | | | |
| Percentage reporting "no problems" getting the primary provider they wanted | NC | FL | IA | TN | IN | AR | GA | MI | **VA** | CT | PA | KY | MA | MN | WI | |
| | 67% | 69% | 70% | 71% | 71% | 74% | 74% | 76% | **76%** | 77% | 78% | 78% | 80% | 81% | 83% | Similar |
| Percentage reporting "big problems" getting the primary provider they wanted | WI | MN | MA | KY | PA | CT | **VA** | MI | GA | AR | IN | TN | IA | FL | NC | |
| | 10% | 11% | 12% | 13% | 13% | 14% | **14%** | 15% | 16% | 16% | 18% | 18% | 19% | 19% | 21% | Similar |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher*, *higher*, *somewhat lower*, or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3. Details on statistical significance are provided in Table TA.C5.

Table 3.6a provides additional context for understanding the reasons behind workers' responses about problems getting desired medical services in Virginia. Most commonly, workers who reported "big problems" getting desired medical services responded that the employer or insurer did not want this care provided.[9] We cannot determine how often the care in question was "necessary" and how often it was discouraged because it was "unnecessary."

[8] As we show in Table TA.C6, the differences between Virginia and these three states are statistically significant.

[9] In this section, we present the reasons reported by workers who had "big problems" getting the care that they or their primary provider wanted. We made this choice because the issues faced by workers with bigger access problems might be of greater policy interest.

**Table 3.6a Reasons for "Big Problems" Getting Desired Medical Services (among those who reported "big problems")**

| | Virginia | 15 Study States | | |
|---|---|---|---|---|
| | | High | Low | Median |
| **Among those who reported "big problems" getting desired medical services:** | | | | |
| Employer or insurer did not want the care provided | 43% | 56% | 25% | 50% |
| Medical professional was not willing to give the care | 39% | 39% | 6% | 26% |
| There was difficulty in diagnosing the condition | 21% | 27% | 12% | 21% |
| Medical professional was not willing to send worker to a specialist | 20% | 22% | 3% | 15% |
| Worker could not get an appointment soon enough | 9% | 16% | 2% | 7% |
| Travel was too difficult to arrange | 6% | 9% | 1% | 5% |
| All other reasons | 23% | 31% | 11% | 22% |

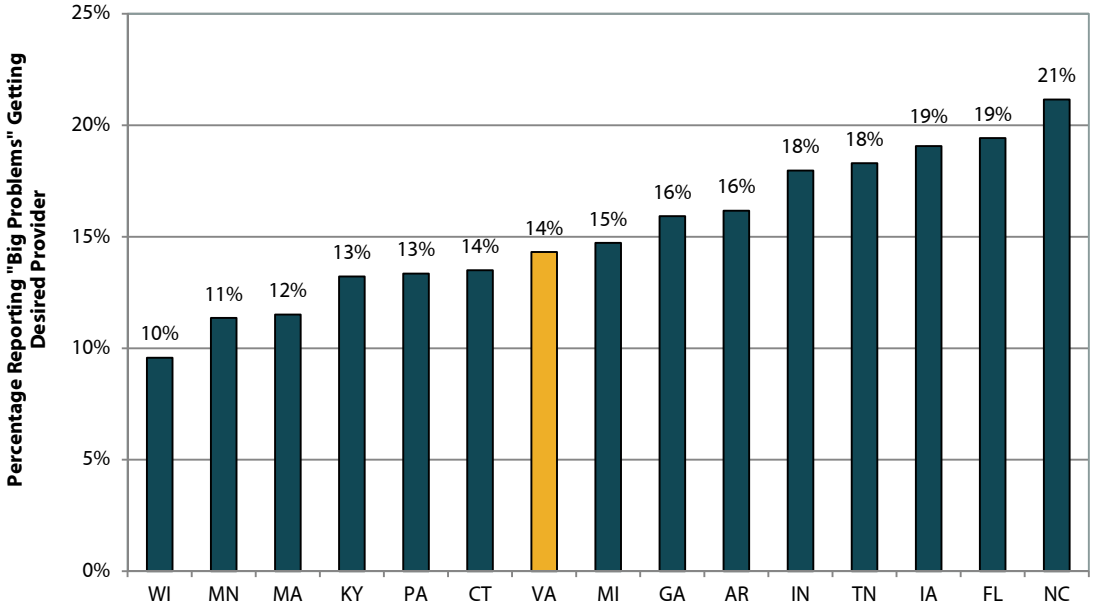
*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Not adjusted for differences in case mix.

Workers could choose multiple responses; therefore, the estimates may not add up to 100.

Unadjusted outcomes are reported because this table shows the types of concerns expressed by injured workers in each state, and the focus is not on interstate comparisons.

Fourteen percent of workers in Virginia reported "big problems" getting the primary provider that they wanted (Figure 3.2 and Table 3.6). This outcome was similar to what we observed in the median of the study states. This measure was somewhat higher than what was reported by injured workers in Wisconsin, although it was lower or somewhat lower than in five of the states in our analysis (Indiana, Tennessee, Iowa, Florida, and North Carolina).

**Figure 3.2 Percentage of Workers Reporting "Big Problems" Getting Desired Primary Provider**




*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

When asked about reasons for their responses, the majority of workers who reported "big problems" getting their desired primary provider responded that the employer or insurer discouraged the worker from using the medical provider they wanted (Table 3.6b).

**Table 3.6b Reasons for "Big Problems" Getting Desired Medical Provider (among those who reported "big problems")**

| | Virginia | 15 Study States | | |
|---|---|---|---|---|
| | | High | Low | Median |
| **Among those who reported "big problems" getting their desired primary provider:** | | | | |
| Employer or insurer discouraged worker from using the desired medical provider | 67% | 67% | 47% | 57% |
| Worker could not get an appointment soon enough | 9% | 17% | 5% | 13% |
| Travel was too difficult to arrange | 5% | 14% | 4% | 6% |
| Medical professional would not take workers' compensation patients | 5% | 12% | 1% | 4% |
| Medical professional was not taking new patients | 1% | 2% | 1% | 1% |
| All other reasons | 32% | 48% | 23% | 33% |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Not adjusted for differences in case mix.

Workers could choose multiple responses; therefore, the estimates may not add up to 100.

Unadjusted outcomes are reported because this table shows the types of concerns expressed by injured workers in each state, and the focus is not on interstate comparisons.

## SATISFACTION WITH CARE

The overwhelming majority of workers reported being "somewhat" or "very" satisfied with their health care—71–82 percent of workers in the 15 study states. Virginia was in the middle group of states on this measure (78 percent) (Table 3.7).

In Virginia, 14 percent of workers reported being "very dissatisfied" with overall care. Responses for this measure varied across states—somewhat fewer workers in Wisconsin (11 percent) reported being "very dissatisfied," while a somewhat higher or higher percentage of workers in North Carolina, Tennessee, Indiana, Georgia, and Florida were "very dissatisfied" with care compared with Virginia.

Many workers also expressed satisfaction with their primary provider—83 percent in Virginia and 78–88 percent of workers across the study states.

Compared with the typical study state, a lower percentage of workers in Virginia wanted to change their initial provider due to dissatisfaction with care.

**Table 3.7 Satisfaction with Overall Care and Primary Providers**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | | VA Compared with 15-State Median |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Satisfaction with health care** | | | | | | | | | | | | | | | | |
| *Satisfaction with overall care* | | | | | | | | | | | | | | | | |
| | FL | GA | IN | TN | NC | IA | MI | AR | MN | **VA** | PA | CT | KY | MA | WI | |
| Percentage who were "somewhat" or "very" satisfied | 71% | 73% | 73% | 74% | 74% | 75% | 75% | 76% | 77% | **78%** | 79% | 80% | 80% | 81% | 82% | Similar[a] |
| | WI | MA | KY | CT | PA | **VA** | MN | AR | MI | IA | NC | TN | IN | GA | FL | |
| Percentage who were "very dissatisfied" | 11% | 12% | 13% | 13% | 14% | **14%** | 15% | 16% | 16% | 17% | 17% | 17% | 18% | 18% | 20% | Similar[a] |
| **Satisfaction with primary provider** | | | | | | | | | | | | | | | | |
| | IA | FL | PA | GA | AR | NC | TN | **VA** | IN | MI | MN | CT | KY | MA | WI | |
| Percentage who were "somewhat" or "very" satisfied | 78% | 78% | 79% | 80% | 80% | 81% | 81% | **83%** | 83% | 84% | 85% | 86% | 86% | 88% | 88% | Similar |
| | WI | MA | KY | CT | MN | MI | IN | **VA** | TN | NC | AR | GA | PA | FL | IA | |
| Percentage who were "very dissatisfied" | 7% | 8% | 9% | 9% | 9% | 10% | 11% | **11%** | 12% | 13% | 13% | 13% | 14% | 14% | 15% | Similar |
| **Percentage ever wanting to change provider because of dissatisfaction with care** | | | | | | | | | | | | | | | | |
| | MA | WI | **VA** | MN | KY | MI | CT | IN | GA | FL | TN | PA | NC | IA | AR | |
| Initial provider | 17% | 20% | **20%** | 21% | 23% | 24% | 26% | 27% | 27% | 27% | 27% | 27% | 28% | 29% | 30% | Lower |
| | MA | IN | KY | CT | MN | WI | NC | MI | GA | IA | AR | **VA** | PA | TN | FL | |
| Primary, non-initial provider[b] | 12% | 13% | 14% | 15% | 16% | 17% | 17% | 18% | 21% | 21% | 21% | **22%** | 24% | 26% | 26% | Similar[c] |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher*, *higher*, *somewhat lower*, or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3. Details on statistical significance are provided in Table TA.C5.

[a] The value does not meet the policy importance threshold, although the difference is statistically significant.

[b] Among workers with a primary, non-initial provider.

[c] The difference from the 15-state median is not statistically significant at the 10 percent level.

# 4

# EXPLORING CHANGES IN OUTCOMES BETWEEN 2010 AND 2013

This chapter examines how outcomes of injured workers in Virginia changed between injury years 2010 and 2013. Workers were interviewed in 2013 and 2016, respectively. We examine changes in outcomes while accounting for differences in the mix of cases between the years. The results are based on the regression models that are presented in Technical Appendix D.

Table 4.1 shows how the key outcomes presented in this report for Virginia changed between injury years 2010 and 2013.[1] In particular, it shows the differences in the predicted outcomes and characterizes these changes as similar, higher, or lower using the approach outlined in Chapter 2.

We found that the outcomes reported by Virginia workers did not change between the 2010 and 2013 samples. Virginia workers injured in 2013, when compared with those injured in 2010, reported similar recovery of physical health and functioning, similar rates of return to work, similar percentages of workers reporting "big problems" getting the primary provider that they wanted and services they or their primary provider wanted, similar rates of earning "a lot less" at the time of the interview, and similar rates of satisfaction with overall care.

Virginia and other study states experienced changes in economic conditions during the study period, including reductions in the unemployment rate and increases in wages. Note that the changes highlighted in this report control for these changes as detailed in Chapter 2. We are not aware of any substantial changes in workers' compensation policies over this period in Virginia.

We do not examine how the trends in outcomes for Virginia compare with those for other states. Since we only have information on the trends on outcomes for six states, analysis of the differential trends may be premature. We plan to examine such comparisons when we have trend results for a greater number of states.

[1] Table TA.C8 shows the p-value of the tests of the difference in outcome measures for injury years 2010 and 2013.

**Table 4.1 Comparing Change in Case-Mix Adjusted Outcomes in Virginia between 2010 and 2013**

| | Change from 2010 to 2013 | Characterization of the Difference between 2010 and 2013 |
|---|---|---|
| **Recovery of physical health and functioning**[a] | | |
| Improvement in health status from injury to interview | -0.4 | Similar |
| **Return to work (as of 3 years postinjury)** | | |
| Percentage never returned to work due to injury | -0.8 | Similar |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | 1.6 | Similar |
| Time from injury to first substantial return to work (median weeks)[b] | 0.9 | Similar |
| **Earnings recovery** | | |
| Percentage who reported earning "a lot less" due to injury at the time of the interview | 2.5 | Similar |
| **Access to health care** | | |
| *Problems getting desired medical services* | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | 0.5 | Similar |
| *Problems getting desired medical provider* | | |
| Percentage reporting "big problems" getting the primary provider they wanted | 1.5 | Similar |
| **Satisfaction with health care** | | |
| *Satisfaction with overall care* | | |
| Percentage who were "somewhat" or "very" satisfied | 0.7 | Similar |
| Percentage who were "very dissatisfied" | -0.5 | Similar |

*Notes:* Estimates are based on the same models used for interstate comparisons and include controls for other states. Full regression results are in Tables TA.D1–TA.D7.

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from the injury to the time of the interview.

# 5

# Discussion

The outcomes examined in this report are important to many workers when they have a workplace injury. Not coincidentally, these outcomes are commonly raised in significant public policy debates about the performance of workers' compensation systems. However, they are often raised by advocates in the form of assertions or anecdotes due to a lack of credible data. The WCRI worker outcomes studies seek to ground those discussions in data on the outcomes achieved by workers. In this section, we highlight several uses of the data relevant from a policy perspective and reflect on other questions that may also be on system stakeholders' minds.

## Reflections about Interstate Comparisons of Worker Outcomes

The interstate comparisons presented in this report provide several important observations for the policy community.

The study allows policymakers to compare outcomes in their states with those observed in other states. For instance, for policymakers concerned about whether or not injured workers in their states have adequate access to quality care, this study provides information about the proportion of workers that reported having problems accessing desired medical care and the reasons they identified underlying these problems. Policymakers can compare results in their states with those found in other states (perhaps neighboring states) or the 15-state median. Policymakers trying to determine the performance of the workers' compensation systems in their states are likely to first consider the examples from neighboring states or states in the same region. This is expected given that neighboring states are the most likely competitors for new businesses.

The analysis provides a way to benchmark and compare workers' compensation systems across different dimensions. However, the outcomes presented do not reflect judgements about system performance. Priorities for achieving different system goals may differ across jurisdictions. It is the role of stakeholders to determine how different system objectives can be achieved.

One common finding in this series of reports is that despite differences in underlying workers' compensation system features, we found relatively small differences in important outcomes across states. For instance, we found that the rate of substantial return to work was similar (within 3 percentage points) in 9 out of 15 states with diverse system features.[1] We observed less than a 5 point difference between states in the

[1] Readers interested in learning more about system features in study states may refer to other WCRI publications, including the workers' compensation laws and medical cost containment national inventories (WCRI and IAIABC, 2012, 2014, and 2016; Tanabe, 2011, 2013, and 2015).

average recovery of health and functioning measured by the SF-12v2® score.[2] For other worker outcome measures, we found only small differences across the majority of study states.

The findings also suggest that differences in outcomes across states likely reflect a combination of multiple system features, not just a single policy feature. This means that readers should be discouraged from linking, for example, fee schedule approaches in a state to the satisfaction with overall medical care. Consider how these measures compare in Massachusetts and Wisconsin. These two states have very different approaches toward medical fee schedules—a fixed-amount fee schedule in Massachusetts versus no fee schedule in Wisconsin. At the same time, the two states had very similar rates of satisfaction with care—10 percent of workers in both states responded that they were "very dissatisfied" with overall care, the lowest rates across study states. On the other hand, Massachusetts and Tennessee have similar fee schedule approaches, but 17 percent of workers in Tennessee reported being "very dissatisfied" with overall care. This suggests that bivariate relationships between a given policy and worker outcomes are unlikely to reveal the true relationship when multiple system features may play a role.[3] Future WCRI studies may examine the relationship between specific system features and worker outcomes.

## NEXT STEPS

In the next phase of this study, we intend to collect data from new states and revisit some of the states from earlier phases that had significant system reforms. We plan to continue to update interstate comparisons and evaluate the impact of selected reforms on worker outcomes by measuring outcomes before and after those reforms.

We look forward to reporting the results from all of the phases as they are obtained.

[2] For more information about the SF-12v2® and its widespread use and acceptance, see https://campaign.optum.com/optum-outcomes/what-we-do.html.

[3] Readers interested in learning more about system features in study states may refer to other WCRI publications, including the workers' compensation laws and medical cost containment national inventories (WCRI and IAIABC, 2012, 2014, and 2016; Tanabe, 2011, 2013, and 2015).

# TECHNICAL APPENDIX A

# OVERVIEW OF DATA COLLECTION AND METHODS

## SURVEY DATA COLLECTION PROCEDURES

### THE SURVEY INSTRUMENT

WCRI developed the worker outcomes survey in collaboration with Mathematica Policy Research (MPR), which also conducted the data collection. Our objective was to obtain information about the core outcomes experienced by injured workers who received medical care and income benefit payments from state workers' compensation systems. Development of the survey instrument was guided by the following considerations:

- The questions should maximize comparability across states.
- Results from other surveys would serve as norms with which to compare system performance and validate questions. We therefore regularly borrowed or adapted questions from other surveys (which we gratefully acknowledge). To preserve comparability, we avoided changing the language of borrowed questions whenever possible.
- The average interview time should not exceed 30 minutes to avoid respondent fatigue that could result in either terminated interviews or deteriorating quality of information received. This limitation required us to regularly make difficult choices about which potentially valuable questions to include and exclude.

The survey consists of seven sections.[1] Section A contains screening questions to confirm that the person being interviewed had a work injury and that the injury is the one we sampled.[2] Section B—the first of three sections dealing with the worker's physical health and functioning as it is self-reported—contains six physical and general questions taken from the often-used SF-12v2® battery.[3] The instrument is designed to ask about the respondent's recent experience. We used the instrument this way in asking about health status at the time of the interview. However, we also used the instrument to retrospectively ask about health status in the four weeks before the work injury occurred and in the week after the injury. Technical Appendix B discusses the evidence of validity of our retrospective use of the SF-12v2®. Section C deals with the health care treatment provided—specifically, issues of access to care, provider selection, and type of provider. Included in the section are several questions about worker satisfaction with their providers and care received. Section D contains the same SF-12v2® questions as in Section B but focuses on the one-week period immediately following the work injury. The questions in Section E target the worker's experience in the preinjury labor

[1] A copy of the survey can be found at https://www.wcrinet.org/images/uploads/files/wcri_sample_2014_survey.pdf. The same version of the survey was used for all states.

[2] Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively.

[3] SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum. The questions and scoring are described in Technical Appendix B.

market, including the worker's earnings and job satisfaction. It also covers the worker's postinjury labor market experience and status in the labor market at the time of the interview. Section F appraises the worker's health status at the time of the interview, using the full SF-12v2® battery (applied to the four weeks immediately preceding the interview). Section G asks for the worker's year of birth, education level, marital status, comorbid conditions, and whether he or she used an attorney's services.

The survey consists of several skip patterns, or paths of questions, that vary depending on the number and type of provider the worker saw or the nature of his or her return to work. Consequently, some workers completed their interviews in a shorter time than others whose circumstances warranted following different and longer paths. On average, the survey took about 30 minutes to complete.

In the past we have used similar surveys to measure worker outcomes in 11 states.[4] The survey instrument used for the recent set of surveys conducted since 2013 was the first major revision of the survey in a decade. In an effort to minimize respondent burden, the survey instrument was shortened by deleting a few questions that were not often used in analysis and by altering the skip patterns. Another change made to the recent survey was the use of SF-12v2® in place of the original SF-12® questionnaire. In concept, such changes could reduce the comparability of the results from the old and new surveys. However, we have taken steps to ensure that the questions related to the main outcomes being reported did not change. The revised instrument was pretested on a small sample of injured workers, leading to minor modifications to improve the clarity of certain questions or terms. The survey instrument was translated to the Spanish version by MPR.

#### THE STATE SAMPLES

In Connecticut, Indiana, Michigan, Minnesota, Pennsylvania, Tennessee, Virginia, and Wisconsin, state agencies provided the workers' names and the contact information we needed to draw the sample. In Arkansas, Florida, Georgia, Iowa, Kentucky, Massachusetts, and North Carolina, the state agency requested that WCRI use data from insurers and employers to draw the sample. Prior to calling, we sent each potential respondent a letter describing the goals and format of the study, the privacy protections surrounding the study, and an opportunity to refuse to participate in the survey. Specifically, the letter told workers the following:

- "You are not required to take part in the survey, but your participation is extremely valuable."
- "Everything you tell us will be kept in the strictest confidence. Your name, address, and telephone number will only be used to contact you to participate in this study and for no other purpose. Your responses to our questions will NOT be shared with anyone outside of the research team – NOT the state, your employer or insurer. Upon completion of the survey your responses to our questions will be combined with those of others so that no one will know your specific answers. This study is strictly for academic purposes and our findings will be published and used to improve workers' compensation programs."
- "If you choose not to participate in this study, you can also use this toll-free number to let us know that you do not wish to be contacted in the future."

[4] Belton and Liu (2009) provide analysis of worker outcomes in 11 states.

We selected samples in each state from the pool of claims contained in the WCRI Detailed Benchmark/Evaluation (DBE) database, which contains about one-half to two-thirds of the total claims in each state. Other WCRI studies show that these very large samples are representative of the full population of claims in each state (Telles, 2012; Telles, 2013, tab. TA.5). We sampled from claims with more than seven days of lost time—a period long enough for the injured workers to obtain income benefits in all states.[5] We did not sample from claims in the top and bottom 1 percentile of medical and/or indemnity costs. We also ensured that the claims available for sampling had adequately detailed medical data and complete contact information. We did this because we wanted to combine the information obtained from the surveys with other data in the DBE database for the purpose of analyzing response bias, validating certain survey responses, assisting the analysis for this report, and conducting other possible studies. We checked for any observed response bias in a large number of metrics. As is discussed in more detail in the data and methods section, where possible biases exist, they appear to be minor.

We sampled claims using a stratified random sample with strata that included the financial seriousness of the claim. We oversampled the claims that were more financially serious. This was done with the goal of collecting enough information needed to examine behaviors that occur among more financially serious claims. Financially serious claims are defined as claims with more than 20 weeks of temporary disability payments or incurred indemnity payments of more than $6,000 at an average 12 months of experience.[6] In all states, we weighted the completed interviews by the distribution of financial seriousness that existed in each state's population of claims.

#### THE SURVEY PROCESS

A computer-assisted telephone interview (CATI) of injured workers was conducted across 15 states with a target of 400 completed interviews per state. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers who were interviewed had received workers' compensation benefits and experienced more than seven days of lost time from work. On average, the injuries for the workers surveyed had occurred about 2.8 to 3.0 years prior to the interviews in all states except Arkansas (3.3 years). Because Arkansas is a smaller state, we had to sample workers injured in 2010 and 2011 in order to get a similar number of completed surveys as in other states. We tested whether the outcomes reported varied with the time between the injury and the interview and found no significant differences. See Technical Appendix D for more details. The time lags between injury and interview were selected in order to examine the intermediate-

[5] Indemnity claims account for the majority of workers' compensation costs in each study state—80–93 percent of costs are from claims with more than seven days of lost time as of three years postinjury. The following statistics provide a general sense of the percentage of claims with more than seven days of lost time in most study states. The percentage of claims with more than seven days of lost time represents 14 percent of all workers' compensation claims in Arkansas, 21 percent in Florida, 13 percent in Indiana, 18 percent in Iowa, 27 percent in Massachusetts, 16 percent in Michigan, 16 percent in Minnesota, 17 percent in Pennsylvania, 18 percent in North Carolina, 15 percent in Virginia, and 16 percent in Wisconsin. These statistics are based on claims with dates of injury arising in October 2010 through September 2011 and evaluated as of March 2012, reflecting an average maturity of 12 months (Telles, 2013, fig. 1).

[6] For 2010 injuries, we used an incurred indemnity benefits threshold of $6,000 evaluated as of March 2011. The amount was adjusted for inflation for subsequent injury years.

term consequences of workers' injuries—in particular, the recovery of health and functioning and return to work. Table TA.A1 contains details about the number of workers interviewed in each state and the dates of injuries and interviews.

**Table TA.A1 Number and Dates of Surveys Conducted in 15 States**

| State | Dates of Injury | Dates of Surveys | Average Duration from Injury to Interview | Number of Surveys Conducted | Number of Surveys Excluded[a] | Number of Surveys Used in Analysis |
|---|---|---|---|---|---|---|
| Arkansas | January 2010–September 2011 | February–April 2014 | 3.3 years | 401 | 3 | 398 |
| Connecticut | January–September 2011 | February–April 2014 | 2.9 years | 402 | 4 | 398 |
| Florida | February –September 2012 | March–May 2015 | 2.9 years | 400 | 5 | 395 |
| Georgia | February –September 2012 | March–May 2015 | 2.9 years | 410 | 4 | 406 |
| Indiana | February–September 2010 | March–May 2013 | 2.8 years | 403 | 3 | 400 |
| Indiana | February–September 2013 | April–June 2016 | 2.9 years | 403 | 5 | 398 |
| Iowa | January–September 2011 | February–April 2014 | 2.9 years | 412 | 2 | 410 |
| Kentucky | October 2011–September 2012 | March–May 2015 | 3.0 years | 405 | 2 | 403 |
| Massachusetts | February–September 2010 | March–May 2013 | 2.8 years | 401 | 8 | 393 |
| Massachusetts | February–September 2013 | March–May 2016 | 2.9 years | 410 | 3 | 407 |
| Michigan | February–September 2010 | March–May 2013 | 2.9 years | 408 | 2 | 406 |
| Michigan | February–September 2013 | March–June 2016 | 2.9 years | 417 | 5 | 412 |
| Minnesota | February–September 2010 | April–June 2013 | 2.9 years | 404 | 3 | 401 |
| North Carolina | February–September 2010 | February–April 2013 | 2.8 years | 416 | 6 | 410 |
| North Carolina | February–September 2013 | April–June 2016 | 3.0 years | 403 | 3 | 400 |
| Pennsylvania | February–September 2010 | February–April 2013 | 2.8 years | 409 | 3 | 406 |
| Tennessee | January–September 2011 | February–April 2014 | 2.9 years | 402 | 5 | 397 |
| Virginia | February–September 2010 | April–June 2013 | 3.0 years | 445 | 2 | 443 |
| Virginia | February–September 2013 | March–May 2016 | 2.9 years | 416 | 0 | 416 |
| Wisconsin | February–September 2010 | February–April 2013 | 2.8 years | 412 | 2 | 410 |
| Wisconsin | February–September 2013 | March–May 2016 | 2.9 years | 409 | 3 | 406 |

[a] We excluded a small number of cases where the respondent did not appear to be the person we intended to interview or was responding about a different injury, or cases where it appeared that the compensability was denied.

MPR sent each worker in the sample an advance letter stating that the worker had been selected to participate in the survey and asking for his or her cooperation if called. MPR mailed the advance letters to the sample members three to five days before the telephone calls began for each state. The letter included a toll-free number that the workers could call with any inquiries, to report changes in his/her telephone number or location, and to refuse participation. The letters were signed by representatives of MPR and WCRI. Also included in the mailing was an endorsement letter from the state workers' compensation agency encouraging the workers to participate in the survey. Both letters assured the workers that their responses would be confidential and that individual responses would not be reported.

During the 2013 surveys, agencies in two states, Minnesota and Virginia, sent their endorsement letters directly to the sample members prior to the start of the survey. These letters included instructions to opt out of the survey by contacting the state agency directly within 10 days of receipt of the letter. Table TA.A2

includes the opt-out rates for the two states by strata. The sample of workers who did not opt out was mailed the advance letters by MPR. Reminder postcards were mailed to nonresponders (sample members who were presumed eligible and who had not responded and not refused) nearly a month after interviewing began. Reminder letters (including incentive reminder letters) were mailed to nonresponders toward the end of the interview periods, as needed, in states where reaching the target of 400 completed interviews was difficult.

In the end, slightly over 400 injured workers per state completed interviews across the 15 states.

**Table TA.A2 Rates of Opting Out from Survey Sample in Minnesota and Virginia, 2010 Injuries**

| State/Strata | Total Number Contacted | Opted Out of the 2013 Survey | Opt-Out Rate |
|---|---|---|---|
| Minnesota | 2,000 | 455 | 23% |
| Less financially serious strata | 1,000 | 245 | 25% |
| More financially serious strata | 1,000 | 210 | 21% |
| Virginia | 2,000 | 250 | 13% |
| Less financially serious strata | 1,000 | 139 | 14% |
| More financially serious strata | 1,000 | 111 | 11% |

## WEIGHTING

As stated earlier, in all states, we weighted the completed interviews by the distribution of financial seriousness that existed in each state's population of claims. This measure is discussed below.

### FINANCIAL SERIOUSNESS

The percentages of *more* and *less* financially serious claims in the sample were weighted to represent the percentages of *more* and *less* financially serious claims in the state. We used the following criteria for determining what we characterized as *more* financially serious claims across the 15 states:

- more than 20 weeks of temporary disability payments; or
- incurred indemnity payments of more than $6,000.[7]

More expensive claims are relatively rare in the workers' compensation system. The purpose of strata of financial seriousness is to get a sufficient number of expensive claims by oversampling them. The final results were weighted to reflect the DBE population.

### ADDITIONAL WEIGHTING CONSIDERATIONS

We applied an additional stratum of weighting to bring the average medical costs of the respondents in line with the average medical costs of the injured workers in Michigan (injury year 2013) and Minnesota (injury year 2010). Respondents had significantly higher medical costs per claim than the population of injured workers in these two states. Average medical costs for respondents were 22 percent higher in Michigan and 29 percent higher in Minnesota. The differences were less than 20 percent or not statistically significant in other

[7] For 2010 injuries, we used an incurred indemnity benefits threshold of $6,000 evaluated as of March 2011. The amount was adjusted for inflation for subsequent injury years.

survey states.

We observed that the differences in average medical costs between respondents and the overall state were more pronounced in the *less* financially serious strata. Therefore, we further categorized the *less* financially serious claims into two groups:

- claims with medical payments of less than or equal to $10,000; and
- claims with medical payments of more than $10,000.

We weighted the responses for these two states by bringing the proportion of respondents in the three groups—the *more* financially serious and the two *less* financially serious groups of claims—in line with the proportion of claims in the state. After the weighting, the average medical cost per claim among respondents was similar to that in the population.

## DATA CLEANING

Of the workers who completed interviews, we subsequently dropped a small proportion of cases. We excluded any respondent we believed was either not the person we intended to interview or was responding about an injury different from the one that led us to include the respondent in the sample, or cases where it appeared that the compensability was denied. When we found serious and multiple disparities between the respondent's information and the information in the claim database about certain claim characteristics, such as the date or nature of the injury, or some other variable, we excluded the observation from the analysis. To infer if compensability was denied or disputed for a particular claim, we used the following rules: if (1) indemnity payments and medical payments were very small, and the payments stopped soon after injury or within the pay-without-prejudice period, and (2) the injury didn't appear to be closely related to the worker's occupation, then we considered the injury to be a potential compensability dispute and excluded the claim from the analysis. We identified 73 such cases (Table TA.A1). We excluded these claims from the analysis because the payment data were more likely to be truncated by a denial or lump-sum settlement.

## RETURN-TO-WORK MEASURES

We also cleaned the return-to-work responses. We flagged cases where the worker reported never having a substantial return to work due to the injury and had 10 weeks or less of payments for temporary disability during our review for internal consistency.[8] We excluded 173 claims from the *no substantial return to work predominantly due to injury* measures and 108 of those claims from the *not working at interview predominantly due to injury* measure reported in Chapter 3.

We excluded the 173 cases because, after careful review, we concluded that the worker and employer probably disagreed about whether the worker was able to return to work. We concluded this because the worker told us that he or she was not working "predominantly due to the injury" but received a smaller number of weeks of income benefits than expected if the workers' perceptions were correct. We distinguished these likely disputes about return to work from likely disputes about compensability of the claim discussed in the previous section when we observed that the worker was receiving medical treatment after income benefits

[8] We acknowledge that temporary disability duration is not a perfect measure of return to work, but it is a reasonable proxy when using administrative data.

ended.

Comparisons of the measures with and without this adjustment are provided in Table TA.A3. The adjusted estimates for these two outcome measures are different from the unadjusted estimates by 2 to 6 percentage points.

Tables in this report may have fewer observations than the total number of completed interviews. This is because a few workers either refused to answer a specific question or said they were unable to answer a specific question, or we excluded them from the analysis for specific measures, as discussed earlier. In addition, in many cases the nature of the skip patterns of the survey meant that some respondents were not asked questions that did not pertain to them.

**Table TA.A3 Comparison of Substantial Return-to-Work Measures with and without Data Cleaning**

| State, Injury Year | Percentage of Claims with No Substantial Return to Work Due to Injury | | | Percentage of Claims with No Substantial Return to Work within 1 Year Due to Injury | | |
|---|---|---|---|---|---|---|
| | Before Exclusion | After Exclusion | Difference | Before Exclusion | After Exclusion | Difference |
| Arkansas, 2010–2011 | 19% | 16% | -3% | 22% | 19% | -3% |
| Connecticut, 2011 | 16% | 11% | -5% | 18% | 14% | -5% |
| Florida, 2012 | 20% | 15% | -5% | 23% | 18% | -5% |
| Georgia, 2012 | 24% | 20% | -4% | 29% | 24% | -4% |
| Indiana, 2010 | 11% | 9% | -2% | 14% | 12% | -2% |
| Indiana, 2013 | 14% | 10% | -4% | 16% | 11% | -4% |
| Iowa, 2011 | 12% | 10% | -2% | 14% | 11% | -2% |
| Kentucky, 2013 | 19% | 16% | -3% | 22% | 19% | -3% |
| Massachusetts, 2010 | 17% | 13% | -4% | 21% | 17% | -4% |
| Massachusetts, 2013 | 16% | 14% | -3% | 18% | 15% | -3% |
| Michigan, 2010 | 13% | 10% | -3% | 16% | 13% | -3% |
| Michigan, 2013 | 15% | 10% | -6% | 20% | 13% | -6% |
| Minnesota, 2010 | 12% | 8% | -5% | 14% | 9% | -5% |
| North Carolina, 2010 | 23% | 20% | -3% | 28% | 24% | -3% |
| North Carolina, 2013 | 17% | 14% | -3% | 21% | 18% | -3% |
| Pennsylvania, 2010 | 17% | 14% | -3% | 19% | 16% | -3% |
| Tennessee, 2011 | 22% | 17% | -5% | 25% | 21% | -5% |
| Virginia, 2010 | 17% | 12% | -5% | 20% | 15% | -5% |
| Virginia, 2013 | 17% | 13% | -4% | 19% | 15% | -4% |
| Wisconsin, 2010 | 14% | 9% | -5% | 15% | 10% | -6% |
| Wisconsin, 2013 | 13% | 8% | -5% | 14% | 9% | -5% |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time. The difference between the original and adjusted measure may not be the same as the difference shown in the table due to rounding.

## SURVEY RESPONSE RATES

In all 15 states, we met or exceeded our goal of 400 completed interviews per state. That target was selected to balance the cost of the survey with the statistical power achieved for interstate comparisons. Based on past surveys, we found that at the 5 percent significance level and 90 percent power, we need a sample size of 400 workers to reject hypotheses of no differences between the top states and median states for most measures included in this study.

We interviewed workers, on average, three years after the injury. This reflected our balancing of potential recall biases and difficulties locating workers against the desire to measure more than the short-term consequences of the injury. In most states, almost 90 percent of claims were closed by three years after the injury.

The telephone surveys were dispersed over different times of the day, ensuring calls were attempted for a case during the day, in the evening, and on weekends. The survey instrument was translated into Spanish and administered in that language when requested by the respondent. A total of 399 interviews were conducted in Spanish across the 15 states and injury years.

The response rates varied from 25 to 31 percent across the 15 states.[9] Tables TA.A4 and TA.A5 show the dispositions for workers sampled. To assess the presence and magnitude of any non-response bias, we addressed the following questions:

1. How do the respondents compare with all workers in their respective workers' compensation systems (with more than seven days of lost time)?
2. How do the respondents compare with refusals?
3. How do the respondents compare with those we could not contact because we did not have valid phone numbers?

Tables TA.A6 and TA.A7 show the results of these comparisons. Our assessment of representativeness and response bias is discussed in detail in Chapter 2.

[9] We computed the overall response rate by dividing the number of completed surveys by the number of sampled cases. The response rates were 30 percent in Arkansas; 30 percent in Connecticut; 25 percent in Florida; 26 percent in Georgia; 31 and 30 percent in Indiana for 2010 and 2013 injuries, respectively; 31 percent in Iowa; 26 percent in Kentucky; 25 and 26 percent in Massachusetts for 2010 and 2013 injuries; 31 percent in Michigan for both 2010 and 2013 injuries; 28 percent in Minnesota; 26 and 25 percent in North Carolina for 2010 and 2013 injuries; 26 percent in Pennsylvania; 30 percent in Tennessee; 25 and 26 percent in Virginia for 2010 and 2013 injuries; and 31 and 30 percent in Wisconsin for 2010 and 2013 injuries.

**Table TA.A4 Attempted Telephone Interviews: Valid Phone Numbers**

| Type of Disposition | AR 2010–2011 | CT 2011 | FL 2012 | GA 2012 | IA 2011 | IN 2010 | IN 2013 | KY 2012 | MA 2010 | MA 2013 | MI 2010 | MI 2013 | MN 2010 | NC 2010 | NC 2013 | PA 2010 | TN 2011 | VA 2010 | VA 2013 | WI 2010 | WI 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total numbers sampled | 1,340 | 1,340 | 1,600 | 1,594 | 1,340 | 1,314 | 1,340 | 1,582 | 1,592 | 1,596 | 1,320 | 1,340 | 1,425 | 1,592 | 1,594 | 1,600 | 1,340 | 1,760 | 1,600 | 1,344 | 1,340 |
| Number of cases with valid telephone numbers | 932 | 1,024 | 1,208 | 1,246 | 985 | 957 | 974 | 1,144 | 1,154 | 1,288 | 896 | 1,068 | 1,063 | 1,116 | 942 | 1,232 | 987 | 1,152 | 1,261 | 1,071 | 1,127 |
| Percentage of cases with valid telephone numbers | 70% | 76% | 76% | 78% | 74% | 73% | 73% | 72% | 72% | 81% | 68% | 80% | 75% | 70% | 59% | 77% | 74% | 65% | 79% | 80% | 84% |

*Note:* The year below the state name indicates the injury year.

**Table TA.A5 Disposition of Cases with Valid Phone Numbers**

| Type of Disposition | Percentage of Cases with Valid Phone Numbers | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AR 2010–2011 | CT 2011 | FL 2012 | GA 2012 | IA 2011 | IN 2010 | IN 2013 | KY 2012 | MA 2010 | MA 2013 | MI 2010 | MI 2013 | MN 2010 | NC 2010 | NC 2013 | PA 2010 | TN 2011 | VA 2010 | VA 2013 | WI 2010 | WI 2013 |
| Completed survey | 43% | 39% | 33% | 33% | 42% | 42% | 41% | 35% | 35% | 32% | 46% | 39% | 38% | 37% | 43% | 33% | 41% | 39% | 33% | 38% | 36% |
| Other valid telephone numbers | 57% | 61% | 67% | 67% | 58% | 58% | 59% | 65% | 65% | 68% | 54% | 61% | 62% | 63% | 57% | 67% | 59% | 61% | 67% | 62% | 64% |
| Refused | 16% | 19% | 24% | 17% | 19% | 17% | 24% | 22% | 18% | 21% | 18% | 18% | 20% | 17% | 24% | 21% | 18% | 19% | 12% | 15% | 21% |
| Answering machine[a] | 24% | 22% | 25% | 27% | 14% | 24% | 23% | 22% | 26% | 25% | 19% | 25% | 22% | 25% | 16% | 17% | 23% | 21% | 30% | 27% | 28% |
| No answer | 1% | 1% | 2% | 3% | 8% | 1% | 2% | 2% | 1% | 3% | 1% | 1% | 1% | 4% | 4% | 2% | 1% | 3% | 4% | 2% | 2% |
| Other | 15% | 18% | 16% | 21% | 17% | 16% | 10% | 19% | 20% | 19% | 17% | 16% | 18% | 17% | 14% | 27% | 18% | 19% | 20% | 18% | 12% |

*Notes:* The "other" category consists of "busy signal," "call back," "foreign language speaker," "partial complete," and "other" categories.

[a] The percentage with the answering machine disposition is large because we released large samples in order to obtain 400 completed interviews without extending the survey field period. The answering machine disposition effectively includes some workers who implicitly refused to be interviewed by screening their calls, as well as those who would have agreed to be interviewed had Mathematica Policy Research been able to reach them directly.

**Table TA.A6 Analysis of Representativeness Based on Administrative Claims Data**

| | AR 2010–2011/2012–2013 | | | CT 2011/2013 | | | FL 2012/2014 | | | GA 2012/2014 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 42 | 42 | 45* | 43 | 43 | 47* | 44 | 45 | 48* | 42 | 42 | 44* |
| Female (percentage of claims) | 29 | 29 | 32 | 40 | 42 | 47* | 39 | 39 | 43 | 41 | 39 | 45 |
| Single (percentage of claims) | 43 | 46* | 42 | 53 | 50* | 46* | 51 | 49 | 46 | 49 | 50 | 47 |
| Tenure with employer (mean years) | 5 | 4* | 5 | 7 | 7 | 9* | 6 | 6 | 7* | 6 | 6 | 7 |
| Weekly wage (mean) | $615 | $614 | $622 | $794 | $813 | $851* | $650 | $642 | $661 | $641 | $644 | $661 |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 26 | 28* | 30 | 13 | 12 | 13 | 7 | 7 | 8 | 14 | 16* | 16 |
| Construction | 13 | 13 | 10 | 7 | 8 | 6 | 6 | 6 | 5 | 6 | 7 | 5 |
| Clerical/professional | 5 | 4* | 5 | 9 | 9 | 11 | 9 | 10 | 11 | 8 | 6* | 7 |
| Trade | 14 | 15 | 14 | 14 | 13 | 12 | 19 | 17* | 17 | 23 | 17* | 17* |
| High-risk services | 25 | 26 | 24 | 32 | 33 | 31 | 29 | 31* | 29 | 27 | 28 | 28 |
| Low-risk services | 11 | 11 | 14 | 15 | 15 | 17 | 18 | 22* | 23* | 15 | 17* | 18 |
| Other | 4 | 3* | 4 | 8 | 9 | 10 | 11 | 8* | 7* | 6 | 7* | 8 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | 0 |
| Neurologic spine pain | 7 | 8 | 11* | 8 | 9 | 8 | 8 | 9 | 10 | 10 | 10 | 9 |
| Back and neck sprains, strains, and non-specific pain | 14 | 14 | 14 | 20 | 20 | 19 | 18 | 18 | 19 | 17 | 18 | 17 |
| Fractures | 13 | 14 | 14 | 9 | 9 | 9 | 10 | 10 | 11 | 9 | 9 | 10 |
| Lacerations and contusions | 12 | 11 | 9 | 11 | 10 | 7* | 12 | 11 | 11 | 11 | 10 | 10 |
| Inflammations | 5 | 6 | 6 | 10 | 11 | 11 | 8 | 8 | 9 | 10 | 11 | 12 |
| Other sprains and strains | 23 | 22 | 22 | 23 | 22 | 22 | 24 | 24 | 21 | 23 | 23 | 22 |
| Upper extremity neurologic (carpal tunnel) | 2 | 2 | 2 | 2 | 3* | 5* | 1 | 1 | 2 | 2 | 2 | 2 |
| Other injuries | 24 | 23 | 22 | 18 | 16* | 18 | 19 | 19 | 17 | 18 | 18 | 18 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $12,633 | $12,085 | $13,056 | $11,850 | $11,320 | $12,136 | $13,363 | $13,166 | $14,438 | $14,350 | $13,191* | $14,588 |
| Indemnity payment (mean) | $9,071 | $8,846 | $9,349 | $11,234 | $10,367* | $9,729* | $8,033 | $7,455* | $7,479 | $15,874 | $15,143 | $14,748 |
| Open claims (percentage of claims) | 19 | 19 | 24* | 32 | 32 | 35 | 21 | 24* | 27* | 25 | 25 | 27 |
| PPD or lump-sum payment (percentage of claims) | 34 | 35 | 37 | 26 | 28* | 32* | 41 | 40 | 46 | 39 | 41 | 44* |
| Lump-sum payment (percentage of claims) | 11 | 12 | 12 | 7 | 7 | 6 | 15 | 12* | 13 | 26 | 28 | 26 |
| Defense attorney involved (percentage of claims) | 17 | 18 | 16 | 24 | 23 | 20 | 31 | 30 | 31 | 33 | 35 | 33 |
| Vocational rehabilitation services (percentage of claims) | 1 | 2* | 1 | 1 | 1 | 1 | 1 | 0* | 1 | 0 | 1* | 1 |
| PPD or lump-sum payment (mean) | $11,298 | $10,589 | $11,835 | $12,930 | $11,619* | $8,752* | $6,361 | $5,410* | $4,617* | $22,059 | $19,534* | $18,359* |
| Lump-sum payment (mean) | $19,852 | $17,142* | $18,347 | $23,650 | $18,570* | $12,582* | $14,635 | $13,417 | $12,139* | $30,878 | $26,567* | $27,334 |
| Duration of temporary disability (mean weeks) | 14 | 14 | 13 | 17 | 16 | 17 | 14 | 14 | 15 | 23 | 22 | 21 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 38 | 40 | 41 | 28 | 29 | 35* | 27 | 26 | 29 | 34 | 32 | 36 |
| Chiropractic care | 1 | 2 | 3* | 5 | 5 | 5 | 1 | 1 | 1 | 1 | 1 | 1 |

*continued*

**Table TA.A6 Analysis of Representativeness Based on Administrative Claims Data (continued)**

| | IA 2011/2013 | | | IN 2010/2012 | | | IN 2013/2015 | | | KY 2012/2014 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 45 | 44* | 47* | 44 | 44 | 48* | 44 | 44 | 47* | 42 | 42 | 45* |
| Female (percentage of claims) | 36 | 35 | 37 | 35 | 33 | 39 | 36 | 33* | 37 | 36 | 34 | 43* |
| Single (percentage of claims) | 43 | 43 | 41 | 45 | 41* | 35* | 52 | 49* | 45* | 44 | 47 | 45 |
| Tenure with employer (mean years) | 7 | 7 | 9* | 6 | 6* | 8 | 6 | 6 | 7* | 6 | 7* | 7 |
| Weekly wage (mean) | $665 | $701* | $726* | $629 | $628 | $647 | $676 | $698* | $713 | $640 | $642 | $642 |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 26 | 29 | 34* | 28 | 29 | 32 | 29 | 28 | 26 | 19 | 25* | 25* |
| Construction | 8 | 7 | 6 | 5 | 5 | 5 | 5 | 6 | 5 | 6 | 7 | 8 |
| Clerical/professional | 11 | 12 | 11 | 6 | 6 | 7 | 3 | 3 | 4 | 8 | 4* | 6 |
| Trade | 12 | 11 | 10 | 17 | 13* | 11* | 15 | 14 | 16 | 18 | 13* | 13* |
| High-risk services | 23 | 23 | 18* | 29 | 32* | 31 | 32 | 33 | 31 | 24 | 25 | 25 |
| Low-risk services | 14 | 9* | 12 | 11 | 11 | 12 | 11 | 11 | 11 | 10 | 10 | 10 |
| Other | 6 | 9* | 9* | 3 | 3 | 3 | 4 | 5 | 6 | 14 | 16 | 13 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 4 | 4 | 4 | 5 | 7* | 5 | 7 | 7 | 7 | 8 | 8 | 6 |
| Back and neck sprains, strains, and non-specific pain | 14 | 15 | 13 | 13 | 11* | 11 | 12 | 12 | 10 | 14 | 16 | 14 |
| Fractures | 11 | 11 | 13 | 12 | 13 | 16* | 11 | 14* | 15* | 11 | 11 | 13 |
| Lacerations and contusions | 11 | 9* | 7* | 11 | 11 | 8* | 10 | 8* | 8 | 8 | 9 | 11 |
| Inflammations | 7 | 8* | 10* | 7 | 8 | 9 | 9 | 9 | 11 | 9 | 8 | 7 |
| Other sprains and strains | 29 | 30 | 29 | 26 | 24* | 24 | 25 | 26 | 25 | 26 | 24 | 23 |
| Upper extremity neurologic (carpal tunnel) | 3 | 3 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| Other injuries | 22 | 20 | 20 | 24 | 25* | 26 | 23 | 22 | 22 | 22 | 22 | 22 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $15,304 | $15,103 | $16,302 | $15,870 | $15,539 | $17,642 | $19,573 | $19,739 | $22,425* | $12,088 | $11,373* | $11,927 |
| Indemnity payment (mean) | $12,074 | $11,668 | $11,895 | $6,364 | $6,770 | $6,810 | $7,258 | $7,339 | $8,024 | $11,245 | $10,784 | $10,210 |
| Open claims (percentage of claims) | 25 | 23 | 24 | 16 | 14 | 14 | 19 | 16* | 18 | 23 | 23 | 26 |
| PPD or lump-sum payment (percentage of claims) | 46 | 46 | 48 | 27 | 28 | 30 | 29 | 25* | 28 | 22 | 22 | 22 |
| Lump-sum payment (percentage of claims) | 16 | 16 | 17 | 15 | 17 | 17 | 17 | 16 | 17 | 16 | 17 | 15 |
| Defense attorney involved (percentage of claims) | 17 | 17 | 16 | 14 | 13 | 10 | 17 | 15* | 14 | 20 | 19 | 17 |
| Vocational rehabilitation services (percentage of claims) | 2 | 3* | 3 | 0 | 0* | 1 | 2 | 4* | 4* | 2 | 4* | 4 |
| PPD or lump-sum payment (mean) | $16,344 | $15,912 | $14,661 | $7,750 | $8,433 | $7,225 | $8,300 | $8,763 | $9,302 | $19,475 | $17,219* | $12,925* |
| Lump-sum payment (mean) | $26,027 | $24,259 | $21,269 | $12,150 | $12,378 | $11,199 | $12,236 | $12,470 | $13,535 | $24,915 | $20,945* | $17,500* |
| Duration of temporary disability (mean weeks) | 12 | 10* | 10* | 11 | 11 | 12 | 12 | 12 | 12 | 16 | 16 | 17 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 40 | 42 | 47* | 40 | 40 | 46* | 40 | 39 | 45 | 35 | 35 | 37 |
| Chiropractic care | 3 | 2 | 4 | 1 | 1 | 0* | 1 | 1 | 0 | 4 | 5 | 7* |

*continued*

**Table TA.A6 Analysis of Representativeness Based on Administrative Claims Data (continued)**

| | MA 2010/2012 | | | MA 2013/2015 | | | MI 2010/2012 | | | MI 2013/2015 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents[a] |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 42 | 42 | 44* | 43 | 43 | 45* | 43 | 42* | 46* | 43 | 44* | 46* |
| Female (percentage of claims) | 33 | 32 | 34 | 33 | 31 | 35 | 39 | 37 | 40 | 40 | 41 | 40 |
| Single (percentage of claims) | 52 | 50 | 48 | 52 | 51 | 49 | 49 | 47 | 43* | 53 | 49* | 41* |
| Tenure with employer (mean years) | 6 | 6 | 7* | 7 | 6* | 7 | 8 | 7* | 9 | 7 | 8* | 9* |
| Weekly wage (mean) | $755 | $773 | $801 | $831 | $798* | $797 | $713 | $711 | $737 | $727 | $735 | $749 |
| **Industry (percentage of claims)** | | | | 0 | 0 | 0 | | | | 0 | 0 | 0 |
| Manufacturing | 13 | 13 | 13 | 13 | 14 | 16 | 23 | 23 | 23 | 28 | 28 | 30 |
| Construction | 13 | 14 | 11 | 14 | 16 | 14 | 6 | 7 | 6 | 6 | 6 | 6 |
| Clerical/professional | 10 | 9 | 12 | 8 | 9 | 12* | 7 | 5* | 6 | 6 | 6 | 8 |
| Trade | 15 | 15 | 13 | 14 | 12* | 12 | 15 | 10* | 12 | 13 | 13 | 11 |
| High-risk services | 29 | 29 | 30 | 29 | 28 | 27 | 27 | 31* | 29 | 27 | 27 | 27 |
| Low-risk services | 15 | 15 | 17 | 16 | 16 | 17 | 16 | 16 | 20 | 15 | 14 | 12* |
| Other | 5 | 4* | 4 | 5 | 4* | 2* | 6 | 6 | 5 | 5 | 5 | 6 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 6 | 7 | 6 | 8 | 8 | 9 | 5 | 6* | 6 | 6 | 6 | 4 |
| Back and neck sprains, strains, and non-specific pain | 21 | 21 | 19 | 18 | 18 | 17 | 17 | 18* | 16 | 15 | 15 | 16 |
| Fractures | 10 | 12* | 13 | 10 | 11 | 12 | 11 | 12 | 12 | 11 | 11 | 13 |
| Lacerations and contusions | 12 | 11 | 8* | 11 | 13 | 15* | 10 | 9 | 8 | 10 | 9 | 8 |
| Inflammations | 7 | 6 | 5* | 8 | 8 | 7 | 8 | 7 | 9 | 9 | 9 | 9 |
| Other sprains and strains | 23 | 22 | 27* | 22 | 21 | 20 | 26 | 25 | 27 | 26 | 27 | 25 |
| Upper extremity neurologic (carpal tunnel) | 1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 2 | 2 |
| Other injuries | 20 | 19 | 19 | 21 | 21 | 18 | 21 | 20 | 18 | 21 | 21 | 23 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $6,168 | $5,660* | $6,444 | $7,031 | $6,368* | $6,615 | $8,177 | $7,950 | $8,939 | $9,501 | $9,258 | $10,438 |
| Indemnity payment (mean) | $11,750 | $11,479 | $10,513 | $13,672 | $13,200 | $11,467* | $7,270 | $7,497 | $6,945 | $7,859 | $7,285 | $6,940 |
| Open claims (percentage of claims) | 19 | 17 | 20 | 23 | 19* | 20 | 20 | 17 | 20 | 20 | 19 | 19 |
| PPD or lump-sum payment (percentage of claims) | 13 | 13 | 11 | 14 | 15 | 13 | 4 | 4 | 3 | 5 | 4 | 3* |
| Lump-sum payment (percentage of claims) | 10 | 10 | 7* | 11 | 13 | 10 | 4 | 3 | 2* | 4 | 3 | 2* |
| Defense attorney involved (percentage of claims) | 20 | 19 | 17 | 21 | 21 | 19 | 12 | 10 | 8 | 12 | 10* | 10 |
| Vocational rehabilitation services (percentage of claims) | 2 | 2* | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 |
| PPD or lump-sum payment (mean) | $26,027 | $26,268 | $23,077 | $31,101 | $29,655 | $19,522* | $38,880 | $43,676 | $41,108 | $38,378 | $32,222* | $31,214 |
| Lump-sum payment (mean) | $31,974 | $31,558 | $33,325 | $36,946 | $34,483 | $23,479* | $42,609 | $49,777 | $44,219 | $43,404 | $38,749 | $41,456 |
| Duration of temporary disability (mean weeks) | 19 | 17* | 17 | 19 | 18 | 18 | 14 | 13 | 13 | 13 | 13 | 13 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 22 | 19* | 23 | 21 | 20 | 21 | 35 | 33 | 40* | 35 | 35 | 36 |
| Chiropractic care | 7 | 7 | 5 | 7 | 7 | 8 | 3 | 2 | 2 | 2 | 1 | 2 |

*continued*

**Table TA.A6 Analysis of Representativeness Based on Administrative Claims Data (continued)**

| | MN 2010/2012 | | | NC 2010/2012 | | | NC 2013/2015 | | | PA 2010/2012 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average for State | Average for Sample | Respondents[a] | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 43 | 43 | 46* | 43 | 43 | 46* | 44 | 43 | 46* | 44 | 44 | 48* |
| Female (percentage of claims) | 41 | 40 | 41 | 35 | 33* | 34 | 36 | 34 | 38 | 33 | 32 | 40* |
| Single (percentage of claims) | 49 | 49 | 45 | 44 | 43 | 36* | 49 | 45* | 43* | 46 | 46 | 37* |
| Tenure with employer (mean years) | 7 | 8* | 10* | 6 | 6 | 7* | 7 | 6* | 6 | 7 | 6* | 8 |
| Weekly wage (mean) | $681 | $714* | $783* | $614 | $630 | $659* | $694 | $705 | $700 | $695 | $707 | $735 |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 22 | 20 | 19 | 20 | 23* | 27* | 23 | 22 | 27 | 19 | 20 | 23 |
| Construction | 7 | 7* | 8 | 9 | 11* | 9 | 7 | 8 | 6 | 7 | 7 | 6 |
| Clerical/professional | 9 | 9 | 11 | 6 | 5 | 6 | 4 | 3* | 4 | 7 | 6 | 7 |
| Trade | 16 | 15 | 14 | 21 | 17* | 16* | 19 | 19 | 17 | 13 | 13 | 12 |
| High-risk services | 27 | 29 | 27 | 25 | 26* | 26 | 25 | 26 | 27 | 28 | 27 | 26 |
| Low-risk services | 14 | 14 | 14 | 12 | 13 | 12 | 13 | 15* | 13 | 14 | 15 | 16 |
| Other | 5 | 5 | 8* | 7 | 4* | 4* | 9 | 7* | 7 | 10 | 12* | 9 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 6 | 6* | 6 | 7 | 9* | 10* | 7 | 8* | 9 | 6 | 6 | 6 |
| Back and neck sprains, strains, and non-specific pain | 20 | 21 | 17 | 17 | 16 | 14* | 16 | 15 | 12* | 16 | 15 | 10* |
| Fractures | 9 | 9 | 11 | 12 | 13 | 14 | 10 | 12 | 13 | 9 | 10 | 15* |
| Lacerations and contusions | 9 | 9 | 6* | 12 | 11 | 11 | 10 | 10 | 10 | 10 | 10 | 9 |
| Inflammations | 8 | 8 | 11* | 7 | 8 | 9 | 9 | 9 | 9 | 8 | 8 | 9 |
| Other sprains and strains | 24 | 23 | 22 | 22 | 21* | 18* | 24 | 24 | 24 | 25 | 25 | 24 |
| Upper extremity neurologic (carpal tunnel) | 4 | 4 | 4 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4* |
| Other injuries | 22 | 21 | 22 | 21 | 20 | 21 | 22 | 21 | 21 | 23 | 23 | 22 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $11,373 | $11,212 | $12,746 | $14,181 | $13,906 | $15,505 | $14,708 | $13,982 | $13,208 | $11,334 | $11,138 | $11,616 |
| Indemnity payment (mean) | $8,116 | $8,190 | $8,934 | $17,116 | $17,645 | $18,681 | $18,224 | $17,557 | $15,954* | $15,140 | $14,713 | $13,512 |
| Open claims (percentage of claims) | 22 | 20 | 24 | 28 | 27 | 31 | 29 | 26* | 26 | 22 | 19* | 19 |
| PPD or lump-sum payment (percentage of claims) | 27 | 27 | 28 | 39 | 40 | 41 | 43 | 46* | 50* | 12 | 11 | 10 |
| Lump-sum payment (percentage of claims) | 10 | 9 | 7 | 29 | 28 | 28 | 32 | 33 | 34 | 12 | 11 | 9 |
| Defense attorney involved (percentage of claims) | 13 | 12 | 10* | 31 | 30 | 28 | 33 | 32 | 29 | 22 | 18* | 16* |
| Vocational rehabilitation services (percentage of claims) | 20 | 20 | 20 | 3 | 3 | 3 | 2 | 3* | 3 | 2 | 1 | 2 |
| PPD or lump-sum payment (mean) | $10,369 | $10,356 | $9,799 | $20,058 | $20,111 | $20,497 | $21,862 | $20,089 | $16,374* | $48,641 | $49,631 | $48,148 |
| Lump-sum payment (mean) | $23,317 | $23,858 | $25,576 | $25,574 | $25,710 | $27,215 | $27,268 | $25,436 | $21,428* | $49,630 | $51,140 | $49,395 |
| Duration of temporary disability (mean weeks) | 12 | 11 | 12 | 24 | 23 | 24 | 22 | 20* | 19* | 20 | 20 | 19 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 34 | 32 | 37 | 37 | 37 | 42* | 37 | 35 | 36 | 33 | 34 | 39* |
| Chiropractic care | 12 | 11 | 11 | 1 | 1 | 0* | 1 | 1 | 0* | 9 | 9 | 5* |

*continued*

**Table TA.A6 Analysis of Representativeness Based on Administrative Claims Data (continued)**

| | TN 2011/2013 | | | VA 2010/2012 | | | VA 2013/2015 | | | WI 2010/2012 | | | WI 2013/2015 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents | Average for State | Average for Sample | Respondents |
| **Worker characteristics** | | | | | | | | | | | | | | | |
| Age (mean years) | 43 | 43 | 47* | 43 | 43 | 46* | 43 | 43 | 46* | 44 | 44 | 48* | 44 | 44 | 48* |
| Female (percentage of claims) | 37 | 37 | 42 | 35 | 32* | 35 | 38 | 36 | 42 | 36 | 35 | 36 | 36 | 36 | 40 |
| Single (percentage of claims) | 42 | 43 | 39 | 45 | 43 | 40* | 51 | 48* | 43* | 46 | 43* | 34* | 51 | 47* | 40* |
| Tenure with employer (mean years) | 6 | 6 | 8* | 6 | 6* | 7 | 6 | 6 | 7* | 8 | 8 | 10* | 9 | 8* | 10 |
| Weekly wage (mean) | $647 | $656 | $651 | $686 | $689 | $719* | $705 | $709 | $737 | $723 | $735 | $776* | $772 | $790 | $781 |
| **Industry (percentage of claims)** | | | | | | | | | | | | | | | |
| Manufacturing | 22 | 23 | 24 | 12 | 13 | 15 | 12 | 14 | 15 | 34 | 35 | 36 | 38 | 38 | 37 |
| Construction | 6 | 7* | 6 | 10 | 12 | 9 | 10 | 11 | 8 | 8 | 8 | 7 | 6 | 7 | 6 |
| Clerical/professional | 4 | 4 | 7* | 8 | 8 | 8 | 7 | 10* | 10* | 7 | 8* | 10* | 5 | 6 | 7 |
| Trade | 14 | 15 | 17 | 17 | 11* | 12* | 18 | 16* | 17 | 14 | 12 | 12 | 13 | 11* | 13 |
| High-risk services | 29 | 30 | 28 | 28 | 30* | 28 | 28 | 28 | 28 | 22 | 21 | 17* | 23 | 24 | 22 |
| Low-risk services | 11 | 13* | 11 | 16 | 16 | 18 | 15 | 14 | 17 | 11 | 9* | 10 | 10 | 11 | 10 |
| Other | 12 | 7* | 8* | 8 | 9 | 10 | 9 | 8 | 5* | 5 | 5 | 7 | 4 | 4 | 5 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | | | | |
| Neurologic spine pain | 7 | 9 | 9 | 6 | 6 | 5 | 7 | 7 | 6 | 5 | 6 | 6 | 6 | 6 | 4 |
| Back and neck sprains, strains, and non-specific pain | 15 | 14 | 11* | 16 | 15 | 13 | 15 | 14 | 13 | 15 | 13* | 11* | 13 | 13 | 9* |
| Fractures | 10 | 11 | 10 | 13 | 15 | 18* | 12 | 14* | 16* | 9 | 9 | 10 | 9 | 10 | 12* |
| Lacerations and contusions | 11 | 8* | 11 | 13 | 12 | 11 | 12 | 12 | 10 | 10 | 9 | 10 | 8 | 9 | 8 |
| Inflammations | 9 | 11* | 12 | 5 | 6 | 6 | 7 | 6 | 8 | 8 | 9 | 8 | 9 | 8 | 9 |
| Other sprains and strains | 25 | 23* | 25 | 26 | 25 | 26 | 25 | 25 | 25 | 26 | 25 | 24 | 25 | 25 | 24 |
| Upper extremity neurologic (carpal tunnel) | 3 | 4 | 4 | 0 | 0* | 1 | 0 | 0 | 0 | 3 | 4 | 5* | 4 | 4 | 6 |
| Other injuries | 21 | 21 | 17 | 20 | 20 | 21 | 22 | 22 | 22 | 24 | 25 | 25 | 25 | 26 | 27 |
| **Claim costs and characteristics** | | | | | | | | | | | | | | | |
| Medical payment (mean) | $12,265 | $11,950 | $13,121 | $15,879 | $15,807 | $17,191 | $17,162 | $16,837 | $19,619* | $16,771 | $17,487 | $19,260* | $19,523 | $19,098 | $20,844 |
| Indemnity payment (mean) | $13,094 | $13,222 | $13,850 | $9,934 | $10,246 | $10,488 | $10,672 | $9,682* | $9,842 | $7,449 | $7,547 | $7,894 | $7,972 | $7,870 | $8,238 |
| Open claims (percentage of claims) | 26 | 24 | 24 | 24 | 22 | 28* | 26 | 22* | 26 | 20 | 17* | 18 | 23 | 19* | 20 |
| PPD or lump-sum payment (percentage of claims) | 36 | 36 | 38 | 14 | 14 | 12 | 15 | 15 | 15 | 34 | 38* | 43* | 36 | 38 | 42* |
| Lump-sum payment (percentage of claims) | 29 | 30 | 31 | 10 | 11 | 7* | 12 | 12 | 10 | 7 | 9* | 10 | 9 | 9 | 10 |
| Defense attorney involved (percentage of claims) | 43 | 46* | 46 | 21 | 20 | 19 | 23 | 22 | 21 | 8 | 6* | 7 | 8 | 7 | 6 |
| Vocational rehabilitation services (percentage of claims) | 2 | 1* | 1* | 5 | 5 | 5 | 4 | 3 | 4 | 1 | 1 | 1 | 9 | 12* | 9 |
| PPD or lump-sum payment (mean) | $19,210 | $19,438 | $18,065 | $21,350 | $22,281 | $19,278 | $25,705 | $22,635* | $22,170 | $8,310 | $8,182 | $7,803 | $8,788 | $8,706 | $9,021 |
| Lump-sum payment (mean) | $22,598 | $22,243 | $21,552 | $27,023 | $27,845 | $26,273 | $30,732 | $26,429* | $26,873 | $12,931 | $11,597 | $10,782 | $12,688 | $12,016 | $12,873 |
| Duration of temporary disability (mean weeks) | 15 | 14* | 15 | 16 | 16 | 17 | 15 | 14 | 15 | 9 | 9 | 9 | 10 | 9 | 10 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | | | | |
| Major surgery | 37 | 40* | 43* | 32 | 32 | 33 | 31 | 30 | 33 | 42 | 41 | 47* | 39 | 38 | 42 |
| Chiropractic care | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 1 | 9 | 9 | 10 | 8 | 7 | 7 |

*Notes:* Underlying data come from the WCRI Detailed Benchmark/Evaluation (DBE) database. All values are for claims with more than seven days of lost time. 2010/2012 refers to workers injured in 2010 and evaluated as of March 2012. Similar notation is used for other years. The DBE contains 45–66 percent of the claims in each state. The state-level values for average medical cost per claim and average indemnity cost per claim were externally validated against reports from the insurance rating bureaus in each state (Telles, 2013).

[a] Minnesota (injury year 2010) and Michigan (injury year 2013) results are presented after reweighting the data to bring the medical costs among respondents in line with the average for the state population.

* Different from the state average at the 5 percent significance level.

*Key:* PPD: permanent partial disability.

**Table TA.A7 Analysis of Response Bias Based on Administrative Claims Data**

| | AR 2010–2011/2012–2013 | | | CT 2011/2013 | | | FL 2012/2014 | | | GA 2012/2014 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 45 | 46 | 39* | 47 | 45* | 41* | 48 | 47 | 42* | 44 | 42 | 40* |
| Female (percentage of claims) | 32 | 28 | 28 | 47 | 39 | 40 | 43 | 37 | 38 | 45 | 40 | 35* |
| Single (percentage of claims) | 42 | 39 | 51* | 46 | 37 | 60* | 46 | 47 | 56* | 47 | 41 | 54 |
| Tenure with employer (mean years) | 5 | 5 | 3* | 9 | 8 | 6* | 7 | 6 | 5* | 7 | 6 | 5* |
| Weekly wage (mean) | $622 | $665 | 559* | $851 | $919 | $707* | $661 | $728 | $568* | $661 | $725 | $582* |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 30 | 31 | 27 | 13 | 10 | 11 | 8 | 5 | 8 | 16 | 15 | 19 |
| Construction | 10 | 8 | 15* | 6 | 8 | 9 | 5 | 5 | 8 | 5 | 6 | 11* |
| Clerical/professional | 5 | 4 | 3 | 11 | 14 | 6* | 10 | 12 | 9 | 7 | 8 | 3* |
| Trade | 14 | 16 | 11 | 12 | 13 | 14 | 17 | 17 | 16 | 17 | 18 | 16 |
| High-risk services | 24 | 26 | 28 | 31 | 31 | 36 | 29 | 30 | 35 | 28 | 24 | 28 |
| Low-risk services | 14 | 14 | 12 | 17 | 16 | 16 | 23 | 21 | 18 | 18 | 23 | 15 |
| Other | 4 | 2 | 4 | 10 | 8 | 9 | 8 | 10 | 6 | 8 | 5 | 6 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 11 | 6 | 6* | 8 | 6 | 10 | 10 | 8 | 8 | 9 | 10 | 9 |
| Back and neck sprains, strains, and non-specific pain | 14 | 15 | 13 | 19 | 19 | 21 | 19 | 18 | 19 | 17 | 20 | 18 |
| Fractures | 14 | 18 | 14 | 9 | 9 | 9 | 11 | 10 | 10 | 10 | 7 | 9 |
| Lacerations and contusions | 9 | 7 | 13 | 7 | 8 | 12 | 11 | 8 | 13 | 10 | 9 | 12 |
| Inflammations | 6 | 5 | 4 | 11 | 10 | 12 | 9 | 8 | 7 | 12 | 7 | 10 |
| Other sprains and strains | 22 | 23 | 21 | 22 | 27 | 20 | 21 | 24 | 23 | 22 | 24 | 21 |
| Upper extremity neurologic (carpal tunnel) | 2 | 2 | 2 | 5 | 3 | 3 | 2 | 1 | 1 | 2 | 3 | 1 |
| Other injuries | 22 | 23 | 27 | 18 | 18 | 14 | 17 | 22 | 19 | 18 | 19 | 20 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $13,056 | $12,468 | $11,422 | $12,136 | $10,449 | $10,914 | $14,438 | $13,675 | $11,927* | $14,588 | $12,389 | $12,602 |
| Indemnity payment (mean) | $9,349 | $8,768 | $8,348 | $9,729 | $9,964 | $10,651 | $7,479 | $7,568 | $6,725 | $14,748 | $15,170 | $14,936 |
| Open claims (percentage of claims) | 24 | 18 | 16* | 35 | 32 | 29 | 27 | 21 | 21* | 27 | 29 | 21 |
| PPD or lump-sum payment (percentage of claims) | 37 | 36 | 33 | 32 | 29 | 27 | 46 | 42 | 35* | 44 | 35* | 40 |
| Lump-sum payment (percentage of claims) | 12 | 13 | 13 | 6 | 9 | 7 | 13 | 13 | 14 | 26 | 26 | 31 |
| Defense attorney involved (percentage of claims) | 16 | 16 | 22* | 20 | 21 | 27 | 31 | 28 | 34 | 33 | 31 | 42* |
| Vocational rehabilitation services (percentage of claims) | 1 | 3 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 2 |
| PPD or lump-sum payment (mean) | $11,835 | $9,191 | $10,247 | $8,752 | $11,592* | $13,529* | $4,617 | $4,767 | $5,370 | $18,359 | $19,881 | $20,801 |
| Lump-sum payment (mean) | $18,347 | $15,052 | $15,657 | $12,582 | $13,692 | $28,901* | $12,139 | $10,830 | $10,190 | $27,334 | $25,348 | $25,590 |
| Duration of temporary disability (mean weeks) | 13 | 15 | 13 | 17 | 13 | 17 | 15 | 13 | 14 | 21 | 24 | 22 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 41 | 41 | 34 | 35 | 29 | 27* | 29 | 28 | 23 | 36 | 27* | 32 |
| Chiropractic care | 3 | 1 | 1 | 5 | 4 | 5 | 1 | 1 | 1 | 1 | 2 | 0 |

*continued*

**Table TA.A7 Analysis of Response Bias Based on Administrative Claims Data (continued)**

| | IA 2011/2013 | | | IN 2010/2012 | | | IN 2013/2015 | | | KY 2012/2014 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 47 | 46 | 42* | 48 | 46 | 41* | 47 | 46 | 41* | 45 | 43 | 39* |
| Female (percentage of claims) | 37 | 27* | 36 | 39 | 24* | 30* | 37 | 32 | 29* | 43 | 26* | 34* |
| Single (percentage of claims) | 41 | 36 | 50* | 35 | 33 | 49* | 45 | 39 | 57* | 45 | 36* | 54* |
| Tenure with employer (mean years) | 9 | 7 | 5* | 8 | 8 | 4* | 7 | 7 | 6* | 7 | 9* | 6 |
| Weekly wage (mean) | $726 | $767 | $650* | $647 | $723* | $572* | $713 | $732 | $664 | $642 | $760* | $579* |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 34 | 26* | 29 | 32 | 27 | 32 | 26 | 26 | 32 | 25 | 23 | 26 |
| Construction | 6 | 9 | 10 | 5 | 8 | 5 | 5 | 4 | 7 | 8 | 7 | 5 |
| Clerical/professional | 11 | 12 | 11 | 7 | 6 | 5 | 4 | 3 | 3 | 6 | 2* | 4 |
| Trade | 10 | 11 | 10 | 11 | 12 | 16 | 16 | 12 | 12 | 13 | 12 | 14 |
| High-risk services | 18 | 21 | 23 | 31 | 34 | 30 | 31 | 37 | 35 | 25 | 30 | 25 |
| Low-risk services | 12 | 9 | 7* | 12 | 9 | 9 | 11 | 13 | 9 | 10 | 12 | 9 |
| Other | 9 | 12 | 10 | 3 | 3 | 3 | 6 | 4 | 3* | 13 | 16 | 16 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 4 | 4 | 2 | 5 | 5 | 7 | 7 | 7 | 6 | 6 | 9 | 7 |
| Back and neck sprains, strains, and non-specific pain | 13 | 16 | 17 | 11 | 12 | 12 | 10 | 12 | 14 | 14 | 19 | 17 |
| Fractures | 13 | 5* | 12 | 16 | 11 | 11* | 15 | 12 | 13 | 13 | 12 | 10 |
| Lacerations and contusions | 7 | 11 | 8 | 8 | 8 | 15* | 8 | 9 | 10 | 11 | 4* | 10 |
| Inflammations | 10 | 6 | 10 | 9 | 3* | 7 | 11 | 8 | 9 | 7 | 10 | 7 |
| Other sprains and strains | 29 | 29 | 29 | 24 | 31 | 21 | 25 | 28 | 26 | 23 | 20 | 26 |
| Upper extremity neurologic (carpal tunnel) | 4 | 4 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 1 | 2 |
| Other injuries | 20 | 26 | 19 | 26 | 28 | 25 | 22 | 23 | 20 | 22 | 25 | 20 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $16,302 | $14,594 | $13,662* | $17,642 | $14,596 | $14,312* | $22,425 | $18,265* | $17,448* | $11,927 | $11,477 | $10,644 |
| Indemnity payment (mean) | $11,895 | $13,489 | $10,555 | $6,810 | $7,196 | $6,750 | $8,024 | $6,734 | $6,859 | $10,210 | $12,564 | $9,950 |
| Open claims (percentage of claims) | 24 | 23 | 21 | 14 | 16 | 12 | 18 | 16 | 12* | 26 | 24 | 21 |
| PPD or lump-sum payment (percentage of claims) | 48 | 44 | 42 | 30 | 24 | 31 | 28 | 28 | 26 | 22 | 22 | 21 |
| Lump-sum payment (percentage of claims) | 17 | 17 | 16 | 17 | 17 | 18 | 17 | 15 | 17 | 15 | 18 | 16 |
| Defense attorney involved (percentage of claims) | 16 | 20 | 18 | 10 | 15 | 18* | 14 | 14 | 16 | 17 | 21 | 21 |
| Vocational rehabilitation services (percentage of claims) | 3 | 4 | 3 | 1 | 0 | 1 | 4 | 3 | 5 | 4 | 6 | 4 |
| PPD or lump-sum payment (mean) | $14,661 | $18,981 | $16,039 | $7,225 | $9,558* | $8,525 | $9,302 | $6,920 | $8,152 | $12,925 | $23,225* | $16,972 |
| Lump-sum payment (mean) | $21,269 | $28,305 | $24,980 | $11,199 | $12,655 | $12,504 | $13,535 | $11,072 | $11,221 | $17,500 | $27,523* | $20,397 |
| Duration of temporary disability (mean weeks) | 10 | 10 | 10 | 12 | 12 | 11 | 12 | 11 | 12 | 17 | 15 | 17 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 47 | 39 | 39* | 46 | 36* | 36* | 45 | 43 | 36* | 37 | 32 | 31 |
| Chiropractic care | 4 | 2 | 1* | 0 | 2* | 1 | 0 | 1 | 1 | 7 | 5 | 4* |

*continued*

**Table TA.A7 Analysis of Response Bias Based on Administrative Claims Data (continued)**

| | MA 2010/2012 | | | MA 2013/2015 | | | MI 2010/2012 | | | MI 2013/2015 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents[a] | Refusals | Invalid Phone Number |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 44 | 43 | 41* | 45 | 43 | 41* | 46 | 43* | 40* | 46 | 45 | 43* |
| Female (percentage of claims) | 34 | 31 | 33 | 35 | 27* | 31 | 40 | 32 | 36 | 40 | 37 | 39 |
| Single (percentage of claims) | 48 | 43 | 61* | 49 | 49 | 56 | 43 | 39 | 53* | 41 | 45 | 59* |
| Tenure with employer (mean years) | 7 | 7 | 5* | 7 | 7 | 5* | 9 | 8 | 6* | 9 | 9 | 8 |
| Weekly wage (mean) | $801 | $869 | $684* | $797 | $884* | $759 | $737 | $788 | $653* | $749 | $832* | $696 |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 13 | 6* | 17 | 16 | 9* | 16 | 23 | 26 | 23 | 30 | 27 | 27 |
| Construction | 11 | 19* | 14 | 14 | 17 | 17 | 6 | 6 | 8 | 6 | 5 | 7 |
| Clerical/professional | 12 | 7 | 9 | 12 | 9 | 8 | 6 | 3 | 4 | 8 | 4 | 4 |
| Trade | 13 | 17 | 14 | 12 | 14 | 9 | 12 | 7 | 12 | 11 | 18* | 12 |
| High-risk services | 30 | 31 | 27 | 27 | 26 | 29 | 29 | 35 | 30 | 27 | 26 | 29 |
| Low-risk services | 17 | 14 | 17 | 17 | 18 | 16 | 20 | 17 | 17 | 12 | 15 | 16 |
| Other | 4 | 5 | 3 | 2 | 7* | 4 | 5 | 5 | 6 | 6 | 4 | 6 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 6 | 7 | 6 | 9 | 11 | 6 | 6 | 4 | 6 | 4 | 5 | 4 |
| Back and neck sprains, strains, and non-specific pain | 19 | 22 | 21 | 17 | 17 | 20 | 16 | 14 | 21 | 16 | 17 | 15 |
| Fractures | 13 | 16 | 11 | 12 | 11 | 11 | 12 | 16 | 12 | 13 | 11 | 8 |
| Lacerations and contusions | 8 | 10 | 13* | 15 | 9* | 12 | 8 | 6 | 9 | 8 | 9 | 10 |
| Inflammations | 5 | 7 | 7 | 7 | 7 | 6 | 9 | 10 | 7 | 9 | 7 | 11 |
| Other sprains and strains | 27 | 20 | 22 | 20 | 23 | 20 | 27 | 23 | 23 | 25 | 24 | 28 |
| Upper extremity neurologic (carpal tunnel) | 2 | 0 | 1 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 | 3 |
| Other injuries | 19 | 17 | 19 | 18 | 20 | 25* | 18 | 24 | 19 | 23 | 26 | 21 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $6,444 | $6,227 | $5,128* | $6,615 | $5,527 | $5,946 | $8,939 | $7,640 | $7,231* | $10,438 | $8,133* | $7,394* |
| Indemnity payment (mean) | $10,513 | $13,232 | $11,922 | $11,467 | $14,413 | $13,869 | $6,945 | $7,413 | $7,434 | $6,940 | $7,367 | $6,896 |
| Open claims (percentage of claims) | 20 | 16 | 18 | 20 | 20 | 17 | 20 | 13 | 16 | 19 | 23 | 18 |
| PPD or lump-sum payment (percentage of claims) | 11 | 10 | 16* | 13 | 16 | 16 | 3 | 4 | 4 | 3 | 4 | 6 |
| Lump-sum payment (percentage of claims) | 7 | 8 | 13* | 10 | 14 | 15 | 2 | 3 | 3 | 2 | 3 | 5* |
| Defense attorney involved (percentage of claims) | 17 | 16 | 22 | 19 | 20 | 24 | 8 | 9 | 12 | 10 | 10 | 10 |
| Vocational rehabilitation services (percentage of claims) | 2 | 0 | 2 | 2 | 2 | 4 | 2 | 1 | 2 | 4 | 2 | 2 |
| PPD or lump-sum payment (mean) | $23,077 | $34,370 | $27,763 | $19,522 | $33,043* | $34,687* | $41,108 | $41,330 | $52,705 | $31,214 | $30,679 | $21,319 |
| Lump-sum payment (mean) | $33,325 | $39,813 | $31,956 | $23,479 | $37,119* | $37,898* | $44,219 | $53,271 | $55,461 | $41,456 | $40,584 | $24,255 |
| Duration of temporary disability (mean weeks) | 17 | 18 | 17 | 18 | 19 | 19 | 13 | 12 | 13 | 13 | 12 | 13 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 23 | 21 | 15* | 21 | 23 | 18 | 40 | 38 | 28* | 36 | 36 | 34 |
| Chiropractic care | 5 | 6 | 8 | 8 | 7 | 5 | 2 | 2 | 4 | 2 | 1 | 0* |

*continued*

**Table TA.A7 Analysis of Response Bias Based on Administrative Claims Data (continued)**

| | MN 2010/2012 | | | NC 2010/2012 | | | NC 2013/2015 | | | PA 2010/2012 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Respondents[a] | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number |
| **Worker characteristics** | | | | | | | | | | | | |
| Age (mean years) | 46 | 43* | 41* | 46 | 44* | 40* | 46 | 45 | 42* | 48 | 45* | 41* |
| Female (percentage of claims) | 41 | 39 | 35 | 34 | 30 | 31 | 38 | 33 | 32* | 40 | 28* | 30* |
| Single (percentage of claims) | 45 | 48 | 49 | 36 | 42 | 47* | 43 | 42 | 47 | 37 | 37 | 53* |
| Tenure with employer (mean years) | 10 | 9 | 6* | 7 | 7 | 4* | 6 | 6 | 6 | 8 | 6* | 5* |
| Weekly wage (mean) | $783 | $773 | $691* | $659 | $653 | $586* | $700 | $807* | $671 | $735 | $773 | $648* |
| **Industry (percentage of claims)** | | | | | | | | | | | | |
| Manufacturing | 19 | 15 | 26* | 27 | 21 | 21* | 27 | 20 | 23 | 23 | 20 | 21 |
| Construction | 8 | 10 | 6 | 9 | 11 | 14* | 6 | 5 | 10* | 6 | 9 | 7 |
| Clerical/professional | 11 | 11 | 8 | 6 | 5 | 5 | 4 | 5 | 2 | 7 | 6 | 6 |
| Trade | 14 | 17 | 13 | 16 | 19 | 15 | 17 | 21 | 19 | 12 | 8 | 13 |
| High-risk services | 27 | 26 | 29 | 26 | 27 | 25 | 27 | 26 | 25 | 26 | 27 | 24 |
| Low-risk services | 14 | 14 | 14 | 12 | 15 | 15 | 13 | 16 | 15 | 16 | 16 | 15 |
| Other | 8 | 7 | 5 | 4 | 3 | 5 | 7 | 8 | 7 | 9 | 12 | 13 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | |
| Neurologic spine pain | 6 | 6 | 5 | 10 | 10 | 8 | 9 | 7 | 9 | 6 | 8 | 5 |
| Back and neck sprains, strains, and non-specific pain | 17 | 20 | 23* | 14 | 18 | 16 | 12 | 14 | 18* | 10 | 16* | 17* |
| Fractures | 11 | 10 | 8 | 14 | 13 | 14 | 13 | 15 | 10 | 15 | 11 | 7* |
| Lacerations and contusions | 6 | 8 | 11* | 11 | 8 | 12 | 10 | 6 | 10 | 9 | 9 | 14* |
| Inflammations | 11 | 9 | 8 | 9 | 10 | 10 | 9 | 11 | 9 | 9 | 8 | 7 |
| Other sprains and strains | 22 | 23 | 20 | 18 | 19 | 20 | 24 | 25 | 22 | 24 | 24 | 23 |
| Upper extremity neurologic (carpal tunnel) | 4 | 5 | 3 | 2 | 3 | 1* | 2 | 1 | 1 | 4 | 0* | 3 |
| Other injuries | 22 | 20 | 22 | 21 | 19 | 19 | 21 | 21 | 20 | 22 | 24 | 25 |
| **Claim costs and characteristics** | | | | | | | | | | | | |
| Medical payment (mean) | $12,746 | $11,590 | $11,014 | $15,505 | $14,124 | $12,751* | $13,208 | $14,504 | $14,569 | $11,616 | $11,346 | $10,708 |
| Indemnity payment (mean) | $8,934 | $8,648 | $8,117 | $18,681 | $20,113 | $17,170 | $15,954 | $18,937 | $18,529 | $13,512 | $17,782 | $14,970 |
| Open claims (percentage of claims) | 24 | 22 | 18 | 31 | 27 | 23* | 26 | 30 | 25 | 19 | 20 | 16 |
| PPD or lump-sum payment (percentage of claims) | 28 | 22 | 27 | 41 | 40 | 41 | 50 | 43 | 45 | 10 | 11 | 13 |
| Lump-sum payment (percentage of claims) | 7 | 7 | 11 | 28 | 29 | 28 | 34 | 27 | 35 | 9 | 10 | 12 |
| Defense attorney involved (percentage of claims) | 10 | 13 | 15* | 28 | 32 | 34 | 29 | 31 | 36* | 16 | 17 | 20 |
| Vocational rehabilitation services (percentage of claims) | 20 | 22 | 22 | 3 | 3 | 2 | 3 | 2 | 4 | 2 | 1 | 1 |
| PPD or lump-sum payment (mean) | $9,799 | $11,810 | $12,437 | $20,497 | $21,693 | $19,826 | $16,374 | $20,929 | $22,587* | $48,148 | $69,525* | $46,227 |
| Lump-sum payment (mean) | $25,576 | $29,030 | $26,209 | $27,215 | $26,381 | $25,907 | $21,428 | $29,695* | $27,492 | $49,395 | $73,911* | $47,068 |
| Duration of temporary disability (mean weeks) | 12 | 13 | 10 | 24 | 27 | 22 | 19 | 22 | 21 | 19 | 21 | 20 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | |
| Major surgery | 37 | 31 | 30* | 42 | 36 | 32* | 36 | 36 | 34 | 39 | 30* | 33 |
| Chiropractic care | 11 | 11 | 12 | 0 | 0 | 1 | 0 | 1 | 1 | 5 | 9 | 11* |

*continued*

**Table TA.A7 Analysis of Response Bias Based on Administrative Claims Data (continued)**

| | TN 2011/2013 | | | VA 2010/2012 | | | VA 2013/2015 | | | WI 2010/2012 | | | WI 2013/2015 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number | Respondents | Refusals | Invalid Phone Number |
| **Worker characteristics** | | | | | | | | | | | | | | | |
| Age (mean years) | 47 | 44* | 41* | 46 | 45 | 41* | 46 | 47 | 41* | 48 | 47 | 42* | 48 | 47 | 43* |
| Female (percentage of claims) | 42 | 30* | 38 | 35 | 26* | 32 | 42 | 33* | 32* | 36 | 32 | 34 | 40 | 34 | 29* |
| Single (percentage of claims) | 39 | 38 | 48* | 40 | 35 | 51* | 43 | 45 | 52* | 34 | 37 | 53* | 40 | 45 | 47 |
| Tenure with employer (mean years) | 8 | 7 | 5* | 7 | 7 | 5* | 7 | 7 | 5* | 10 | 11 | 7* | 10 | 10 | 8 |
| Weekly wage (mean) | $651 | $722 | $577* | $719 | $766 | $656* | $737 | $763 | $633* | $776 | $775 | $647* | $781 | $840 | $778 |
| **Industry (percentage of claims)** | | | | | | | | | | | | | | | |
| Manufacturing | 24 | 18 | 20 | 15 | 19 | 11 | 15 | 15 | 14 | 36 | 41 | 33 | 37 | 31 | 42 |
| Construction | 6 | 5 | 9 | 9 | 11 | 15* | 8 | 9 | 13* | 7 | 11 | 6 | 6 | 8 | 8 |
| Clerical/professional | 7 | 6 | 4* | 8 | 7 | 6 | 10 | 16 | 7 | 10 | 8 | 7 | 7 | 6 | 6 |
| Trade | 17 | 15 | 16 | 12 | 12 | 12 | 17 | 14 | 15 | 12 | 10 | 15 | 13 | 11 | 8 |
| High-risk services | 28 | 35 | 32 | 28 | 25 | 33 | 28 | 24 | 32 | 17 | 12 | 25* | 22 | 24 | 21 |
| Low-risk services | 11 | 15 | 11 | 18 | 15 | 13* | 17 | 14 | 12 | 10 | 13 | 8 | 10 | 18* | 10 |
| Other | 8 | 6 | 9 | 10 | 11 | 10 | 5 | 8 | 7 | 7 | 5 | 5 | 5 | 4 | 5 |
| **Type of injury (percentage of claims)** | | | | | | | | | | | | | | | |
| Neurologic spine pain | 9 | 12 | 9 | 5 | 5 | 6 | 6 | 10 | 5 | 6 | 6 | 6 | 4 | 6 | 3 |
| Back and neck sprains, strains, and non-specific pain | 11 | 14 | 15 | 13 | 15 | 17 | 13 | 9 | 16 | 11 | 11 | 16 | 9 | 14* | 15* |
| Fractures | 10 | 10 | 13 | 18 | 17 | 16 | 16 | 14 | 14 | 10 | 9 | 10 | 12 | 9 | 11 |
| Lacerations and contusions | 11 | 8 | 6* | 11 | 10 | 13 | 10 | 11 | 15* | 10 | 6 | 10 | 8 | 9 | 7 |
| Inflammations | 12 | 13 | 9 | 6 | 5 | 6 | 8 | 2* | 6 | 8 | 16* | 7 | 9 | 7 | 8 |
| Other sprains and strains | 25 | 19 | 24 | 26 | 28 | 21 | 25 | 26 | 23 | 24 | 22 | 24 | 24 | 26 | 23 |
| Upper extremity neurologic (carpal tunnel) | 4 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 3 | 6 | 3 | 2* |
| Other injuries | 17 | 21 | 22 | 21 | 21 | 21 | 22 | 27 | 21 | 25 | 28 | 24 | 27 | 26 | 31 |
| **Claim costs and characteristics** | | | | | | | | | | | | | | | |
| Medical payment (mean) | $13,121 | $10,879 | $11,586 | $17,191 | $14,811 | $14,989 | $19,619 | $14,999* | $14,827* | $19,260 | $17,263 | $15,485* | $20,844 | $18,202 | $18,032 |
| Indemnity payment (mean) | $13,850 | $12,790 | $10,812* | $10,488 | $12,331 | $8,999 | $9,842 | $8,741 | $10,452 | $7,894 | $6,914 | $6,917 | $8,238 | $8,404 | $7,898 |
| Open claims (percentage of claims) | 24 | 26 | 19 | 28 | 25 | 20* | 26 | 18* | 20* | 18 | 18 | 13* | 20 | 21 | 13* |
| PPD or lump-sum payment (percentage of claims) | 38 | 33 | 35 | 12 | 14 | 16 | 15 | 10 | 17 | 43 | 38 | 34* | 42 | 35 | 37 |
| Lump-sum payment (percentage of claims) | 31 | 26 | 29 | 7 | 9 | 12* | 10 | 7 | 15 | 10 | 10 | 7 | 10 | 10 | 9 |
| Defense attorney involved (percentage of claims) | 46 | 46 | 49 | 19 | 18 | 22 | 21 | 15 | 25 | 7 | 7 | 5 | 6 | 8 | 5 |
| Vocational rehabilitation services (percentage of claims) | 1 | 1 | 1 | 5 | 5 | 5 | 4 | 1 | 3 | 1 | 2 | 1 | 9 | 13 | 13 |
| PPD or lump-sum payment (mean) | $18,065 | $18,960 | $15,425 | $19,278 | $26,481 | $17,162 | $22,170 | $24,894 | $26,561 | $7,803 | $6,791 | $7,670 | $9,021 | $8,821 | $9,618 |
| Lump-sum payment (mean) | $21,552 | $22,561 | $17,595 | $26,273 | $34,646 | $20,384 | $26,873 | $30,148 | $30,128 | $10,782 | $7,535 | $9,105 | $12,873 | $12,430 | $15,833 |
| Duration of temporary disability (mean weeks) | 15 | 14 | 14 | 17 | 17 | 15 | 15 | 13 | 14 | 9 | 9 | 10 | 10 | 10 | 9 |
| **Type of medical treatment received (percentage of claims)** | | | | | | | | | | | | | | | |
| Major surgery | 43 | 40 | 35* | 33 | 32 | 31 | 33 | 32 | 26* | 47 | 44 | 37* | 42 | 36 | 32* |
| Chiropractic care | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 10 | 8 | 9 | 7 | 9 | 4 |

*Notes:* Underlying data come from the WCRI Detailed Benchmark/Evaluation (DBE) database. All values are for claims with more than seven days of lost time. 2010/2012 refers to workers injured in 2010 and evaluated as of March 2012. Similar notation is used for other years.

[a] Minnesota (injury year 2010) and Michigan (injury year 2013) results are presented after reweighting the data to bring the medical costs among respondents in line with the average for the state population.

* Different from the respondents at the 5 percent significance level.

*Key:* PPD: permanent partial disability.

# TECHNICAL APPENDIX B

# MEASURING HEALTH STATUS, INJURY SEVERITY, AND RECOVERY OF HEALTH AND FUNCTIONING

## APPROACH TO MEASURING PHYSICAL HEALTH AND FUNCTIONING

In each interview, we obtained data on health and functioning from the perspective of three points in time: preinjury, postinjury, and at interview. We thus relied on each worker's perception of his or her own health and functioning three years, on average, before the interview.

The overall health and functioning measure is derived from questions in the SF-12v2®, a commonly used standardized survey instrument that has been validated on numerous populations. We used the physical component summary score derived using the responses to the six general health and physical functioning questions in the SF-12v2®. The questions in the list that follows pertain to the respondent's perception of health and functioning four weeks preinjury. We asked these questions two more times, modified as appropriate, to ascertain postinjury and at-interview health and functioning. The outcome measures were based on each health status measure.

- *General health:* In general, would you say that your health was excellent, very good, good, fair, or poor in the four weeks before your injury?
- *Limits on activities:* During a typical day in the four weeks before your injury, how limited were you in performing moderate activities such as moving a table, pushing a vacuum cleaner, bowling, or playing golf? Were you limited a lot, limited a little, or not limited at all?
- *Limits on climbing stairs:* During a typical day in the four weeks before your injury, how limited were you in climbing several flights of stairs? Were you limited a lot, limited a little, or not limited at all?
- *Amount accomplished:* During the four weeks before your injury, did you accomplish less than you would like with your work or other regular daily activities as a result of your physical health? (Note that daily activities include activities outside of work.)
- *Physical limitations:* During the four weeks before your injury, were you limited in the kind of work or other regular daily activities you did as a result of your physical health?
- *Pain:* During the four weeks before your injury, how much did pain interfere with your normal work, including both work outside the home and housework? Would you say not at all, a little bit, moderately, quite a bit, or extremely?

We retained the full set of 12 questions from the SF-12v2® when we asked respondents about their at-interview physical and mental health and functioning. However, there are two significant differences between the survey approach we used and the traditional approach. First, we used the six general health and physical functioning questions from the SF-12v2® to ask about all three points in time. We asked the six mental health and functioning questions from the SF-12v2® regarding the time of the interview only, not pre- and postinjury, in part because of special concerns about the difficulty of recalling mental health status. Moreover, to ask 12 questions about each of the three periods would have significantly lengthened the time needed to

conduct the entire survey. Additionally, we were concerned that respondents might be confused by, or balk at, answering the same 12 questions three times. As an accommodation to those concerns, we eliminated the six mental health questions from the pre- and postinjury portions of the survey.

The standard software for scoring the SF-12v2® requires that all 12 questions be administered. That was not an issue in scoring a worker's at-interview condition. To arrive at a worker's pre- and postinjury standardized scaled scores for physical health and functioning, we assumed that the responses to the six mental health and functioning questions would be the same as the responses at the time of the interview.[1] We recognize the potential for noise created by this approach. Suppose, for instance, that the worker's mental health and functioning were lower at the time of the interview because of the injury compared with the preinjury score. By incorporating the scores from the at-interview mental health questions into the worker's preinjury score, we might underestimate the preinjury score, leading us to underestimate any decline in the score and to overstate recovery.

A previous WCRI study determined the impact this assumption could have on the physical health and functioning scores by replacing the actual responses to the six mental health and functioning questions with best-case responses and then with worst-case responses. In the scaled score for physical health and functioning, the mental health questions carry a very small weight.[2] Using the best-case or worst-case imputations in place of actual values changed the physical health and functioning scores by only one point in either direction (Belton and Liu, 2010).

The second difference from the standard SF-12v2® approach relates to the retrospective use of the questions. In the standard use of the SF-12v2®, the worker is asked about his or her health status in the four-week period that precedes the interview. That was the approach we took in this survey when asking about the worker's at-interview health status. However, we also asked the worker to think back to the time before the injury and immediately after the injury and answer the same questions about health status, limitations on activities and climbing stairs, pain levels, and so on. This approach raised concerns about the accuracy of workers' recall. However, we were willing to consider that workers could recall facts surrounding important dates in their lives—such as the dates of their work injuries and their treatments for significant medical events. Our approach was to evaluate our concerns about recall based on how workers' responses about their preinjury health and functioning compared with the average for the U.S. population for the SF-12v2®. If the responses were similar, recall concerns would not be significant, on average; if the responses were very dissimilar, concerns about recall and validity would be reinforced. As described later, the results were reassuring on the recall issue.

## RECOVERY OF HEALTH AND FUNCTIONING

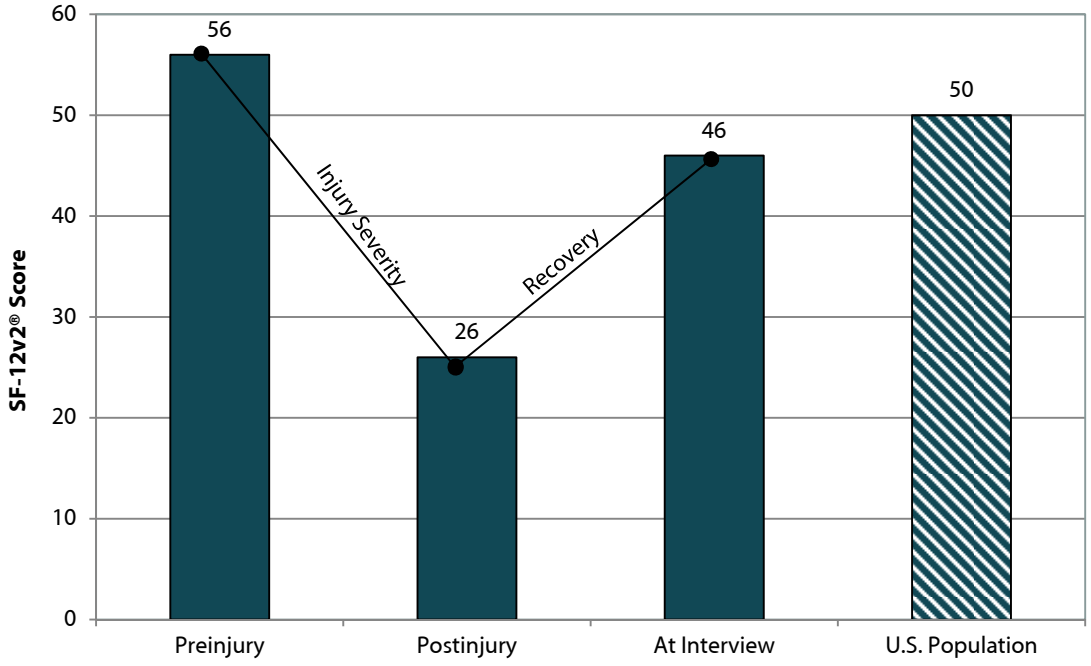
In this report, recovery of physical health and functioning is the estimated difference between the worker's self-reported health and functioning just after the injury and the comparable measure at the time of the interview. Injury severity is the estimated difference between the worker's pre- and postinjury self-reported health and functioning. We illustrate these concepts in Figure TA.B1 using one of the states in the study—

[1] Ann Lawthers, Director of Quality at the University of Massachusetts Medical School, MassHealth Office of Clinical Affairs, developed this approach and calculated the scores for the earlier editions of the study. Paul Kirby, Senior Policy Analyst at the Office of Clinical Affairs calculated the scores for the 2016 interviews. We appreciate their contributions.

[2] The SF-12v2® scores can be reported using three views. The one we report throughout this study is the perceived physical condition (PCS) of the respondent. The other two views are the perceived mental condition (MCS) of the respondent and a combined scaled score for both perceived physical and perceived mental conditions.

Indiana. This state is illustrative of patterns we observed in all other states with respect to the relationships between the scores at the different points in time. For example, the average physical health and functioning score just after the injury in Indiana was 26. The same score for the preinjury period was 56. This means that the average worker's physical health and functioning fell in Indiana from 56 to 26—a drop of 30 points or 3.0 standard deviations (recall that this group of injured workers had more than seven days of lost time). We call this measure *injury severity*. By the time of the interview, three years postinjury, the average injured worker's physical health and functioning in Indiana had increased to 46—an increase of 20 points or 2.0 standard deviations. We call this measure *recovery of health and functioning*.

**Figure TA.B1 Illustration of How We Measure Severity and Recovery**




*Notes:* Underlying data for the preinjury, postinjury, and at-interview scores in this figure are the sample of Indiana workers injured in 2010 and interviewed in 2013. Similar scores were seen in the other 14 states. All workers surveyed experienced more than seven days of lost time. SF-12v2® scores range from 0 to 100. A higher score indicates better health. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

*Source:* Figure for average of U.S. population is from Ware, Keller, and Kosinski (1998).

The physical health and functioning outcome measures showed plausible patterns and reconciled well with values reported in other studies. For example, the average preinjury scaled scores for physical health and functioning in the 15 states (56–58 points) were consistent across the states and higher than average for the general U.S. population (50 points). An employed population is generally assumed to be healthy, and one would expect the scores for an employed population to be higher than those of the general population. Further, the scores were similar to those found in a special study of a healthy population.[3] In all 15 states, the average postinjury scores were lower than the preinjury scores (reflecting injury severity), and the average at-interview scores were higher than the postinjury scores (reflecting some recovery) (see Table TA.B1). The

[3] A special study of a "healthy" British population, defined as persons with no longstanding illness, found that the average SF-12® score was 55 (Airey et al., 1999, tab. 3.12).

average physical health and functioning score at interview was 8–15 points lower than the preinjury score. This indicates that, on average, workers in these states did not fully recover their health. It is still plausible that there may remain some measurement error in self-reported recovery measures, which may potentially lead to a bias toward zero for the estimates of coefficients in the recovery regressions. However, given the patterns of the correlations outlined above, this bias is unlikely to be large.

**Table TA.B1 Injury Severity and Recovery**

| State, Injury Year | Mean SF-12v2® Physical Health and Functioning Score[a] | | | |
|---|---|---|---|---|
| | Preinjury Health Status | Injury Severity | Recovery | Overall Change in Physical Health and Functioning from Preinjury to Interview |
| Arkansas, 2010–2011 | 57 | -30 | 17 | -14 |
| Connecticut, 2011 | 56 | -28 | 19 | -10 |
| Florida, 2012 | 57 | -32 | 18 | -14 |
| Georgia, 2012 | 58 | -31 | 16 | -15 |
| Indiana, 2010 | 56 | -30 | 20 | -10 |
| Indiana, 2013 | 57 | -31 | 18 | -13 |
| Iowa, 2011 | 57 | -28 | 19 | -10 |
| Kentucky, 2012 | 57 | -32 | 18 | -14 |
| Massachusetts, 2010 | 57 | -30 | 21 | -10 |
| Massachusetts, 2013 | 58 | -31 | 20 | -11 |
| Michigan, 2010 | 57 | -30 | 21 | -10 |
| Michigan, 2013 | 58 | -32 | 20 | -12 |
| Minnesota, 2010 | 56 | -29 | 20 | -10 |
| North Carolina, 2010 | 58 | -31 | 17 | -14 |
| North Carolina, 2013 | 56 | -30 | 18 | -12 |
| Pennsylvania, 2010 | 56 | -30 | 20 | -10 |
| Tennessee, 2011 | 57 | -30 | 17 | -13 |
| Virginia, 2010 | 57 | -31 | 19 | -12 |
| Virginia, 2013 | 57 | -31 | 19 | -12 |
| Wisconsin, 2010 | 56 | -28 | 21 | -8 |
| Wisconsin, 2013 | 56 | -28 | 19 | -9 |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

[a] SF-12v2® scores range from 0 to 100. A higher score indicates better health. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

We have seen that the SF-12v2® physical health and functioning scores for respondents' preinjury physical health and functioning reconcile well with expectations for a working or healthy population. The postinjury and at-interview scores are also plausible in the context of injuries suffered by workers. However, because of concerns regarding workers' recall, we explored additional evidence to see how plausible these health and functioning results might be.

As we discussed in the previous section, the pattern shown in Figure TA.B1 of the SF-12v2® scores for workers' physical health and functioning based on the Indiana sample is typical of the patterns we observed in all other states where we have conducted worker outcomes surveys. In Indiana, the average SF-12v2® score reported by workers at interview was 46 points, which is lower than the average of 50 for the U.S. population.

This average score may reflect several underlying patterns of recovery across workers—some workers may have fully recovered, while other workers may still be experiencing the impact of their injuries on physical health and functioning. The overall score reported for physical health and functioning preinjury was 56 points, higher than the average for the U.S. population.

#### INJURY SEVERITY AND MEDICAL COSTS

Within each state, one would expect that workers reporting more severe injuries would receive more medical care and that the care would be more expensive than for workers reporting less severe injuries. Thus, we expected to see higher medical costs for workers who reported more severe injuries (that is, workers with larger reductions in their SF-12v2® physical health and functioning scores from pre- to postinjury). We observed that medical costs did increase with medical severity. When compared with workers with less than 25 points of severity, the mean and median medical costs of workers who had severity between 25 and 39 points was 24 and 31 percent higher, respectively. Workers with reported severity of 40 points or over had 61 percent higher average medical costs and 62 percent higher median medical costs than those with less than 25 points of severity.[4]

[4] Pooling data across the 15 states and injury years, we observed that the average medical cost per claim for workers with less than 25 points of severity, 25 to 40 points, and 40 points or higher was $11,709, $14,474, and $18,841, respectively. The median medical cost per claim for the three groups was $6,287, $8,207, and $10,164, respectively.

# TECHNICAL APPENDIX C

# DEFINITIONS OF KEY OUTCOMES AND CONTROL VARIABLES AND METHODS

## APPROACH FOR REGRESSION ADJUSTMENT

As policymakers seek to evaluate the performance of their state workers' compensation systems, they often look for evidence about the costs to employers and the outcomes experienced by injured workers. Evidence commonly exists on the costs to employers, and a number of different measures are available. Evidence about worker outcomes is much more difficult for policymakers to obtain. This study helps fill this information gap in 15 states. It quantifies the outcomes that policymakers commonly seek to measure—recovery of health and functioning, the speed and sustainability of return to work, earnings recovery, access to health care, and satisfaction with health care. We plan on expanding the lists of states covered in the study in future editions of the report.

To achieve the goal of providing meaningful comparisons of key worker outcomes across states, we used regression methods that control for key worker demographic, employment, and injury characteristics and comorbidities that could influence outcomes. This approach allows us to understand the differences in worker outcomes across states if all states were to have workers with similar demographic, employment, and injury characteristics. In this section, we describe how we defined each of the outcome variables (the dependent variables used in our regression models), the case-mix adjustment variables, and appropriate regression approaches that we used. The full sets of estimates from the regression analyses are included in Technical Appendix D. Regressions were estimated using the Stata statistical programming package (StataCorp, 2009).

## DEFINITIONS OF AND MEASUREMENT OF KEY OUTCOMES

This study focuses on a number of worker outcomes. Table TA.C1 lists the main outcome variables that we use in this report. First, we highlight multiple measures of the return-to-work construct—whether workers were working at the time of the interview, whether workers experienced any return to work, whether workers achieved substantial return to work, whether return to work happened within a year after the injury, duration of disability, and whether workers suffered earnings losses after the injury.[1] Second, we examine the two dimensions of access to care—whether workers perceived problems getting the services that they wanted and whether workers perceived problems getting the providers that they wanted. Third, we examine the measures used to assess satisfaction with care—whether workers were satisfied with overall care and whether workers were satisfied with their providers. In addition, we report the self-reported recovery of health and functioning measure.

[1] We report measures of no return to work predominantly due to injury. We do not report the measure for workers with no return to work due to other reasons.

There are several reasons why we selected these measures. First, the measures of recovery of health and functioning and the speed of return to work represent the *bottom line* goals of workers' compensation systems. While measures of workers' access to medical care and satisfaction with medical care are certainly important *intermediate* measures reflecting the process of medical care delivery, the extent to which workers recover from their injuries and return to work reflects the end-result outcomes of the care provided.

Note that the outcomes we examine in the report have different characteristics—some are continuous measures, others are dichotomous measures taking values 0 or 1, while other measures are ordered categorical variables. These measures require different modeling approaches. The approaches that we chose to use are listed in Table TA.C1 and are discussed in more detail below.

Many of the tables in this report have fewer observations than the total number of completed interviews. This is because a few workers either refused or said they were unable to answer a specific question. In addition, for some of the measures, the universe of responses may not include all workers. For instance, when examining earnings losses at the time of the substantial return to work, we limit the sample of workers to those who had a substantial return to work.

**Table TA.C1 Main Outcomes Examined in the Report and Regression Approaches**

| Variable | Definition | Estimation |
|---|---|---|
| Recovery of physical health and functioning | Worker's perceived recovery. The difference between SF-12v2® score in the week after the injury and the score at the time of the interview. | Ordinary least squares model |
| Not working at interview due to injury | A dummy variable. The value is 1 if the worker was not working at the time of interview predominantly due to injury. | Logistic regression |
| No substantial return to work due to injury | A dummy variable. The value is 1 if the worker never returned to work or returned to work, but was not able to stay for one full month predominantly due to injury. | Logistic regression |
| Duration of disability | The number of weeks from the time of the injury to the first substantial return to work. If workers did not have substantial return to work, we assigned the time between the injury and the interview in weeks for them. | Accelerated failure time (survival) model (assumed log-logistic distribution of duration with gamma distribution of unobserved heterogeneity) |
| No substantial return to work 1 year postinjury due to injury | A dummy variable. The value is 1 if the worker was not able to have a sustained return to work within 1 year after the injury predominantly due to injury. | Logistic regression |
| Worker reporting large earnings losses at the time of interview due to injury | A dummy variable. The value is 1 if the worker reported large earnings losses at the time of interview predominantly due to injury. | Logistic regression |
| Problems getting desired medical services | An ordinal categorical variable. The question is about the level of problems getting services that the worker or his/her primary provider wanted. 1 is "no problems;" 2 is "small problems;" 3 is "big problems." | Ordered logistic regression |
| Problems getting desired provider | An ordinal categorical variable. The question is about the level of problems getting the primary provider the worker wanted. 1 is "no problems;" 2 is "small problems;" 3 is "big problems." | Ordered logistic regression |
| Satisfaction with overall care | An ordinal categorical variable. The question is about the satisfaction level with the medical care the worker received overall. 1 is "very satisfied;" 2 is "somewhat satisfied;" 3 is "somewhat dissatisfied;" 4 is "very dissatisfied." | Ordered logistic regression |
| Satisfaction with primary provider | An ordinal categorical variable. The question is about the satisfaction level with the medical care the worker received from his/her primary provider. 1 is "very satisfied;" 2 is "somewhat satisfied;" 3 is "somewhat dissatisfied;" 4 is "very dissatisfied." | Ordered logistic regression |

*continued*

**Table TA.C1 Main Outcomes Examined in the Report and Regression Approaches (continued)**

| Variable | Definition | Estimation |
|---|---|---|
| Wanting to change initial provider because of dissatisfaction with care | A dummy variable. The value is 1 if the worker wanted to change initial provider because of dissatisfaction with care. | Logistic regression |
| Wanting to change primary, non-initial provider because of dissatisfaction with care | A dummy variable. The value is 1 if the worker wanted to change primary, non-initial provider because of dissatisfaction with care. | Logistic regression |

*Note:* SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

## REGRESSION ADJUSTMENT METHODS

For all outcomes of interest, we estimated a pooled regression that can be written down in a general form as follows:

$$Y_{is} = f(\alpha + STATE/YEAR_s\gamma + WORKER_{is}\beta_1 + EMPLOYER_{is}\beta_2 + INJURY_{is}\beta_3 + COMORBIDITIES_{is}\beta_4) + \varepsilon_{is} \quad \text{(TA.C1)}$$

Where, $Y_{is}$ stands for the outcome of interest (one of the measures listed in Table TA.C1); $\beta_1$, $\beta_2$, $\beta_3$, and $\beta_4$ reflect vectors of estimated coefficients on the worker, employer, injury characteristics, and self-reported comorbidities; $\gamma$ reflects the vector of the coefficients on state-year dummies; $f(.)$ takes different functional forms based on the appropriate empirical specification for each of the measures of interest. The state-year dummies mainly reflect differences across states in system features and cultural norms, as well as other variables that we did not control for in the regression. For example, in an ordinary least squares (OLS) specification, coefficients on state dummies would represent the differences across states in the variables of interest while holding worker, employer, and injury characteristics, and comorbidities that we controlled for, constant. States with multiple surveys have two dummy variables, each capturing a different round of data collection. The differences between these dummy variables allow examining changes in outcomes in those states over time. Coefficient sets $\beta_1$, $\beta_2$, $\beta_3$, and $\beta_4$ isolate effects of each of the other separate factors that are included in the model. Those are briefly discussed when we present results in Technical Appendix D.

### CONTROL VARIABLES

We controlled for differences in worker demographic, employment, and injury characteristics, and relevant comorbidities. We also included information on county-level unemployment rates at the time of injury. Table TA.C2 provides a complete description of the control variables used in the regressions.[2] Some claims were missing information for some of the case-mix adjustment variables. We included these claims in the regressions by including corresponding dummy variables indicating missing information and setting the missing values to zero.

[2] We tested variance inflation factors (VIFs) and found no evidence that multicollinearity was a concern in our analysis. The average VIF was 1.61 and the maximum VIF for a given variable was 3.34, well below a commonly used threshold of 10.

**Table TA.C2 Case-Mix Adjustment Variables**

| WCRI Variable | Definition | Source of Data |
|---|---|---|
| **Worker characteristics** | | |
| Age | Worker's age at injury classified into one of five categories; categories then used to create five dummy variables. Categories include (1) age 15 to 24, (2) age 25 to 39, (3) age 40 to 54, (4) age 55 to 60, and (5) age over 60. "Age 25 to 39" is the reference category. | DBE and survey |
| Gender | 1 if male; 0 otherwise. | DBE |
| Marital status | 1 if married; 0 otherwise. | DBE and survey |
| Education attainment | Claim classified into one of four categories based on highest level of education attained; categories then used to create five dummy variables. Categories include (1) less than high school graduate, (2) high school graduate, (3) some college, and (4) college graduate or post-graduate. "High school graduate" is the reference category. | Survey |
| Language chosen to be interviewed | 1 if worker chose to be interviewed in Spanish; 0 otherwise. | Survey |
| **Employment characteristics** | | |
| Tenure with employer | Claim classified into one of five categories based on the number of years worker was employed with employer prior to injury; categories then used to create five dummy variables. Categories include (1) fewer than or equal to 6 months, (2) more than 6 months to 1 year, (3) more than 1 year to 5 years, (4) more than 5 years to 10 years, and (5) more than 10 years. "More than 1 year to 5 years" is the reference category. | DBE |
| Wage | Average weekly wage in dollars; natural log form used in models. | DBE |
| Part-time status | 1 if worker typically worked fewer than 35 hours per week; 0 otherwise. | Survey |
| Hourly worker | 1 if worker reported being paid an hourly wage; 0 otherwise (worker reported being paid a salary). | Survey |
| Multiple employers in the year before injury | 1 if worker had more than one employer in the year prior to his/her injury; 0 otherwise. | Survey |
| Satisfaction with job at the time of injury | Claim classified into one of three categories based on worker's satisfaction level with his/her job at the time of injury. Categories then used to create three dummy variables. Categories include (1) completely satisfied, (2) mostly satisfied, and (3) somewhat or not at all satisfied. "Completely satisfied" is the reference category. | Survey |
| Worker was concerned that he/she would be fired or laid off | Claim classified into three categories based on the level of worker's agreement with the statement. Categories then used to create three dummy variables. Categories include (1) disagree, (2) somewhat agree, and (3) strongly agree. "Disagree" is the reference category. | Survey |
| Employer's payroll size | Claim classified into one of four company-size categories based on the payroll size at the time of injury. Categories then used to create four dummy variables. Categories include (1) $1 to $4 million (very small size), (2) more than $4 million to $20 million (small size), (3) more than $20 million to $80 million (medium size), and (4) over $80 million (large size). "$1 to $4 million (very small size)" is the reference category. | DBE |
| Industrial classification | Claim classified into one of seven categories based on industrial classification of occupation or employer; categories then used to create seven dummy variables. Categories include (1) manufacturing, (2) construction, (3) clerical/ professional, (4) trade, (5) high-risk services, (6) low-risk services, and (7) other industry. "Clerical/professional" is the reference category. Details on each group are available in Table TA.C3. | DBE |
| Metropolitan statistical area | 1 if worker lived in a metropolitan statistical area as defined by Census Bureau; 0 otherwise. | Census |
| **Injury characteristics** | | |
| Injury type | Claim classified into one of eight categories based on the nature of injury; categories then used to create eight dummy variables. Categories include (1) neurologic spine pain; (2) spine (back and neck) sprains, strains, and non-specific pain; (3) fractures; (4) lacerations and contusions; (5) inflammations; (6) other sprains and strains; (7) upper extremity neurologic; and (8) other injury. "Fractures" is the reference category. | DBE |
| Injury severity | Measured by calculating the difference between the preinjury and postinjury composite health and functioning status scores. Health and functioning status scores are based on single scaled scores ranging from 0 to 100 using SF-12v2® survey questions and scoring. Claim classified into one of three categories based on the distribution of perceived severity; categories then used to create three dummy variables. Categories include (1) severity under 25 points, (2) severity 25 to 39 points, and (3) severity 40 points and over. “Severity under 25 points” is the reference category. | Survey |

*continued*

**Table TA.C2 Case-Mix Adjustment Variables (continued)**

| WCRI Variable | Definition | Source of Data |
|---|---|---|
| **Comorbidities** | | |
| Cancer | 1 if worker reported receiving treatment for cancer; 0 otherwise. | Survey |
| Diabetes | 1 if worker reported receiving treatment for diabetes; 0 otherwise. | Survey |
| Heart problems | 1 if worker reported receiving treatment for heart problems; 0 otherwise. | Survey |
| Hypertension | 1 if worker reported receiving treatment for hypertension; 0 otherwise. | Survey |
| Lung conditions | 1 if worker reported receiving treatment for lung conditions; 0 otherwise. | Survey |
| Smoking history | Claim classified into one of three categories: (1) worker did not smoke; (2) worker smoked for 1 to 9 years; (3) worker smoked for at least 10 years. "No smoking" is the reference category. | Survey |
| **State/year dummies** | | |
| State/year dummies | Claim classified into one of the 21 groups based on the state/year of injury; groups then used to create 21 dummy variables. Categories include: (1) Arkansas, 2011; (2) Connecticut, 2011; (3) Florida, 2012; (4) Georgia, 2012; (5) Indiana, 2010; (6) Indiana, 2013; (7) Iowa, 2011; (8) Kentucky, 2012; (9) Massachusetts, 2010; (10) Massachusetts, 2013; (11) Michigan, 2010; (12) Michigan, 2013; (13) Minnesota, 2010; (14) North Carolina, 2010; (15) North Carolina, 2013; (16) Pennsylvania, 2010; (17) Tennessee, 2011; (18) Virginia, 2010; (19) Virginia, 2013; (20) Wisconsin, 2010; and (21) Wisconsin, 2013. "Arkansas, 2011" is the reference category. | DBE and survey |
| **Other** | | |
| Unemployment rate | Monthly county-level unemployment rate from BLS at the time of injury. | BLS |

*Note:* SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

*Key:* BLS: U.S. Bureau of Labor Statistics; DBE: WCRI's Detailed Benchmark/Evaluation database.

Table TA.C3 lists the major components of each of the seven occupation/industry groups used in our analysis—clerical and professional, construction, manufacturing, trade, high-risk services, low-risk services, and other industries. We classified claims into occupation/industry groups based on four-digit, industry-standard worker and governing-class codes and standard industrial classification (SIC) codes.[3] For certain occupations/industries, incidence rates published by the Bureau of Labor Statistics (BLS) were also used to further classify occupations that are in the same industry but bear very different risk factors. Note that the clerical and professional category includes only clerical and educational professionals, while health professionals are split into either high-risk or low-risk services. For instance, physicians and dentists were grouped in the low-risk services category, while other health workers, such as nurses and home health care aides, fell into the high-risk services group, based on the injury incidence rates associated with the codes. The other categories include agriculture, mining, quarrying, and miscellaneous occupations.

In the analysis, we controlled only for the main effects of the variables. We did not examine any potential interactions between variables of interest. While this approach is potentially less flexible, it avoids concerns about available degrees of freedom and complex interpretation of interactions in nonlinear models. We also kept the overall effect similar across state-year combinations. For example, we did not allow the effect of the age variable on an outcome to differ across states/injury years.

[3] A workers' compensation claim is assigned a classification code based on the injured worker's occupation and the payroll exposure reports of the employer. Classification codes in most states are defined using a common set of basic classifications published by the National Council on Compensation Insurance (NCCI), subject to individual state exceptions, although some states use independently established sets of basic classifications. In Pennsylvania, for example, classification codes are set out in the Pennsylvania Compensation Rating Bureau's Pennsylvania Workers Compensation Manual.

**Table TA.C3 Industry Categories**

| |
|---|
| **Clerical and professional** |
| Clerical |
| Instructional professions |
| **Construction** |
| Erection |
| Shipbuilding |
| Miscellaneous construction |
| **Manufacturing** |
| Food and tobacco |
| Textiles |
| Cloth products |
| Leather |
| Rubber/bone products |
| Paper/pulp products, printing |
| Wood |
| Metallurgy |
| Metal forming |
| Machine shops/fine machines |
| Vehicles |
| Stone products |
| Clay products |
| Glass products |
| Chemicals |
| Miscellaneous manufacturing |
| **Trade** |
| Retail trade |
| Wholesale trade |
| **High-risk services** |
| Laundering, cleaning, and dyeing |
| Stevedoring and freight handling; explosives or ammunition shipping; refrigerator car loading or unloading |
| Railroad operations |
| Package delivery; hauling (long-distance or local) |
| Electric light or power; steam light or power; waterworks operation; sewage disposal plant operation; recycling and garbage collection |
| Automobile hauling; automobile sales and services |
| Warehousing and storage |
| Health care facility-related services, nursing home, home care (excluding physician and dentist services) |
| Building maintenance; janitorial services; elevator services; sign installation; window cleaning |
| Hotels, restaurants, clubs |
| **Low-risk services** |
| Telephone, telegraph, Internet access providers; computer data processing; radio and television broadcasting; cable television; motion picture productions; recording studios |
| Automobile parking and garage |
| Physicians and dentists |
| Insurance; real estate; travel agencies; addressing; mailing; mail packaging; advertising |
| Schools, museums, day care centers |
| Commercial service and repair; architect or engineer consulting |
| Property management; leasing services |
| Dinner theater; theater operations |
| Amusement park or exhibition operations; dog shows; horse shows; racetrack operations |
| Personal service, such as beauty salons and hair styling |
| **Other industries** |
| Agriculture |
| Mining; oil and gas production |
| Quarrying: stone, sand, clay |
| Miscellaneous occupations |

## REGRESSION MODELS

As indicated in Table TA.C1, our outcomes of interest come in different forms: continuous (recovery), continuous with censoring (duration of return to work), in two categories (substantial return to work), and in more than two categories (satisfaction). We therefore had to use different statistical methods for different dependent variables, as discussed in more detail below. For continuous variables (recovery), we estimated our relationship of interest using a linear regression, also known as an OLS regression. For binary outcomes, we used a logistic regression. For categorical variables with more than two categories, we used an ordered logistic regression. For continuous variables with right censoring, we used a survival model. Each of the models used the controls listed in Table TA.C2.

### REGRESSION APPROACH FOR CONTINUOUS VARIABLES: RECOVERY OF PHYSICAL HEALTH AND FUNCTIONING

We used an OLS regression to model a continuous outcome: recovery of physical health and functioning. An OLS regression describes a linear relationship between a variable of interest and a set of predictors where the functional form $f(.)$ in the equation (TA.C1) is linear, and the estimated coefficient of a variable simply measures how the outcome changes with a one-unit increase in the variable. Estimates from the OLS regression for the continuous measure are provided in Table TA.D1 and are discussed in Technical Appendix D. A convenient aspect of the OLS regression is that the differences in the estimated coefficients for state dummies reflect the differences in the average predictions between states conditional on the control variables. Next, we discuss how we estimated the predictions for other outcome variables for which we cannot use linear regressions.

All regression estimates provided in this study were weighted using probability weights. These weights are designed to make the sample representative of the overall population of claims in the state since we have oversampled more financially serious cases. See Technical Appendix A for more details on how we constructed the weights.

### REGRESSION APPROACH FOR BINARY VARIABLES

A number of the variables listed in Table TA.C1 are binary, that is they take only two values—"1" if a condition was true and "0" if otherwise. For instance, the *no substantial return to work* measure is equal to 1 if the worker was not able to return to work and stay for one full month, and 0 if otherwise. For such measures, we estimated predictions using a logistic regression. This is a non-linear approach designed to deal with categorical dependent variables that take on two possible values: 1 and 0.[4] Consider, for example, the estimates for return to work. In the logit model, $Y_{is}$ in the equation (TA.C1) is replaced by an unobserved variable $Y_{is}^{*}$, which represents the unobserved propensity to return to work, and $\varepsilon_{is}$ is assumed to have a logistic distribution (and results are always nearly identical assuming a normal distribution). The discrete value $Y_{is}$ equals 1 if $Y_{is}^{*} > 0$, and it equals 0 otherwise. The equation for the logistic model can be written down as follows:

$$\Pr(Y_{is} = 1) = \frac{e^{Z_{is}\theta}}{1+e^{Z_{is}\theta}} \qquad \text{(TA.C2)}$$

$$\Pr(Y_{is} = 0) = \frac{1}{1+e^{Z_{is}\theta}}$$

[4] Alternatives are a probit model or linear probability model. Probit models generally produce results that are similar to the estimates from a logistic model. A linear probability model may not be appropriate in this situation since it does not constrain the predicted outcomes to be between 0 and 1.

Where $Z_{is}\theta$ denotes parameters and variables on the right-hand side of the equation (TA.C1), and parameters $\theta$ are estimated using the maximum likelihood approach.

Like the usual linear regression estimates, this method allows us to examine the relationship between factors that are hypothesized to affect outcomes of interest and worker and injury characteristics. Unlike the OLS regression, the coefficients from the model cannot be used directly to examine the differences in predicted outcomes without necessary transformations. As a result, in most of the report we focus not on discussing the coefficients but rather on discussing the differences in predictions from the same set of claims, as discussed later in this section.

In addition, Technical Appendix D presents transformations of the logit coefficients that are more easily interpretable. Specifically, we present odds ratios for each variable. They measure the multiplicative effect of the variable of interest. For instance, if the odds ratio is 1.15, then a one-unit increase in the variable of interest increases the relative probability $\Pr(Y_{is} = 1)$ by 15 percent.

#### REGRESSION APPROACH FOR DURATION OF TIME BEFORE RETURN TO WORK

We estimated the model for the duration of time out of work using survival models to account for the possible truncation of the spell of time out of work. In particular, at the time of the survey, 10–18 percent of workers across the 15 states still had not had a substantial return to work, which implies that their time out of work lasted at least up to the time of the survey (Table 3.2). Survival models were designed to address situations like these—they examine the length of time to the occurrence of an event. In our case, we examine the time to substantial return to work. These methods can be applied to measures that are not normally distributed. In this framework, the outcome measure is the length of the spell of time out of work ($T_{is}$). We estimated an accelerated failure time model:

$$\ln(T_{is}) = Z_{is}\theta + \varepsilon_{is} \qquad \text{(TA.C3)}$$

$T_{is}$ captures the duration of time from injury to substantial return to work measured in weeks (a substantial return to work is observed when the worker returns to work for at least one month). Survival models account for the possibility that the duration of the time before return to work is not normally distributed. While many injured workers return to work within a short period of time after their work-related injury, some workers may find it difficult to return to work after a certain point. The survival approach also explicitly models the probability that the time off work is not fully observed, and the values are therefore right censored. The accelerated failure time models provide insight into how the values of predictors impact the expected value of failure time.

We explored several accelerated failure time models: gamma, exponential, Weibull, log-normal, and log-logistic. In Figures TA.C1 and TA.C2, we plot the Kaplan-Meier survival estimate and the estimated hazard function for our data for each of the states. The hazard function shows how the likelihood that an end of the spell of non-work occurs in a given time period, conditional on the worker not returning to work in prior periods. We saw that for all states in our analysis, the hazard rate decreases with time. The Kaplan-Meier survival curve shows the probability that the spell of time off work lasted beyond each of the time periods. This is a non-parametric approach to estimate a survival curve. The states that have higher survival rates in Figure TA.C1 have more workers stay out of work at each time period.

**Figure TA.C1 Kaplan-Meier Survival Estimates**

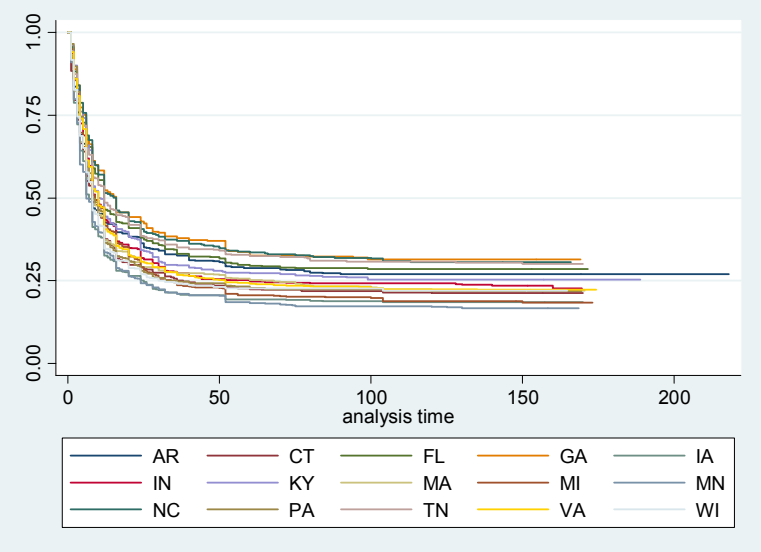
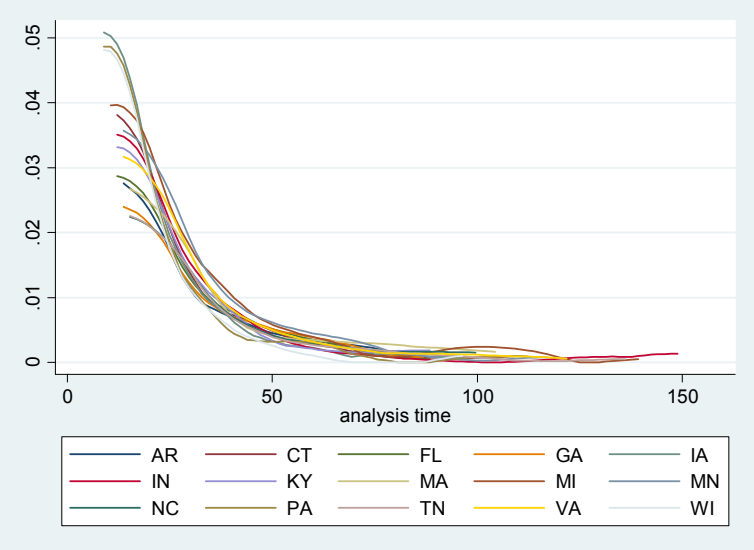



**Figure TA.C2 Smoothed Hazard Estimates**




For our analysis, we chose a log-logistic model. Since we can make different assumptions about the distribution of $\varepsilon_{is}$, our choice was driven by the need to find a model that provides a good approximation for our data. The Kaplan-Meier survival estimate and the estimated hazard function for our data in Figures TA.C1 and TA.C2 suggest that the log-logistic model provides a good approximation for our measure of the duration of time before substantial return to work. An appealing feature of the hazard function for the log-logistic distribution is that it is flexible and can be increasing monotonically, decreasing monotonically, or first increasing and then decreasing. We also accounted for possible unobserved heterogeneity using gamma

distribution.[5] This model delivers the lowest Akaike information criterion (AIC) when compared with alternative specifications (see Table TA.C4).

In our estimates from the duration model, we directly address concerns about potential bias arising from unobserved heterogeneity—that observed responses by injured workers may differ based on factors that are not observed by researchers. Unlike OLS or logistic models presented above, unobserved heterogeneity may bias estimates from duration models even if it is uncorrelated with regressors. We considered two types of unobserved heterogeneity (gamma and inverse Gaussian) and chose the model with the best fit. From a statistical view, there are several approaches for selecting the best parametric model for the analysis. For nested models, we can distinguish between different specifications using the likelihood-ratio test. The generalized gamma distribution provides one of the most flexible forms for the hazard function, which may take a large number of possible shapes. It nests the log-normal distribution, the Weibull distribution, and the exponential distribution. For non-nested models, we can distinguish between approaches using AIC. The preferred model is the one with the smallest AIC value. Table TA.C4 lists the test statistics from multiple models we considered based on different assumptions about the distribution of the hazard and the distribution of the unobserved heterogeneity. Model (12), log-logistic distribution with gamma unobserved heterogeneity, has the smallest value of AIC. The estimated θ in Model (12) is statistically different from zero. It shows unobserved heterogeneity does exist. Therefore, we chose Model (12), the log-logistic distribution with gamma unobserved heterogeneity for our study.

We used the duration model described above to estimate case-mix adjusted outcomes for Chapter 3 by predicting median time to return to work. Since we estimated the survival model with unobserved individual heterogeneity, we estimated predicted median time to return to work unconditional on unobserved heterogeneity—that is, the prediction was averaged over the distribution of unobserved heterogeneity.

#### REGRESSION APPROACH FOR ORDERED CATEGORICAL MEASURES

Finally, for the measures of satisfaction with care, we used an ordered logistic regression. Measures of satisfaction with care are categorical variables where each of the responses can be ordered. For instance, the response to the questions about workers' satisfaction with overall care includes the following options: very satisfied, somewhat satisfied, somewhat dissatisfied, and very dissatisfied. These responses can be clearly ranked, but there is no way to quantify the distance between the responses. Ordered logistic regressions were developed to study outcomes like these. The framework of the analysis is similar to the logit model presented for the binary responses, with the addition of multiple comparison categories.

To help with interpreting the results, we transformed ordered logit coefficients into odds ratios. These show relative probability of reporting one level higher on the satisfaction or access-to-care questions. For instance, if the odds ratio is 1.15, then a one-unit increase in the variable of interest increases the relative probability that the level of satisfaction is one unit higher by 15 percent.

[5] The estimated θ in the duration model that we estimate is statistically different from zero. It suggests that unobserved heterogeneity is relevant for our estimates.

**Table TA.C4 Test Statistics from Survival Models with Different Assumptions about the Distribution of the Hazard Function and the Unobserved Heterogeneity**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazard function | Gamma | Weibull | Log-normal | Exponential | Gamma | Gamma | Weibull | Weibull | Log-normal | Log-logistic | Log-logistic | Log-logistic |
| Unobserved heterogeneity function | | | | | Inverse Gaussian | Gamma | Gamma | Inverse Gaussian | Gamma | | Gamma | Inverse Gaussian |
| Log likelihood | -9,417.19 | -10,689.64 | -10,006.14 | -12,299.05 | -9,313.49 | -9,228.55 | -9,389.30 | -10,340.70 | -9,231.66 | -10,020.07 | -9,163.09 | -9,227.51 |
| Sigma (σ) | 1.27 | | 1.87 | | 1.02 | 0.84 | | | 0.76 | | | |
| Kappa (κ) | -2.05 | | | | -0.98 | -0.21 | | | | | | |
| AIC | 18,978.37 | 21,521.27 | 20,154.29 | 24,738.09 | 18,772.99 | 18,603.10 | 18,922.59 | 20,825.41 | 18,607.32 | 20,182.14 | 18,470.19 | 18,599.03 |
| Theta (θ) | | | | | 1.52 | 1.78 | 7.57 | 2.56 | 2.12 | | 1.73 | 6.32 |

*Key:* AIC: Akaike information criterion.

## ESTIMATES FOR MULTISTATE COMPARISONS

The main objective of this report is to examine how worker outcomes differ across states while accounting for differences in case mix.[6] The regression models outlined above were used to derive case-mix adjusted estimates that are used throughout the report. In this section we outline our approach to deriving the predicted outcomes.

### PREDICTED OUTCOMES

Throughout the report, we compare outcomes between states by comparing predictions from the regression models outlined above. Our estimates are based on the regression models that have dummy variables for 20 of the state-year combinations (treating one of the states as a comparison group) and include an intercept. We can recover predictions for the outcome of interest for each of the 15 states. In states with two rounds of data collection, we present estimates from the most recent survey year. Furthermore, our main focus is on the predictions from the model rather than on the comparison of the state-specific coefficients, although there is a direct correspondence between the coefficient and predictions which can be easily traced and confirmed in the linear models. The estimates from the regression models are available in Technical Appendix D. Case-mix adjusted outcomes allow us to make meaningful comparisons between states while holding all available relevant factors constant. To estimate values of the worker outcomes, we first constructed a sample of claims covering all workers with completed surveys while setting the state dummy to reflect the state of interest. The prediction sample includes all of the injured workers from our analysis. Then, we estimated the predicted value of the outcome based on the regression results while assuming that all workers came from the same state. We accounted for the sampling weights in this estimation. We repeated this exercise for each state in our analysis by varying the values of the state identifiers that are turned on and off for different predictions. For instance, to estimate the likelihood that the worker had not returned to work in Arkansas, we computed the predicted value for the return-to-work measure using coefficients from the return-to-work regression (Table TA.D2) for the full sample of claims while assuming that all claims come from Arkansas. We repeated this exercise for each of the states in the analysis. As a result of this exercise, we have predicted outcomes for the identical set of claims in each state. Any differences in predicted outcomes across states are driven by state-specific factors and not by interstate differences in the underlying worker, employer, or claim characteristics.

Future editions of the report will construct predictions in a similar manner. We will first estimate regression models for all states in the analysis, including new states that become available. Predictions of worker outcomes will be computed as discussed above. Note, however, that the predicted estimates for the states that are currently in the report may slightly change. There are several reasons for the change. Adding more states to the analysis may change the estimates of the coefficients that serve as a basis for prediction. For instance, the relationship between preinjury wages and the return-to-work measure may change slightly once we add more states to our analysis. Another potential source of difference is the expansion of the sample from which we draw predictions, since the characteristics of the claims from which we make predictions may differ from the prior rounds of analysis. We found that the differences in predicted values between different rounds

[6] Readers interested in unadjusted outcome measures may refer to the databook available at https://www.wcrinet.org/images/uploads/files/VA_databook16.pdf.

of analysis for the same state are minor.

#### MULTISTATE COMPARISONS OF PREDICTED OUTCOMES

In this report, we characterize an individual state's performance by comparing the predicted outcomes with the median of the study states as well as to other states. Chapter 2 describes the criteria used to characterize the outcomes in a state as *higher, somewhat higher*, *lower, somewhat lower*, or *similar* compared with the median of the study states or other states. The thresholds used to arrive at these characterizations are detailed in Table 2.3. For example, for measures expressed in percentage terms, *higher* means 5 or more percentage points above the median or other state, *somewhat higher* means 3 to 4 percentage points above the median or other state, *lower* means 5 or more percentage points below the median or other state, *somewhat lower* means 3 to 4 percentage points below the median or other state, and *similar* means within 3 percentage points above or below the median or other state's value. In addition, any differences between states that are not statistically significant at the 10 percent level are characterized in our tables as *similar*. Table TA.C6 highlights the other states where injured workers reported higher or lower outcomes compared with the report state.

We realize that these specific thresholds may not satisfy the needs of all system stakeholders. We provide detailed information of the difference between the report state and the median as well as the statistical significance levels from tests of difference between outcomes for the report state and the 15-state median in Table TA.C5.

#### NOTE ON STATISTICAL SIGNIFICANCE OF DIFFERENCES IN PREDICTED OUTCOMES

When comparing differences in predicted worker outcomes across states, we examine the statistical precision of these differences. For each pair of states, we estimate the standard error of the difference in predicted outcomes and the corresponding confidence interval. Throughout the report we highlight whether the differences between the states are statistically significant at the 10 percent level. For each of the comparisons we have bootstrapped standard errors by drawing 1,000 samples. We chose to bootstrap the estimates of the standard errors assuming a normal distribution, since these estimates are not readily available for the predictions from non-linear models. While standard errors of the differences in the predicted outcomes for pairs of states are straightforward to estimate for OLS regressions, it is challenging to estimate these from non-linear models. We apply the bootstrap approach consistently for all models, including predictions from logistic and duration models.[1] We also apply the bootstrap approach to determine statistical significance of the difference between state-level predicted outcomes and the 15-state median.

Table TA.C7 provides the main descriptive statistics mentioned in this report.

## ESTIMATES FOR COMPARING CHANGE IN OUTCOMES OVER TIME

In states with two rounds of surveys, the report shows how outcomes of injured workers changed between rounds. Analysis for Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin examines how outcomes of injured workers changed between injury years 2010 and 2013 (workers were interviewed in 2013 and 2016, respectively). We compared the outcomes while controlling for possible changes in case mix

[1] For measures of time before substantial return to work derived from duration models, we compare differences in predicted median time before substantial return to work across states (and also with the median of the study states). We use bootstrap methods to determine statistical significance of these comparisons.

between the years. Table TA.C8 shows the details on these comparisons for the analysis state.

Comparisons of outcomes over time rely on the same regression models used for the interstate comparisons that are presented in Technical Appendix D. For each of the states with two rounds of data collection, the analysis had two separate dummies indicating whether workers in those states were from the 2010 or 2013 injury year cohort. The difference between those two dummies indicates the difference in predicted outcomes between the two rounds of data while keeping other factors constant. Details on the estimates of differences in outcomes between the two years are provided in Table TA.C8.

To estimate the changes in worker outcomes over time, our approach was to use all available data across the 15 states and to control for case mix. Several alternative methods may be used to examine the differences in outcomes in a state over time. One approach is to compare differences in unadjusted outcomes within a state over time. This approach is unlikely to be informative due to potential differences in age, gender, injury type, etc., in the two time periods. Another approach is to use state-specific data. Findings from the state models were generally consistent with our preferred specification, which can be used to examine both interstate variations and trends.

The comparison of outcomes over time needs to consider the role of changes in economic conditions. In our analysis, we compare differences in case-mix adjusted outcomes while also controlling for the differences in local economic conditions approximated by county-level unemployment rates. A substantial decrease in the unemployment rate between 2010 and 2013 may impact how we explain differences in outcomes over time.[2] If we expect that the local area unemployment rate contributes to the outcomes that we observe, than we would expect that adjusting for the unemployment rate would change our predictions. In particular, we may not be able to distinguish between the differences in outcomes over time from the differences that may be driven purely by changes in the unemployment rate. In Technical Appendix D, we examine sensitivity to these concerns by presenting results from specifications that do not control for local area unemployment rates. In Technical Appendix D, we show results from those alternative approaches. The results are generally consistent across the various specifications.

## ANALYSIS LIMITATIONS

The approach outlined above was chosen to reflect the scope of the study, which is to compare outcomes of injured workers across 15 states. In particular, the analysis addresses the question of how worker outcomes differ across study states after controlling for differences in the mix of injured workers, employers, and injury types. We do not examine why there may be residual differences in worker outcomes across states and which workers' compensation system features explain these differences. A different type of analysis is needed to address these research questions.

The analysis in this report is also subject to the typical limitations that may be raised about any survey-based analysis. Survey researchers typically worry about nonresponse bias, i.e., whether the sample of workers that responded to the survey is different from the overall sample of workers who were eligible to be interviewed. We compared the worker, injury, and claim characteristics of workers that responded to the survey with those that did not using administrative claims data and observed no apparent differences. For more details about this, see Chapter 2.

[2] The average county-level unemployment rate decreased between 2010 and 2013, from 11.1 to 7.9 percent in Indiana, from 8.8 to 7.2 percent in Massachusetts, from 13.1 to 9.3 percent in Michigan, from 11.3 to 8.2 percent in North Carolina, from 8.0 to 6.1 percent in Virginia, and from 9.2 to 7.2 percent in Wisconsin.

Readers may also be worried about other biases that may be present in workers' responses to survey questions. Those may include acquiescence bias,[7] recall bias, social desirability bias, or extreme responding. Some of these were addressed by the design of the survey instrument, such as asking factual questions about experience after an injury and mixing positively and negatively worded questions. However, biases may still be present. To examine whether the biases that still remain invalidate the responses that we received, we compared the measures that we captured in surveys with similar measures from administrative data, as well as the consistency across responses to different questions, and found no concerns.

Finally, the analysis is limited to the measures that we collected in the survey. While there may be many more measures that are of interest to policymakers, we had to make difficult choices about which potentially important questions to include in the survey.

[7] This is also known as *yea-saying*—respondents to a survey have a tendency to agree with all the questions in a measure, leading to inconsistent answers across different measures worded in a similar manner.

**Table TA.C5 Testing Statistical Significance of the Difference between Measures for Virginia and the 15-State Median**

| | VA | 15-State Median | Difference | P-Value of the Difference | VA Compared with 15-State Median |
|---|---|---|---|---|---|
| **Recovery of physical health and functioning**[a] | | | | | |
| Improvement in health status from injury to interview | 18 | 18 | 0.095 | 0.884 | Similar |
| **Return to work (as of 3 years postinjury)** | | | | | |
| Percentage never returned to work due to injury | 10% | 10% | -0.007 | 0.613 | Similar |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | 14% | 14% | 0.002 | 0.891 | Similar |
| Time from injury to first substantial return to work (median weeks)[b] | 12 | 11 | 0.500 | 0.575 | Similar |
| Percentage with no substantial return to work 1 year postinjury due to injury | 17% | 17% | 0.001 | 0.940 | Similar |
| Percentage not working at interview due to injury | 13% | 15% | -0.013 | 0.428 | Similar |
| Percentage with substantial return to work who had second absences due to the same injury | 18% | 16% | 0.021 | 0.356 | Similar |
| Percentage reporting that they returned to work too soon | 39% | 39% | -0.005 | 0.845 | Similar |
| **Earnings recovery** | | | | | |
| Percentage who reported earning "a lot less" due to injury at the time of interview | 8% | 8% | 0.001 | 0.936 | Similar |
| **Access to health care** | | | | | |
| *Problems getting desired medical services* | | | | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | 17% | 17% | -0.002 | 0.907 | Similar |
| *Problems getting desired provider* | | | | | |
| Percentage reporting "big problems" getting the primary provider they wanted | 14% | 15% | -0.004 | 0.759 | Similar |
| **Satisfaction with health care** | | | | | |
| *Satisfaction with overall care* | | | | | |
| Percentage who were "somewhat" or "very" satisfied | 78% | 76% | 0.028 | 0.091 | Similar[c] |
| Percentage who were "very dissatisfied" | 14% | 16% | -0.021 | 0.087 | Similar[c] |
| *Satisfaction with primary provider* | | | | | |
| Percentage who were "somewhat" or "very" satisfied | 83% | 83% | 0.000 | 1.000 | Similar |
| Percentage who were "very dissatisfied" | 11% | 11% | 0.000 | 1.000 | Similar |
| *Percentage who ever wanted to change provider because of dissatisfaction with care* | | | | | |
| Initial provider | 20% | 27% | -0.066 | 0.004 | Lower |
| Primary, non-initial provider[d] | 22% | 18% | 0.041 | 0.342 | Similar[e] |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

States are characterized as either *somewhat higher*, *higher*, *somewhat lower,* or *lower* if they satisfy policy and statistical significance thresholds. Details of these thresholds are discussed in Chapter 2 and presented in Table 2.3.

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from injury to the time of the interview.

[c] The value does not meet the policy importance threshold, although the difference is statistically significant.

[d] Among workers with a primary, non-initial provider.

[e] The difference from the 15-state median is not statistically significant at the 10 percent level.

**Table TA.C6 Case-Mix Adjusted Outcomes across States with Tests of Statistical Significance between Virginia and Other State Values**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Recovery of physical health and functioning**[a] | | | | | | | | | | | | | | | |
| Improvement in health status from injury to interview | AR | GA | KY | FL | IA | TN | IN | NC | **VA** | MI | WI | MA | MN | PA | CT |
| | 17 | 17 | 18 | 18 | 18 | 18 | 18 | 18 | **18** | 18 | 18 | 19 | 19 | 19 | 20 |
| **Return to work (as of 3 years postinjury)** | | | | | | | | | | | | | | | |
| Percentage not working at interview due to injury | MN | WI | IN | IA | **VA** | MI | FL | NC | CT | TN | AR | MA | PA | KY | GA |
| | 11% | 11% | 12% | 13% | **13%** | 13% | 14% | 15% | 15% | 15% | 16% | 16% | 16% | 16% | 16% |
| Percentage never returned to work due to injury | IN | WI | MN | IA | **VA** | NC | CT | MI | AR | PA | FL | TN | KY | MA | GA* |
| | 7% | 8% | 8% | 8% | **10%** | 10% | 10% | 10% | 11% | 11% | 11% | 11% | 13% | 13% | 15% |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | IN* | MN* | MI | WI | CT | FL | TN | IA | **VA** | NC | AR | PA | MA | KY | GA |
| | 10% | 10% | 12% | 12% | 12% | 13% | 14% | 14% | **14%** | 14% | 15% | 15% | 15% | 17% | 18% |
| Time from injury to first substantial return to work (median weeks)[b] | CT* | MN* | AR* | WI* | IA* | MA | TN | NC | IN | FL | **VA** | PA | KY | GA | MI |
| | 9 | 9 | 9 | 9 | 10 | 10 | 11 | 11 | 12 | 12 | **12** | 12 | 13 | 13 | 13 |
| Percentage with no substantial return to work 1 year postinjury due to injury | IN* | MN* | WI | CT | IA | MI | FL | MA | PA | **VA** | AR | TN | NC | KY | GA* |
| | 11% | 12% | 13% | 14% | 15% | 16% | 16% | 17% | 17% | **17%** | 17% | 17% | 18% | 20% | 22% |
| Percentage with substantial return to work who had second absences due to the same injury | MA* | NC* | AR | WI | FL | IA | PA | GA | TN | IN | MI | **VA** | KY | MN | CT |
| | 13% | 13% | 13% | 14% | 14% | 14% | 14% | 16% | 16% | 16% | 16% | **18%** | 18% | 18% | 19% |
| Percentage reporting that they returned to work too soon | FL* | GA | NC | TN | MA | **VA** | CT | KY | MN | PA | MI | AR | WI | IA | IN |
| | 31% | 36% | 37% | 37% | 38% | **39%** | 39% | 39% | 39% | 40% | 41% | 41% | 42% | 43% | 45% |
| **Earnings recovery** | | | | | | | | | | | | | | | |
| Percentage who reported earning "a lot less" due to injury at the time of interview | KY | PA | IN | AR | CT | NC | IA | MI | WI | **VA** | MA | TN | MN | FL | GA |
| | 6% | 6% | 7% | 8% | 8% | 8% | 8% | 8% | 8% | **8%** | 8% | 9% | 9% | 10% | 11% |
| **Access to health care** | | | | | | | | | | | | | | | |
| *Problems getting desired medical services* | | | | | | | | | | | | | | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | PA* | WI* | MA | CT | TN | **VA** | AR | MN | MI | IA | GA | NC | IN | KY | FL* |
| | 12% | 13% | 14% | 15% | 16% | **17%** | 17% | 17% | 17% | 18% | 18% | 18% | 18% | 18% | 21% |
| *Problems getting desired provider* | | | | | | | | | | | | | | | |
| Percentage reporting "big problems" getting the primary provider they wanted | WI* | MN | MA | KY | PA | CT | **VA** | MI | GA | AR | IN* | TN* | IA* | FL* | NC* |
| | 10% | 11% | 12% | 13% | 13% | 14% | **14%** | 15% | 16% | 16% | 18% | 18% | 19% | 19% | 21% |

*continued*

**Table TA.C6 Case-Mix Adjusted Outcomes across States with Tests of Statistical Significance between Virginia and Other State Values**

| | Comparison of States' Outcomes | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Satisfaction with health care** | | | | | | | | | | | | | | | |
| *Satisfaction with overall care* | | | | | | | | | | | | | | | |
| Percentage who were "somewhat" or "very" satisfied | FL* | GA* | IN* | TN* | NC* | IA | MI | AR | MN | **VA** | PA | CT | KY | MA | WI* |
| | 71% | 73% | 73% | 74% | 74% | 75% | 75% | 76% | 77% | **78%** | 79% | 80% | 80% | 81% | 82% |
| Percentage who were "very dissatisfied" | WI* | MA | KY | CT | PA | **VA** | MN | AR | MI | IA | NC* | TN* | IN* | GA* | FL* |
| | 11% | 12% | 13% | 13% | 14% | **14%** | 15% | 16% | 16% | 17% | 17% | 17% | 18% | 18% | 20% |
| *Satisfaction with primary provider* | | | | | | | | | | | | | | | |
| Percentage who were "somewhat" or "very" satisfied | IA* | FL* | PA | GA | AR | NC | TN | **VA** | IN | MI | MN | CT | KY* | MA* | WI* |
| | 78% | 78% | 79% | 80% | 80% | 81% | 81% | **83%** | 83% | 84% | 85% | 86% | 86% | 88% | 88% |
| Percentage who were "very dissatisfied" | WI* | MA* | KY* | CT | MN | MI | IN | **VA** | TN | NC | AR | GA | PA | FL* | IA* |
| | 7% | 8% | 9% | 9% | 9% | 10% | 11% | **11%** | 12% | 13% | 13% | 13% | 14% | 14% | 15% |
| *Percentage who ever wanted to change provider because of dissatisfaction with care* | | | | | | | | | | | | | | | |
| Initial provider | MA | WI | **VA** | MN | KY | MI | CT* | IN* | GA* | FL* | TN* | PA* | NC* | IA* | AR* |
| | 17% | 20% | **20%** | 21% | 23% | 24% | 26% | 27% | 27% | 27% | 27% | 27% | 28% | 29% | 30% |
| Primary, non-initial provider[c] | MA* | IN* | KY | CT | MN | WI | NC | MI | GA | IA | AR | **VA** | PA | TN | FL |
| | 12% | 13% | 14% | 15% | 16% | 17% | 17% | 18% | 21% | 21% | 21% | **22%** | 24% | 26% | 26% |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2013 and interviewed in 2016. All workers experienced more than seven days of lost time. Case-mix adjusted. For more details about case-mix adjustment, see Technical Appendix C.

* The difference between Virginia and other state values is statistically significant at the 10 percent level.

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from injury to the time of the interview.

[c] Among workers with a primary, non-initial provider.

**Table TA.C7 Descriptive Statistics for Virginia**

| | VA | VA |
|---|---|---|
| | 2010 | 2013 |
| Observations | 443 | 416 |
| **Worker characteristics** | | |
| Average age at the time of injury | 46 | 46 |
| Median age at the time of injury | 48 | 48 |
| *Age group categories* | | |
| Age 15 to 24 | 4% | 5% |
| Age 25 to 39 | 25% | 25% |
| Age 40 to 54 | 45% | 42% |
| Age 55 to 60 | 13% | 14% |
| Percentage married | 60% | 57% |
| *Educational attainment categories* | | |
| Less than high school graduate | 14% | 17% |
| High school graduate | 39% | 33% |
| Some college | 30% | 30% |
| College graduate or postgraduate | 17% | 20% |
| Percentage chose to be interviewed in Spanish | 6% | 9% |
| **Employment characteristics** | | |
| Part-time worker at the time of injury | 11% | 13% |
| Part-time status was missing | 0% | 1% |
| Hourly worker at the time of injury | 83% | 84% |
| Hourly worker status is missing | 4% | 0% |
| Multiple employers in the year before injury | 16% | 19% |
| *Tenure categories* | | |
| ≤ 6 months | 15% | 19% |
| > 6 months to 1 year | 8% | 5% |
| > 1 to 5 years | 31% | 21% |
| > 5 to 10 years | 15% | 17% |
| > 10 years | 20% | 23% |
| Tenure is missing | 12% | 15% |
| Preinjury average weekly wage | $719 | $737 |
| Preinjury weekly wage (median) | $641 | $687 |
| Log of preinjury wage | 6.4 | 6.4 |
| *Industry categories* | | |
| Manufacturing | 15% | 15% |
| Construction | 8% | 8% |
| Clerical and professional | 8% | 10% |
| Trade | 12% | 17% |
| High-risk services | 27% | 28% |
| Low-risk services | 17% | 16% |
| Other industries | 9% | 5% |
| Industry is missing | 3% | 1% |
| *Firm's payroll size categories* | | |
| $1 to $4 million (very small size) | 22% | 19% |
| >$4 million to $20 million (small size) | 17% | 12% |
| >$20 million to $80 million (medium size) | 11% | 7% |
| > $80 million (large size) | 21% | 18% |
| Payroll values missing | 29% | 45% |
| *Satisfied with job at the time of injury* | | |
| Completely | 43% | 40% |
| Mostly | 36% | 35% |
| Somewhat | 17% | 21% |
| Not at all | 4% | 4% |

*continued*

**Table TA.C7 Descriptive Statistics for Virginia (continued)**

| | VA | VA |
|---|---|---|
| | 2010 | 2013 |
| *Concerned about being fired* | | |
| Strongly agree | 29% | 32% |
| Somewhat agree | 11% | 11% |
| Somewhat disagree | 11% | 10% |
| Strongly disagree | 47% | 45% |
| Value is missing | 1% | 1% |
| *Supervisor thought was faking or exaggerating injury* | | |
| Strongly agree | 18% | 19% |
| Somewhat agree | 5% | 8% |
| Somewhat disagree | 10% | 6% |
| Strongly disagree | 67% | 63% |
| Value is missing | 0% | 4% |
| *Additional injuries* | | |
| Prior work injury | 4% | 6% |
| Subsequent work injury | 6% | 7% |
| **Location characteristics** | | |
| County unemployment rate at the time of injury | 8.0% | 6.1% |
| Metropolitan area | 78% | 81% |
| **Injury characteristics** | | |
| SF-12v2® score 4 weeks before the injury | 57 | 57 |
| SF-12v2® score 1 week after the injury | 25 | 26 |
| SF-12v2® score at interview | 45 | 45 |
| Average severity | -32 | -32 |
| *Self-reported injury severity categories* | | |
| Severity under 25 points | 24% | 26% |
| Severity 25 to 39 points | 47% | 45% |
| Severity 40 points and over | 26% | 28% |
| Severity is missing | 3% | 0% |
| *Injury type categories* | | |
| Neurologic spine pain | 5% | 6% |
| Back and neck sprains, strains, and non-specific pain | 13% | 13% |
| Fractures | 18% | 16% |
| Lacerations and contusions | 11% | 10% |
| Inflammations | 6% | 8% |
| Other sprains and strains | 26% | 25% |
| Upper extremity neurologic (carpal tunnel) | 1% | 0% |
| Other injuries | 21% | 22% |
| **Comorbidities** | | |
| Received treatment for cancer | 3% | 2% |
| Received treatment for diabetes | 11% | 11% |
| Received treatment for heart problems | 5% | 3% |
| Received treatment for hypertension | 32% | 28% |
| Received treatment for lung conditions | 10% | 10% |
| *Smoking history* | | |
| Did not smoke | 42% | 49% |
| Smoked 1 to 9 years | 14% | 13% |
| Smoked 10 or more years | 43% | 36% |

*Note:* Sample of Virginia workers injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers surveyed experienced more than seven days of lost time.

**Table TA.C8 Comparing Change in Case-Mix Adjusted Outcomes in Virginia between 2010 and 2013**

| | Change from 2010 to 2013 | P-Value | Characterization of the Difference between 2010 and 2013 |
|---|---|---|---|
| **Recovery of physical health and functioning**[a] | | | |
| Improvement in health status from injury to interview | -0.4 | 0.653 | Similar |
| **Return to work (as of 3 years postinjury)** | | | |
| Percentage never returned to work due to injury | -0.8 | 0.669 | Similar |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | 1.6 | 0.457 | Similar |
| Time from injury to first substantial return to work (median weeks)[b] | 0.9 | 0.440 | Similar |
| **Earnings recovery** | | | |
| Percentage who reported earning "a lot less" due to injury at the time of interview | 2.5 | 0.194 | Similar |
| **Access to health care** | | | |
| *Problems getting desired medical services* | | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | 0.5 | 0.813 | Similar |
| *Problems getting desired medical provider* | | | |
| Percentage reporting "big problems" getting the primary provider they wanted | 1.5 | 0.427 | Similar |
| **Satisfaction with health care** | | | |
| *Satisfaction with overall care* | | | |
| Percentage who were "somewhat" or "very" satisfied | 0.7 | 0.775 | Similar |
| Percentage who were "very dissatisfied" | -0.5 | 0.775 | Similar |

*Note:* Estimates are based on the same models used for interstate comparisons and include controls for other states. Full regression results are in Tables TA.D1–TA.D7.

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from the injury to the time of the interview.

# TECHNICAL APPENDIX D

# REGRESSION ESTIMATES

This section of the technical appendices presents results from the regression analyses that were used to create the case-mix adjusted measures of worker outcomes discussed throughout this report.

Table TA.D1 presents coefficient estimates from the OLS regression for the continuous outcome examined in this report—recovery of health and functioning. The coefficients in this table show how worker outcomes change with changes in the control variables. For the continuous variables, the coefficient can be interpreted as a change in the outcome when the control increases by 1. For logged continuous control variables, the coefficient estimates can be interpreted as a semi-elasticity—a change in the outcome when the control increases by 1 percent. For categorical controls, the coefficients show how the average outcome in the selected group compares with the average outcome in the base category. Consider, for example, coefficient estimates for age group categories from the recovery of health and functioning equation in Table TA.D1. We observed that the recovery of health and functioning decreases when age is higher. Workers who were over 60 years old had recoveries that were 3.5 points lower than workers who were 25 to 39 years old (our base category). Note that the coefficients show the change in outcomes while keeping each of the other variables that are used in the analysis constant. These regression estimates were used to compute predicted outcomes that are used for interstate comparisons of worker outcomes in the main body of the report.

Table TA.D1b provides p-values from the within-state differences in case-mix adjusted outcomes between different injury years. In particular, we tested the differences in estimates of the coefficients for the dummy variables for states with surveys covering injury years 2010 and 2013, which show how the outcome of interest changed between 2010 and 2013 for a given state. For instance, the p-value of 0.460 for Massachusetts indicates that the difference between the "Massachusetts, 2013" and "Massachusetts, 2010" coefficients for the recovery variable presented in Table TA.D1 are not statistically significant at conventional levels.

Table TA.D2 presents estimated odds ratios from the logistic regressions for return-to-work outcomes. As discussed in Technical Appendix C, a logistic regression is a common approach for examining binary outcomes. Return-to-work measures examined in Table TA.D2 are examples of such binary measures. For instance, the first measure examined in the table takes the value "1" if the worker was not working at the time of the interview predominantly due to the injury and "0" if the worker was working at the time of the interview. Since the coefficient estimates from logistic regressions are not intuitively easy to explain, we present odds ratios that measure the multiplicative effect of the variable of interest. The odds ratios that are greater than 1 reveal a positive correlation between the control and outcome variables. The odds ratios that are less than 1 reveal a negative correlation between the control and outcome variables. For instance, workers who were over the age of 60 were more likely to be not working at the time of the interview, more likely to experience no return to work, and more likely to experience no substantial return to work when compared with workers who were 25–39 years old. Table TA.D2b presents p-values for the tests of difference in return-to-work outcomes between different rounds of surveys in each of the states.

Table TA.D3 presents coefficient estimates from the duration model for the measure of time before substantial return to work. As discussed in Technical Appendix C, these models are designed to examine measures where the full duration spell may sometimes be unobserved. A positive coefficient estimate suggests positive correlation with the outcome, and a negative coefficient estimate suggests a negative correlation with the duration measure. For instance, consistent with expectations, we found that workers with higher self-reported severity took longer to return to work. Table TA.D3b presents p-values for the tests of difference in duration outcomes between different rounds of surveys in each of the states.

Table TA.D4 presents odds ratios from logistic regressions for measures of earnings recovery. In particular, we examine whether workers reported that they earned "a lot less" at the time of the interview due to the injury. As in the case of the binary return-to-work outcomes, we present the estimates of the odds ratios. Odds ratios that are greater than 1 reveal a positive correlation between the control and outcome variables. Odds ratios that are less than 1 reveal a negative correlation between the control and outcome variables. Table TA.D4b presents p-values for the tests of difference in earnings recovery measures between different rounds of surveys in each of the states.

Table TA.D5 presents odds ratios from ordered logistic regressions for measures of access to care. In particular, we examine whether workers reported big problems getting the care they wanted or big problems getting the provider they wanted. Workers could respond that they had "big problems," "small problems," or "no problems." Table TA.D5b presents p-values for the tests of difference in access-to-care measures between different rounds of surveys in each of the states.

Table TA.D6 shows coefficient estimates from ordered logistic regressions for measures of satisfaction with care and satisfaction with primary provider. Ordered logistic regressions are designed to deal with categorical outcomes that are ordered in nature. In this case, there is a clear ranking of responses to the satisfaction question, ranging from "very satisfied" to "very dissatisfied." The table reports odds ratios as well as coefficient estimates. Odds ratios that are greater than 1 reveal a positive correlation between the control and outcome variables. Odds ratios that are less than 1 reveal a negative correlation between the control and outcome variables. Table TA.D6b presents p-values for the tests of difference in satisfaction measures between different rounds of surveys in each of the states.

Table TA.D7 provides estimates for two additional measures of satisfaction with care—whether workers wanted to change their initial or their primary, non-initial provider due to dissatisfaction with care. In this table, we present separate logistic regressions for the two measures—for instance, the first measure reported in Table TA.D7 was coded as "1" if workers wanted to change their initial provider and "0" if otherwise. The second measure was coded similarly. These measures were examined using the logistic regression approaches outlined above. Table TA.D7b presents p-values for the tests of difference in the two additional measures of satisfaction with care between different rounds of surveys in each of the states.

## CHANGES IN PREDICTED OUTCOMES BETWEEN PHASES 1, 2, 3, AND 4

The empirical analysis in this report follows approaches from earlier phases of this study using an expanded set of states. Analysis in Phase 1 (Savych, Thumula, and Victor, 2014a–d; Thumula, Savych, and Victor, 2014a–d) relied on survey information from 8 states; Phase 2 used 12 states (Savych, Thumula, and Victor, 2015a–d); Phase 3 used data from 15 states (3 new states were added) (Savych and Thumula, 2016a–o); and Phase 4 (this current report) revisited 6 of the states that were interviewed in Phase 1, increasing the sample to 21 state-year combinations from 15 states. Since we used a larger sample, we would not expect estimates from

the current study to be identical to estimates from Phases 1, 2, and 3 of the analysis. The change may result from more precise regression estimates using the 21-state-year sample (Tables TA.D1–TA.D7),[1] as well as from the differences in samples that were used to make case-mix adjusted predictions.

Predictions for the six states (Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin) with data for injury year 2013 (interviews in 2016) reflect new information in this report. A separate analysis in this report examines the changes in outcomes in these six states between the 2010 and 2013 injuries.

For other state-year combinations where the data was collected in Phases 1–3, we found that the expansion of the sample led to small changes in predicted outcomes that we present in Chapter 3. As we discussed in detail in Technical Appendix C, predicted outcomes were constructed by repeatedly applying regression estimates from Tables TA.D1–TA.D7 to the sample of all workers while assuming that this sample came from each of the state-year combinations in our analysis. However, the set of claims for which we made predictions changed between the four phases of analysis—it now includes observations from 21 state-year combinations. Most changes in predicted outcomes were within 1 percentage point. For instance, we found a 1 percentage point lower rate of not returning to work predominantly due to the injury in Tennessee using a 21-state-year sample compared with a 15-state sample, but a 1 percentage point higher rate of dissatisfaction with overall medical care in Minnesota. We expect that these predictions will change slightly once we add more state-year combinations to the interstate comparisons.

[1] Those looking for more details may compare point estimates from the regressions—the tables are numbered in a consistent manner between the phases. Regression estimates presented in Tables TA.D1 through TA.D7 in this report correspond to the regression estimates presented in Tables TA.D1 through TA.D7 in the previous phases (e.g., Savych, Thumula, and Victor, 2014a).

**Table TA.D1 Coefficient Estimates from OLS Regressions for Recovery of Health and Functioning**

| Control Variables | Recovery | |
|---|---|---|
| | Coefficient | Standard Error |
| **Worker demographics** | | |
| *Age group categories* | | |
| Age 15 to 24 | 3.179*** | (0.631) |
| Age 25 to 39 (base) | | |
| Age 40 to 54 | -2.941*** | (0.367) |
| Age 55 to 60 | -3.535*** | (0.487) |
| Age over 60 | -3.524*** | (0.508) |
| Gender is male | 1.698*** | (0.318) |
| Marital status is married | 0.643** | (0.288) |
| *Educational attainment* | | |
| Less than high school graduate | -2.530*** | (0.512) |
| High school graduate (base) | | |
| Some college | 0.697** | (0.324) |
| College graduate or postgraduate | 1.038** | (0.422) |
| Chose to be interviewed in Spanish | -3.201*** | (0.720) |
| **Employment characteristics** | | |
| *Tenure categories* | | |
| ≤ 6 months | -0.985** | (0.462) |
| > 6 months to 1 year | -0.781 | (0.554) |
| > 1 to 5 years (base) | | |
| > 5 to 10 years | -0.291 | (0.446) |
| > 10 years | 0.198 | (0.408) |
| Tenure is missing | -0.700 | (0.499) |
| Log of preinjury wage | 1.277*** | (0.307) |
| Part-time worker at the time of injury | 0.524 | (0.475) |
| Hourly worker at the time of injury | -0.001 | (0.421) |
| Hourly worker status is missing | -2.823** | (1.357) |
| Multiple employers in the year before injury | -0.155 | (0.363) |
| *Satisfied with job at the time of injury* | | |
| Completely satisfied (base) | | |
| Mostly satisfied | 1.915*** | (0.316) |
| Somewhat or not at all satisfied | 2.230*** | (0.362) |
| *Concerned about being fired* | | |
| Disagree (base) | | |
| Somewhat agree | -2.548*** | (0.417) |
| Strongly agree | -5.860*** | (0.338) |
| *Firm's payroll size categories* | | |
| $1 to $4 million (very small size) (base) | | |
| > $4 million to $20 million (small size) | -0.615 | (0.502) |
| > $20 million to $80 million (medium size) | -0.981* | (0.517) |
| > $80 million (large size) | -0.778 | (0.495) |
| Payroll values missing | -0.454 | (0.408) |
| *Industry categories* | | |
| Manufacturing | 0.361 | (0.594) |
| Construction | -0.669 | (0.739) |
| Clerical and professional (base) | | |
| Trade | 1.318** | (0.626) |
| High-risk services | 0.278 | (0.561) |
| Low-risk services | 0.063 | (0.610) |
| Other industries | 0.980 | (0.741) |
| Industry is missing | 2.087** | (0.915) |
| **Location characteristics** | | |
| Metropolitan statistical area | 0.571* | (0.341) |
| County unemployment rate | -0.265*** | (0.084) |

*continued*

**Table TA.D1 Coefficient Estimates from OLS Regressions for Recovery of Health and Functioning (continued)**

| Control Variables | Recovery | |
|---|---|---|
| | Coefficient | Standard Error |
| **Injury characteristics** | | |
| *Injury type categories* | | |
| Neurologic spine pain | -6.814*** | (0.636) |
| Back and neck sprains, strains, and non-specific pain | -3.994*** | (0.527) |
| Fractures (base) | | |
| Lacerations and contusions | -0.941* | (0.548) |
| Inflammations | -2.558*** | (0.566) |
| Other sprains and strains | -2.424*** | (0.432) |
| Upper extremity neurologic (carpal tunnel) | -2.116** | (0.869) |
| Other injuries | -2.279*** | (0.441) |
| *Self-reported injury severity categories* | | |
| Severity under 25 points (base) | | |
| Severity 25 to 39 points | 11.478*** | (0.317) |
| Severity 40 points and over | 14.373*** | (0.405) |
| Prior work injury | -1.174** | (0.522) |
| **Comorbidities** | | |
| Received treatment for cancer | -1.483* | (0.833) |
| Received treatment for diabetes | -1.296** | (0.506) |
| Received treatment for heart problems | -3.107*** | (0.745) |
| Received treatment for hypertension | -1.944*** | (0.340) |
| Received treatment for lung conditions | -2.393*** | (0.506) |
| *Smoking history* | | |
| Did not smoke (base) | | |
| Smoked 1 to 9 years | -0.878** | (0.432) |
| Smoked 10 or more years | -0.716** | (0.307) |
| **Dummy variables for each state specific survey** | | |
| Arkansas, 2011 (base) | | |
| Connecticut, 2011 | 2.733*** | (0.936) |
| Florida, 2012 | 1.150 | (0.960) |
| Georgia, 2012 | 0.065 | (0.897) |
| Indiana, 2010 | 4.806*** | (0.910) |
| Indiana, 2013 | 1.269 | (0.889) |
| Iowa, 2011 | 1.235 | (0.930) |
| Kentucky, 2012 | 1.067 | (0.922) |
| Massachusetts, 2010 | 2.828*** | (0.946) |
| Massachusetts, 2013 | 2.146** | (0.934) |
| Michigan, 2010 | 4.757*** | (1.044) |
| Michigan, 2013 | 1.608* | (0.927) |
| Minnesota, 2010 | 2.236** | (0.907) |
| North Carolina, 2010 | 1.671* | (0.943) |
| North Carolina, 2013 | 1.390 | (0.881) |
| Pennsylvania, 2010 | 2.609*** | (0.914) |
| Tennessee, 2011 | 1.260 | (0.921) |
| Virginia, 2010 | 1.882** | (0.909) |
| Virginia, 2013 | 1.485 | (0.936) |
| Wisconsin, 2010 | 4.724*** | (0.886) |
| Wisconsin, 2013 | 1.623* | (0.901) |
| Constant | 7.399*** | (2.336) |
| Observations | 8,395 | |
| R-squared | 0.280 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

*Key:* OLS: ordinary least squares.

**Table TA.D1b P-Value from Tests of Difference between 2010 and 2013 Surveys from OLS Regressions for Recovery of Health and Functioning**

| State | Recovery | Medical Costs |
|---|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | | |
| Indiana | 0.000 | 0.003 |
| Massachusetts | 0.460 | 0.457 |
| Michigan | 0.001 | 0.044 |
| North Carolina | 0.752 | 0.250 |
| Virginia | 0.656 | 0.243 |
| Wisconsin | 0.000 | 0.107 |

*Note:* Tests of difference of survey dummy variables from OLS regressions presented in Table TA.D1.

*Key:* OLS: ordinary least squares.

**Table TA.D2 Odds Ratios from Logistic Regressions for Return-to-Work Measures**

| Control Variables | Not Working at the Time of Interview Due to Injury | | No Substantial Return to Work Due to Injury | | No Substantial Return to Work within 1 Year after Injury Due to Injury | |
|---|---|---|---|---|---|---|
| | Odds Ratio | Standard Error | Odds Ratio | Standard Error | Odds Ratio | Standard Error |
| **Worker characteristics** | | | | | | |
| *Age group categories* | | | | | | |
| Age 15 to 24 | 0.290*** | (0.087) | 0.374*** | (0.092) | 0.381*** | (0.086) |
| Age 25 to 39 (base) | | | | | | |
| Age 40 to 54 | 1.694*** | (0.168) | 1.423*** | (0.138) | 1.401*** | (0.127) |
| Age 55 to 60 | 2.419*** | (0.304) | 1.794*** | (0.223) | 1.589*** | (0.187) |
| Age over 60 | 3.246*** | (0.417) | 2.459*** | (0.315) | 2.261*** | (0.272) |
| Gender is male | 0.872* | (0.071) | 0.885 | (0.072) | 0.926 | (0.071) |
| Marital status is married | 0.896 | (0.066) | 0.924 | (0.068) | 0.894 | (0.062) |
| *Educational attainment* | | | | | | |
| Less than high school graduate | 1.876*** | (0.201) | 1.692*** | (0.183) | 1.666*** | (0.175) |
| High school graduate (base) | | | | | | |
| Some college | 0.881 | (0.073) | 0.817** | (0.068) | 0.894 | (0.070) |
| College graduate or postgraduate | 0.748** | (0.088) | 0.664*** | (0.079) | 0.719*** | (0.080) |
| Chose to be interviewed in Spanish | 0.843 | (0.152) | 0.978 | (0.172) | 0.935 | (0.162) |
| **Employment characteristics** | | | | | | |
| *Tenure categories* | | | | | | |
| ≤ 6 months | 1.666*** | (0.183) | 1.634*** | (0.175) | 1.538*** | (0.158) |
| > 6 months to 1 year | 1.295* | (0.180) | 1.114 | (0.157) | 1.234* | (0.158) |
| > 1 to 5 years (base) | | | | | | |
| > 5 to 10 years | 0.929 | (0.107) | 0.916 | (0.107) | 0.919 | (0.100) |
| > 10 years | 1.13 | (0.118) | 1.075 | (0.111) | 1.031 | (0.101) |
| Tenure is missing | 1.145 | (0.152) | 1.000 | (0.132) | 0.905 | (0.114) |
| Log of preinjury wage | 0.782*** | (0.061) | 0.711*** | (0.053) | 0.765*** | (0.054) |
| Part-time worker at the time of injury | 0.781* | (0.101) | 0.759** | (0.099) | 0.757** | (0.094) |
| Hourly worker at the time of injury | 0.983 | (0.107) | 1.000 | (0.110) | 1.081 | (0.112) |
| Hourly worker status is missing | 1.999** | (0.607) | 2.290*** | (0.662) | 2.001** | (0.570) |
| Multiple employers in the year before injury | 0.986 | (0.095) | 1.173* | (0.110) | 1.153 | (0.103) |
| *Satisfied with job at the time of injury* | | | | | | |
| Completely satisfied (base) | | | | | | |
| Mostly satisfied | 0.559*** | (0.043) | 0.653*** | (0.051) | 0.663*** | (0.049) |
| Somewhat or not at all satisfied | 0.374*** | (0.037) | 0.438*** | (0.043) | 0.452*** | (0.042) |
| *Concerned about being fired* | | | | | | |
| Disagree (base) | | | | | | |
| Somewhat agree | 1.565*** | (0.174) | 1.424*** | (0.162) | 1.411*** | (0.151) |
| Strongly agree | 2.886*** | (0.228) | 2.941*** | (0.231) | 3.109*** | (0.229) |
| *Firm's payroll size categories* | | | | | | |
| $1 to $4 million (very small size) (base) | | | | | | |
| > $4 million to $20 million (small size) | 1.005 | (0.123) | 0.928 | (0.113) | 0.901 | (0.105) |
| > $20 million to $80 million (medium size) | 0.941 | (0.126) | 0.852 | (0.114) | 0.885 | (0.111) |
| > $80 million (large size) | 1.095 | (0.133) | 0.981 | (0.120) | 1.018 | (0.118) |
| Payroll values missing | 0.995 | (0.104) | 0.893 | (0.093) | 0.942 | (0.093) |
| *Industry categories* | | | | | | |
| Manufacturing | 0.984 | (0.153) | 0.971 | (0.151) | 0.968 | (0.143) |
| Construction | 1.368* | (0.251) | 1.492** | (0.271) | 1.488** | (0.259) |
| Clerical and professional (base) | | | | | | |
| Trade | 0.787 | (0.129) | 0.785 | (0.126) | 0.742* | (0.115) |
| High-risk services | 0.956 | (0.138) | 0.993 | (0.143) | 1.020 | (0.140) |
| Low-risk services | 0.981 | (0.155) | 0.869 | (0.138) | 0.874 | (0.132) |
| Other industries | 0.871 | (0.172) | 0.771 | (0.154) | 0.806 | (0.153) |
| Industry is missing | 0.842 | (0.225) | 0.677 | (0.192) | 0.817 | (0.205) |
| **Location characteristics** | | | | | | |
| Metropolitan statistical area | 0.969 | (0.082) | 1.257*** | (0.111) | 1.291*** | (0.108) |
| County unemployment rate | 1.051** | (0.021) | 1.065*** | (0.023) | 1.062*** | (0.022) |

*continued*

**Table TA.D2 Odds Ratios from Logistic Regressions for Return-to-Work Measures (continued)**

| Control Variables | Not Working at the Time of Interview Due to Injury | | No Substantial Return to Work Due to Injury | | No Substantial Return to Work within 1 Year after Injury Due to Injury | |
|---|---|---|---|---|---|---|
| | Odds Ratio | Standard Error | Odds Ratio | Standard Error | Odds Ratio | Standard Error |
| **Injury characteristics** | | | | | | |
| *Injury type categories* | | | | | | |
| Neurologic spine pain | 6.649*** | (1.005) | 5.419*** | (0.830) | 4.569*** | (0.652) |
| Back and neck sprains, strains, and non-specific pain | 3.079*** | (0.448) | 2.228*** | (0.328) | 1.965*** | (0.267) |
| Fractures (base) | | | | | | |
| Lacerations and contusions | 0.931 | (0.191) | 0.749 | (0.154) | 0.639** | (0.123) |
| Inflammations | 2.183*** | (0.348) | 2.700*** | (0.422) | 2.615*** | (0.377) |
| Other sprains and strains | 1.927*** | (0.263) | 1.855*** | (0.255) | 1.721*** | (0.216) |
| Upper extremity neurologic (carpal tunnel) | 1.872** | (0.466) | 1.799** | (0.450) | 1.752** | (0.408) |
| Other injuries | 1.696*** | (0.240) | 1.582*** | (0.227) | 1.502*** | (0.196) |
| *Self-reported injury severity categories* | | | | | | |
| Severity under 25 points (base) | | | | | | |
| Severity 25 to 39 points | 1.353*** | (0.129) | 1.373*** | (0.135) | 1.428*** | (0.132) |
| Severity 40 points and over | 2.737*** | (0.284) | 2.767*** | (0.293) | 2.887*** | (0.286) |
| Severity is missing | 2.481*** | (0.627) | 1.716** | (0.457) | 2.172*** | (0.548) |
| Prior work injury | 1.478*** | (0.176) | 1.356** | (0.169) | 1.282** | (0.154) |
| **Comorbidities** | | | | | | |
| Received treatment for cancer | 1.149 | (0.231) | 1.103 | (0.215) | 1.001 | (0.190) |
| Received treatment for diabetes | 1.112 | (0.122) | 1.092 | (0.123) | 1.183 | (0.127) |
| Received treatment for heart problems | 1.352* | (0.216) | 1.438** | (0.227) | 1.404** | (0.214) |
| Received treatment for hypertension | 1.448*** | (0.115) | 1.347*** | (0.107) | 1.284*** | (0.097) |
| Received treatment for lung conditions | 1.244* | (0.142) | 1.141 | (0.134) | 1.059 | (0.120) |
| *Smoking history* | | | | | | |
| Did not smoke (base) | | | | | | |
| Smoked 1 to 9 years | 1.001 | (0.117) | 1.243* | (0.142) | 1.219* | (0.132) |
| Smoked 10 or more years | 1.192** | (0.092) | 1.162* | (0.091) | 1.261*** | (0.093) |
| **Dummy variables for each state-specific survey** | | | | | | |
| Arkansas, 2011 (base) | | | | | | |
| Connecticut, 2011 | 0.920 | (0.205) | 0.751 | (0.166) | 0.739 | (0.155) |
| Florida, 2012 | 0.812 | (0.177) | 0.864 | (0.188) | 0.899 | (0.184) |
| Georgia, 2012 | 1.059 | (0.226) | 1.354 | (0.279) | 1.454* | (0.283) |
| Indiana, 2010 | 0.577** | (0.135) | 0.471*** | (0.109) | 0.504*** | (0.107) |
| Indiana, 2013 | 0.678* | (0.152) | 0.574** | (0.131) | 0.569*** | (0.122) |
| Iowa, 2011 | 0.740 | (0.170) | 0.944 | (0.215) | 0.874 | (0.188) |
| Kentucky, 2012 | 1.035 | (0.219) | 1.248 | (0.259) | 1.233 | (0.243) |
| Massachusetts, 2010 | 1.035 | (0.229) | 0.908 | (0.199) | 1.095 | (0.222) |
| Massachusetts, 2013 | 1.018 | (0.216) | 1.048 | (0.222) | 0.972 | (0.197) |
| Michigan, 2010 | 0.670 | (0.166) | 0.518** | (0.133) | 0.608** | (0.146) |
| Michigan, 2013 | 0.802 | (0.179) | 0.740 | (0.163) | 0.895 | (0.181) |
| Minnesota, 2010 | 0.631* | (0.150) | 0.616** | (0.145) | 0.629** | (0.137) |
| North Carolina, 2010 | 1.234 | (0.260) | 1.006 | (0.216) | 1.082 | (0.218) |
| North Carolina, 2013 | 0.912 | (0.201) | 0.980 | (0.221) | 1.090 | (0.227) |
| Pennsylvania, 2010 | 1.029 | (0.223) | 1.005 | (0.218) | 0.978 | (0.199) |
| Tennessee, 2011 | 0.957 | (0.199) | 0.940 | (0.197) | 1.000 | (0.199) |
| Virginia, 2010 | 0.718 | (0.153) | 0.820 | (0.177) | 0.901 | (0.183) |
| Virginia, 2013 | 0.801 | (0.185) | 0.964 | (0.213) | 0.982 | (0.205) |
| Wisconsin, 2010 | 0.678 | (0.161) | 0.573** | (0.136) | 0.555** | (0.128) |
| Wisconsin, 2013 | 0.637* | (0.154) | 0.742 | (0.178) | 0.708 | (0.160) |
| Observations | 8,335 | | 8,255 | | 8,095 | |
| Pseudo R-squared | 0.186 | | 0.171 | | 0.171 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

**Table TA.D2b P-Value from Tests of Difference between 2010 and 2013 Surveys from Logistic Regressions for Return-to-Work Measures**

| State | Not Working at the Time of Interview Due to Injury | No Substantial Return to Work Due to Injury | No Substantial Return to Work within 1 Year after Injury Due to Injury |
|---|---|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | | | |
| Indiana | 0.513 | 0.427 | 0.602 |
| Massachusetts | 0.938 | 0.501 | 0.554 |
| Michigan | 0.453 | 0.153 | 0.093 |
| North Carolina | 0.171 | 0.908 | 0.976 |
| Virginia | 0.635 | 0.473 | 0.683 |
| Wisconsin | 0.813 | 0.327 | 0.341 |

*Note:* Tests of difference of survey dummy variable from logistic regressions presented in Table TA.D2.

**Table TA.D3 Coefficient Estimates from Duration Model**

| Control Variables | Duration Model | | |
|---|---|---|---|
| | Marginal Effect | Coefficient | Standard Error |
| **Worker demographics** | | | |
| *Age group categories* | | | |
| Age 15 to 24 | -0.348 | -0.036 | (0.077) |
| Age 25 to 39 (base) | | | |
| Age 40 to 54 | 0.881* | 0.092* | (0.047) |
| Age 55 to 60 | 1.740*** | 0.181*** | (0.062) |
| Age over 60 | 2.148*** | 0.223*** | (0.067) |
| Gender is male | 0.997** | 0.104** | (0.041) |
| Marital status is married | -0.575 | -0.060 | (0.038) |
| *Educational attainment* | | | |
| Less than high school graduate | 0.777 | 0.081 | (0.070) |
| High school graduate (base) | | | |
| Some college | -0.182 | -0.019 | (0.041) |
| College graduate or postgraduate | -0.995* | -0.103* | (0.053) |
| Chose to be interviewed in Spanish | 1.119 | 0.116 | (0.098) |
| **Employment characteristics** | | | |
| *Tenure categories* | | | |
| ≤ 6 months | 0.086 | 0.009 | (0.061) |
| > 6 months to 1 year | 0.796 | 0.083 | (0.075) |
| > 1 to 5 years (base) | | | |
| > 5 to 10 years | -0.574 | -0.060 | (0.056) |
| > 10 years | -0.841* | -0.087* | (0.050) |
| Tenure is missing | -0.426 | -0.044 | (0.064) |
| Log of preinjury wage | 0.360 | 0.037 | (0.041) |
| Part-time worker at the time of injury | 1.138** | 0.118** | (0.059) |
| Hourly worker at the time of injury | 1.724*** | 0.179*** | (0.058) |
| Hourly worker status is missing | 1.809 | 0.188 | (0.225) |
| Multiple employers in the year before injury | -0.166 | -0.017 | (0.049) |
| *Satisfied with job at the time of injury* | | | |
| Completely satisfied (base) | | | |
| Mostly satisfied | -1.231*** | -0.128*** | (0.040) |
| Somewhat or not at all satisfied | -1.566*** | -0.163*** | (0.048) |
| *Concerned about being fired* | | | |
| Disagree (base) | | | |
| Somewhat agree | 2.170*** | 0.226*** | (0.053) |
| Strongly agree | 3.916*** | 0.407*** | (0.052) |
| *Firm's payroll size categories* | | | |
| $1 to $4 million (very small size) (base) | | | |
| > $4 million to $20 million (small size) | -0.445 | -0.046 | (0.063) |
| > $20 million to $80 million (medium size) | -1.032 | -0.107 | (0.066) |
| > $80 million (large size) | 0.136 | 0.014 | (0.062) |
| Payroll values missing | -0.369 | -0.038 | (0.052) |
| *Industry categories* | | | |
| Manufacturing | 0.867 | 0.090 | (0.079) |
| Construction | 2.977*** | 0.310*** | (0.100) |
| Clerical and professional (base) | | | |
| Trade | 1.528* | 0.159* | (0.082) |
| High-risk services | 2.941*** | 0.306*** | (0.074) |
| Low-risk services | 1.809** | 0.188** | (0.079) |
| Other industries | 2.348** | 0.244** | (0.095) |
| Industry is missing | 1.475 | 0.153 | (0.115) |
| **Location characteristics** | | | |
| Metropolitan statistical area | 0.520 | 0.054 | (0.042) |
| County unemployment rate | 0.001 | 0.000 | (0.011) |

*continued*

**Table TA.D3 Coefficient Estimates from Duration Model (continued)**

| Control Variables | Duration Model | | |
|---|---|---|---|
| | Marginal Effect | Coefficient | Standard Error |
| **Injury characteristics** | | | |
| *Injury type categories* | | | |
| Neurologic spine pain | 0.814 | 0.085 | (0.099) |
| Back and neck sprains, strains, and non-specific pain | -3.016*** | -0.314*** | (0.067) |
| Fractures (base) | | | |
| Lacerations and contusions | -4.581*** | -0.477*** | (0.067) |
| Inflammations | 0.123 | 0.013 | (0.088) |
| Other sprains and strains | -0.862 | -0.090 | (0.060) |
| Upper extremity neurologic (carpal tunnel) | 1.546 | 0.161 | (0.118) |
| Other injuries | -1.152** | -0.120** | (0.057) |
| *Self-reported injury severity categories* | | | |
| Severity under 25 points (base) | | | |
| Severity 25 to 39 points | 3.684*** | 0.383*** | (0.042) |
| Severity 40 points and over | 7.862*** | 0.818*** | (0.050) |
| Severity is missing | 4.178*** | 0.435*** | (0.145) |
| Prior work injury | -0.829 | -0.086 | (0.074) |
| **Comorbidities** | | | |
| Received treatment for cancer | -0.742 | -0.077 | (0.114) |
| Received treatment for diabetes | 0.060 | 0.006 | (0.067) |
| Received treatment for heart problems | 1.815* | 0.189* | (0.098) |
| Received treatment for hypertension | 1.085*** | 0.113*** | (0.041) |
| Received treatment for lung conditions | -0.444 | -0.046 | (0.073) |
| *Smoking history* | | | |
| Did not smoke (base) | | | |
| Smoked 1 to 9 years | 0.193 | 0.020 | (0.056) |
| Smoked 10 or more years | 0.982*** | 0.102*** | (0.039) |
| **Dummy variables for each state-specific survey** | | | |
| Arkansas, 2011 (base) | | | |
| Connecticut, 2011 | 0.382 | 0.040 | (0.114) |
| Florida, 2012 | 0.938 | 0.098 | (0.133) |
| Georgia, 2012 | 3.185*** | 0.331*** | (0.117) |
| Indiana, 2010 | 1.891* | 0.197* | (0.112) |
| Indiana, 2013 | 1.314 | 0.137 | (0.122) |
| Iowa, 2011 | 0.549 | 0.057 | (0.115) |
| Kentucky, 2012 | 4.174*** | 0.434*** | (0.110) |
| Massachusetts, 2010 | 2.078* | 0.216* | (0.111) |
| Massachusetts, 2013 | 2.119* | 0.220* | (0.112) |
| Michigan, 2010 | 2.886** | 0.300** | (0.119) |
| Michigan, 2013 | 4.710*** | 0.490*** | (0.115) |
| Minnesota, 2010 | -0.142 | -0.015 | (0.109) |
| North Carolina, 2010 | 3.637*** | 0.378*** | (0.118) |
| North Carolina, 2013 | 1.472 | 0.153 | (0.111) |
| Pennsylvania, 2010 | 3.845*** | 0.400*** | (0.105) |
| Tennessee, 2011 | 1.873* | 0.195* | (0.112) |
| Virginia, 2010 | 2.779*** | 0.289*** | (0.108) |
| Virginia, 2013 | 3.304*** | 0.344*** | (0.109) |
| Wisconsin, 2010 | 1.171 | 0.122 | (0.110) |
| Wisconsin, 2013 | 0.234 | 0.024 | (0.112) |
| Constant | 0.000 | 0.411 | (0.301) |
| Observations | | 8,270 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

**Table TA.D3b P-Value from Tests of Difference between 2010 and 2013 Surveys from Duration Model**

| State | P-Value |
|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | |
| Indiana | 0.636 |
| Massachusetts | 0.970 |
| Michigan | 0.109 |
| North Carolina | 0.063 |
| Virginia | 0.592 |
| Wisconsin | 0.378 |

*Note:* Tests of difference of survey dummy variables from logistic regressions presented in Table TA.D3.

**Table TA.D4 Odds Ratios from Logistic Regressions for Earnings Recovery Measures**

| Control Variables | Reporting Earning "a Lot Less" at the Time of Interview Due to Injury | |
|---|---|---|
| | Odds Ratio | Standard Error |
| **Worker demographics** | | |
| *Age group categories* | | |
| Age 15 to 24 | 0.558** | (0.160) |
| Age 25 to 39 (base) | | |
| Age 40 to 54 | 1.159 | (0.163) |
| Age 55 to 60 | 0.977 | (0.197) |
| Age over 60 | 1.176 | (0.307) |
| Gender is male | 0.922 | (0.122) |
| Marital status is married | 0.834 | (0.097) |
| *Educational attainment* | | |
| Less than high school graduate | 1.007 | (0.227) |
| High school graduate (base) | | |
| Some college | 1.312** | (0.179) |
| College graduate or postgraduate | 1.163 | (0.205) |
| Chose to be interviewed in Spanish | 0.597* | (0.183) |
| **Employment characteristics** | | |
| *Tenure categories* | | |
| ≤ 6 months | 1.017 | (0.184) |
| > 6 months to 1 year | 1.071 | (0.221) |
| > 1 to 5 years (base) | | |
| > 5 to 10 years | 1.264 | (0.219) |
| > 10 years | 0.696** | (0.125) |
| Tenure is missing | 0.930 | (0.200) |
| Log of preinjury wage | 0.882 | (0.112) |
| Part-time worker at the time of injury | 0.544** | (0.130) |
| Hourly worker at the time of injury | 0.712** | (0.117) |
| Hourly worker status is missing | 0.761 | (0.483) |
| Multiple employers in the year before injury | 1.028 | (0.153) |
| *Satisfied with job at the time of injury* | | |
| Completely satisfied (base) | | |
| Mostly satisfied | 0.599*** | (0.074) |
| Somewhat or not at all satisfied | 0.368*** | (0.060) |
| *Concerned about being fired* | | |
| Disagree (base) | | |
| Somewhat agree | 1.758*** | (0.332) |
| Strongly agree | 5.318*** | (0.694) |
| *Firm's payroll size categories* | | |
| $1 to $4 million (very small size) (base) | | |
| > $4 million to $20 million (small size) | 1.422* | (0.288) |
| > $20 million to $80 million (medium size) | 1.099 | (0.242) |
| > $80 million (large size) | 1.086 | (0.226) |
| Payroll values missing | 1.049 | (0.185) |
| *Industry categories* | | |
| Manufacturing | 2.133** | (0.653) |
| Construction | 2.172** | (0.762) |
| Clerical and professional (base) | | |
| Trade | 2.428*** | (0.747) |
| High-risk services | 2.478*** | (0.714) |
| Low-risk services | 1.540 | (0.472) |
| Other industries | 1.487 | (0.529) |
| Industry is missing | 1.681 | (0.769) |
| **Location characteristics** | | |
| Metropolitan statistical area | 0.918 | (0.127) |
| County unemployment rate | 0.967 | (0.034) |

*continued*

**Table TA.D4 Odds Ratios from Logistic Regressions for Earnings Recovery Measures (continued)**

| Control Variables | Reporting Earning "a Lot Less" at the Time of Interview Due to Injury | |
|---|---|---|
| | Odds Ratio | Standard Error |
| **Injury characteristics** | | |
| *Injury type categories* | | |
| Neurologic spine pain | 2.288*** | (0.600) |
| Back and neck sprains, strains, and non-specific pain | 1.809*** | (0.416) |
| Fractures (base) | | |
| Lacerations and contusions | 1.113 | (0.302) |
| Inflammations | 1.514 | (0.389) |
| Other sprains and strains | 1.481* | (0.315) |
| Upper extremity neurologic (carpal tunnel) | 1.963* | (0.742) |
| Other injuries | 1.462* | (0.322) |
| *Self-reported injury severity categories* | | |
| Severity under 25 points (base) | | |
| Severity 25 to 39 points | 1.609*** | (0.265) |
| Severity 40 points and over | 2.497*** | (0.440) |
| Severity is missing | 2.619** | (1.025) |
| Prior work injury | 1.171 | (0.262) |
| **Comorbidities** | | |
| Received treatment for cancer | 0.996 | (0.394) |
| Received treatment for diabetes | 1.437* | (0.280) |
| Received treatment for heart problems | 1.336 | (0.466) |
| Received treatment for hypertension | 1.095 | (0.152) |
| Received treatment for lung conditions | 1.305 | (0.271) |
| *Smoking history* | | |
| Did not smoke (base) | | |
| Smoked 1 to 9 years | 0.980 | (0.171) |
| Smoked 10 or more years | 1.102 | (0.138) |
| **Dummy variables for each state-specific survey** | | |
| Arkansas, 2011 (base) | | |
| Connecticut, 2011 | 1.007 | (0.387) |
| Florida, 2012 | 1.381 | (0.502) |
| Georgia, 2012 | 1.566 | (0.540) |
| Indiana, 2010 | 0.970 | (0.353) |
| Indiana, 2013 | 0.886 | (0.330) |
| Iowa, 2011 | 1.052 | (0.395) |
| Kentucky, 2012 | 0.785 | (0.290) |
| Massachusetts, 2010 | 0.561 | (0.244) |
| Massachusetts, 2013 | 1.116 | (0.416) |
| Michigan, 2010 | 1.407 | (0.563) |
| Michigan, 2013 | 1.079 | (0.412) |
| Minnesota, 2010 | 1.298 | (0.467) |
| North Carolina, 2010 | 0.689 | (0.265) |
| North Carolina, 2013 | 1.020 | (0.376) |
| Pennsylvania, 2010 | 0.807 | (0.329) |
| Tennessee, 2011 | 1.150 | (0.426) |
| Virginia, 2010 | 0.713 | (0.261) |
| Virginia, 2013 | 1.099 | (0.390) |
| Wisconsin, 2010 | 0.888 | (0.334) |
| Wisconsin, 2013 | 1.095 | (0.405) |
| Observations | 5,901 | |
| Pseudo R-squared | 0.153 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

**Table TA.D4b P-Value from Tests of Difference between 2010 and 2013 Surveys from Logistic Regressions for Earnings Recovery Measures**

| State | Reporting Earning "a Lot Less" at the Time of Interview Due to Injury |
|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | |
| Indiana | 0.809 |
| Massachusetts | 0.108 |
| Michigan | 0.484 |
| North Carolina | 0.310 |
| Virginia | 0.200 |
| Wisconsin | 0.582 |

*Note:* Tests of difference of survey dummy variable from logistic regressions presented in Table TA.D4.

**Table TA.D5 Coefficient Estimates from Ordered Logistic Regressions for Measures of Access to Care and Provider**

| Control Variables | Problems Getting Care (1: no problems, 2: small problems, 3: big problems) | | | Problems Getting Provider (1: no problems, 2: small problems, 3: big problems) | | |
|---|---|---|---|---|---|---|
| | Odds Ratio | Coefficient | Standard Error | Odds Ratio | Coefficient | Standard Error |
| **Worker demographics** | | | | | | |
| *Age group categories* | | | | | | |
| Age 15 to 24 | 0.765** | -0.268** | (0.130) | 0.952 | -0.049 | (0.136) |
| Age 25 to 39 (base) | | | | | | |
| Age 40 to 54 | 1.003 | 0.003 | (0.069) | 1.055 | 0.054 | (0.073) |
| Age 55 to 60 | 0.947 | -0.054 | (0.092) | 0.995 | -0.005 | (0.098) |
| Age over 60 | 0.960 | -0.041 | (0.104) | 0.941 | -0.061 | (0.109) |
| Gender is male | 0.860** | -0.151** | (0.060) | 0.896* | -0.110* | (0.064) |
| Marital status is married | 0.998 | -0.002 | (0.055) | 1.020 | 0.020 | (0.059) |
| *Educational attainment* | | | | | | |
| Less than high school graduate | 1.158 | 0.147 | (0.091) | 1.220** | 0.199** | (0.095) |
| High school graduate (base) | | | | | | |
| Some college | 1.130* | 0.122* | (0.063) | 1.133* | 0.125* | (0.066) |
| College graduate or postgraduate | 1.114 | 0.108 | (0.080) | 1.077 | 0.074 | (0.085) |
| Chose to be interviewed in Spanish | 1.640*** | 0.495*** | (0.129) | 1.327** | 0.283** | (0.137) |
| **Employment characteristics** | | | | | | |
| *Tenure categories* | | | | | | |
| ≤ 6 months | 1.046 | 0.045 | (0.084) | 1.000 | 0.000 | (0.089) |
| > 6 months to 1 year | 1.038 | 0.037 | (0.102) | 0.875 | -0.134 | (0.111) |
| > 1 to 5 years (base) | | | | | | |
| > 5 to 10 years | 1.025 | 0.025 | (0.085) | 1.091 | 0.087 | (0.088) |
| > 10 years | 1.142* | 0.133* | (0.078) | 1.026 | 0.026 | (0.083) |
| Tenure is missing | 0.981 | -0.019 | (0.101) | 1.012 | 0.012 | (0.106) |
| Log of preinjury wage | 0.968 | -0.033 | (0.059) | 1.005 | 0.005 | (0.063) |
| Part-time worker at the time of injury | 0.937 | -0.065 | (0.094) | 0.914 | -0.090 | (0.099) |
| Hourly worker at the time of injury | 0.969 | -0.032 | (0.081) | 1.119 | 0.112 | (0.086) |
| Hourly worker status is missing | 1.536* | 0.429* | (0.235) | 1.358 | 0.306 | (0.280) |
| Multiple employers in the year before injury | 1.102 | 0.097 | (0.070) | 1.104 | 0.099 | (0.075) |
| *Satisfied with job at the time of injury* | | | | | | |
| Completely satisfied (base) | | | | | | |
| Mostly satisfied | 1.117* | 0.111* | (0.060) | 1.004 | 0.004 | (0.063) |
| Somewhat or not at all satisfied | 1.141* | 0.132* | (0.069) | 1.089 | 0.085 | (0.073) |
| *Concerned about being fired* | | | | | | |
| Disagree (base) | | | | | | |
| Somewhat agree | 1.815*** | 0.596*** | (0.077) | 1.900*** | 0.642*** | (0.079) |
| Strongly agree | 2.678*** | 0.985*** | (0.060) | 2.469*** | 0.904*** | (0.064) |
| *Firm's payroll size categories* | | | | | | |
| $1 to $4 million (very small size) (base) | | | | | | |
| > $4 million to $20 million (small size) | 0.958 | -0.043 | (0.095) | 0.977 | -0.023 | (0.102) |
| > $20 million to $80 million (medium size) | 1.024 | 0.024 | (0.103) | 1.230* | 0.207* | (0.106) |
| > $80 million (large size) | 1.267** | 0.237** | (0.092) | 1.381*** | 0.323*** | (0.098) |
| Payroll values missing | 1.116 | 0.110 | (0.079) | 1.125 | 0.118 | (0.085) |
| *Industry categories* | | | | | | |
| Manufacturing | 1.062 | 0.060 | (0.118) | 0.811* | -0.209* | (0.119) |
| Construction | 1.177 | 0.163 | (0.142) | 0.930 | -0.073 | (0.148) |
| Clerical and professional (base) | | | | | | |
| Trade | 1.094 | 0.090 | (0.124) | 0.839 | -0.175 | (0.123) |
| High-risk services | 1.217* | 0.196* | (0.111) | 0.917 | -0.087 | (0.110) |
| Low-risk services | 1.039 | 0.038 | (0.122) | 0.678*** | -0.389*** | (0.124) |
| Other industries | 1.343** | 0.295** | (0.139) | 0.982 | -0.018 | (0.143) |
| Industry is missing | 1.100 | 0.095 | (0.195) | 0.861 | -0.150 | (0.196) |
| **Location characteristics** | | | | | | |
| Metropolitan statistical area | 0.954 | -0.047 | (0.065) | 1.033 | 0.032 | (0.069) |
| County unemployment rate | 1.000 | 0.000 | (0.016) | 0.989 | -0.011 | (0.017) |

*continued*

**Table TA.D5 Coefficient Estimates from Ordered Logistic Regressions for Measures of Access to Care and Provider (continued)**

| Control Variables | Problems Getting Care (1: no problems, 2: small problems, 3: big problems) | | | Problems Getting Provider (1: no problems, 2: small problems, 3: big problems) | | |
|---|---|---|---|---|---|---|
| | Odds Ratio | Coefficient | Standard Error | Odds Ratio | Coefficient | Standard Error |
| **Injury characteristics** | | | | | | |
| *Injury type categories* | | | | | | |
| Neurologic spine pain | 3.504*** | 1.254*** | (0.119) | 2.625*** | 0.965*** | (0.123) |
| Back and neck sprains, strains, and non-specific pain | 2.452*** | 0.897*** | (0.108) | 2.280*** | 0.824*** | (0.110) |
| Fractures (base) | | | | | | |
| Lacerations and contusions | 1.513*** | 0.414*** | (0.130) | 1.269* | 0.238* | (0.132) |
| Inflammations | 2.333*** | 0.847*** | (0.118) | 1.964*** | 0.675*** | (0.122) |
| Other sprains and strains | 2.012*** | 0.699*** | (0.101) | 1.639*** | 0.494*** | (0.102) |
| Upper extremity neurologic (carpal tunnel) | 1.868*** | 0.625*** | (0.187) | 1.496** | 0.403** | (0.196) |
| Other injuries | 1.737*** | 0.552*** | (0.104) | 1.459*** | 0.378*** | (0.106) |
| *Self-reported injury severity categories* | | | | | | |
| Severity under 25 points (base) | | | | | | |
| Severity 25 to 39 points | 1.516*** | 0.416*** | (0.068) | 1.265*** | 0.235*** | (0.072) |
| Severity 40 points and over | 2.270*** | 0.820*** | (0.076) | 1.872*** | 0.627*** | (0.080) |
| Severity is missing | 1.954*** | 0.670*** | (0.209) | 1.380 | 0.322 | (0.221) |
| Prior work injury | 0.980 | -0.020 | (0.099) | 1.107 | 0.102 | (0.101) |
| **Comorbidities** | | | | | | |
| Received treatment for cancer | 0.903 | -0.102 | (0.174) | 1.290 | 0.255 | (0.157) |
| Received treatment for diabetes | 1.091 | 0.087 | (0.089) | 0.987 | -0.013 | (0.100) |
| Received treatment for heart problems | 1.264* | 0.234* | (0.135) | 1.060 | 0.058 | (0.150) |
| Received treatment for hypertension | 0.989 | -0.011 | (0.063) | 0.900 | -0.105 | (0.067) |
| Received treatment for lung conditions | 1.121 | 0.114 | (0.091) | 1.245** | 0.219** | (0.095) |
| *Smoking history* | | | | | | |
| Did not smoke (base) | | | | | | |
| Smoked 1 to 9 years | 1.129 | 0.121 | (0.085) | 0.964 | -0.037 | (0.089) |
| Smoked 10 or more years | 1.149** | 0.139** | (0.058) | 1.044 | 0.043 | (0.062) |
| **Dummy variables for each state-specific survey** | | | | | | |
| Arkansas, 2011 (base) | | | | | | |
| Connecticut, 2011 | 0.902 | -0.103 | (0.174) | 0.799 | -0.225 | (0.180) |
| Florida, 2012 | 1.317 | 0.275 | (0.171) | 1.270 | 0.239 | (0.173) |
| Georgia, 2012 | 1.083 | 0.080 | (0.167) | 0.980 | -0.020 | (0.175) |
| Indiana, 2010 | 0.942 | -0.060 | (0.175) | 1.178 | 0.164 | (0.175) |
| Indiana, 2013 | 1.125 | 0.118 | (0.169) | 1.146 | 0.136 | (0.175) |
| Iowa, 2011 | 1.074 | 0.071 | (0.177) | 1.239 | 0.214 | (0.175) |
| Kentucky, 2012 | 1.129 | 0.121 | (0.165) | 0.778 | -0.251 | (0.176) |
| Massachusetts, 2010 | 0.811 | -0.210 | (0.179) | 0.730* | -0.315* | (0.177) |
| Massachusetts, 2013 | 0.824 | -0.193 | (0.178) | 0.659** | -0.417** | (0.187) |
| Michigan, 2010 | 0.582*** | -0.542*** | (0.202) | 0.710* | -0.342* | (0.204) |
| Michigan, 2013 | 1.008 | 0.008 | (0.177) | 0.889 | -0.118 | (0.190) |
| Minnesota, 2010 | 1.004 | 0.004 | (0.170) | 0.649** | -0.433** | (0.182) |
| North Carolina, 2010 | 0.978 | -0.022 | (0.166) | 1.142 | 0.133 | (0.172) |
| North Carolina, 2013 | 1.115 | 0.109 | (0.165) | 1.425** | 0.354** | (0.162) |
| Pennsylvania, 2010 | 0.691** | -0.369** | (0.177) | 0.787 | -0.239 | (0.181) |
| Tennessee, 2011 | 0.978 | -0.022 | (0.171) | 1.174 | 0.160 | (0.168) |
| Virginia, 2010 | 0.954 | -0.047 | (0.167) | 0.750 | -0.288 | (0.176) |
| Virginia, 2013 | 0.991 | -0.009 | (0.171) | 0.858 | -0.153 | (0.175) |
| Wisconsin, 2010 | 0.557*** | -0.585*** | (0.185) | 0.479*** | -0.736*** | (0.194) |
| Wisconsin, 2013 | 0.703* | -0.352* | (0.184) | 0.531*** | -0.633*** | (0.192) |
| Observations | | 8,433 | | | 8,396 | |
| Pseudo R-squared | | 0.073 | | | 0.066 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

**Table TA.D5b P-Value from Tests of Difference between 2010 and 2013 Surveys from Ordered Logistic Regressions for Measures of Access to Care and Provider**

| State | Problems Getting Care | Problems Getting Provider |
|---|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | | |
| Indiana | 0.306 | 0.876 |
| Massachusetts | 0.927 | 0.586 |
| Michigan | 0.005 | 0.279 |
| North Carolina | 0.412 | 0.181 |
| Virginia | 0.814 | 0.441 |
| Wisconsin | 0.230 | 0.624 |

*Note:* Tests of difference of survey dummy variable from logistic regressions presented in Table TA.D5.

**Table TA.D6 Coefficients from Ordered Logistic Regressions for Satisfaction with Care and Provider**

| Control Variables | Satisfaction with Care (1: very satisfied, 2: somewhat satisfied, 3: somewhat dissatisfied, 4: very dissatisfied) | | | Satisfaction with Provider (1: very satisfied, 2: somewhat satisfied, 3: somewhat dissatisfied, 4: very dissatisfied) | | |
|---|---|---|---|---|---|---|
| | Odds Ratio | Coefficient | Standard Error | Odds Ratio | Coefficient | Standard Error |
| **Worker demographics** | | | | | | |
| *Age group categories* | | | | | | |
| Age 15 to 24 | 0.850 | -0.163 | (0.109) | 0.946 | -0.055 | (0.123) |
| Age 25 to 39 (base) | | | | | | |
| Age 40 to 54 | 0.929 | -0.074 | (0.061) | 1.020 | 0.020 | (0.066) |
| Age 55 to 60 | 0.897 | -0.109 | (0.083) | 0.968 | -0.033 | (0.087) |
| Age over 60 | 0.826** | -0.191** | (0.091) | 0.887 | -0.120 | (0.100) |
| Gender is male | 0.893** | -0.113** | (0.053) | 0.969 | -0.031 | (0.058) |
| Marital status is married | 0.934 | -0.068 | (0.049) | 0.946 | -0.055 | (0.052) |
| *Educational attainment* | | | | | | |
| Less than high school graduate | 1.254*** | 0.226*** | (0.081) | 1.022 | 0.022 | (0.086) |
| High school graduate (base) | | | | | | |
| Some college | 1.020 | 0.020 | (0.056) | 0.974 | -0.026 | (0.059) |
| College graduate or postgraduate | 0.980 | -0.020 | (0.072) | 0.908 | -0.097 | (0.077) |
| Chose to be interviewed in Spanish | 1.568*** | 0.450*** | (0.113) | 1.946*** | 0.666*** | (0.112) |
| **Employment characteristics** | | | | | | |
| *Tenure categories* | | | | | | |
| ≤ 6 months | 1.137* | 0.128* | (0.075) | 1.139 | 0.130 | (0.080) |
| > 6 months to 1 year | 1.036 | 0.035 | (0.092) | 1.008 | 0.008 | (0.100) |
| > 1 to 5 years (base) | | | | | | |
| > 5 to 10 years | 1.018 | 0.018 | (0.074) | 1.115 | 0.109 | (0.081) |
| > 10 years | 1.019 | 0.019 | (0.069) | 1.110 | 0.104 | (0.073) |
| Tenure is missing | 0.961 | -0.040 | (0.087) | 1.210** | 0.191** | (0.093) |
| Log of preinjury wage | 1.031 | 0.031 | (0.053) | 0.966 | -0.035 | (0.057) |
| Part-time worker at the time of injury | 0.956 | -0.045 | (0.083) | 0.919 | -0.084 | (0.090) |
| Hourly worker at the time of injury | 1.190** | 0.174** | (0.072) | 1.178** | 0.164** | (0.078) |
| Hourly worker status is missing | 1.592** | 0.465** | (0.228) | 1.249 | 0.222 | (0.237) |
| Multiple employers in the year before injury | 1.111 | 0.105 | (0.064) | 1.030 | 0.030 | (0.068) |
| *Satisfied with job at the time of injury* | | | | | | |
| Completely satisfied (base) | | | | | | |
| Mostly satisfied | 1.192*** | 0.176*** | (0.054) | 1.302*** | 0.264*** | (0.059) |
| Somewhat or not at all satisfied | 1.306*** | 0.267*** | (0.060) | 1.595*** | 0.467*** | (0.065) |
| *Concerned about being fired* | | | | | | |
| Disagree (base) | | | | | | |
| Somewhat agree | 1.852*** | 0.616*** | (0.066) | 1.795*** | 0.585*** | (0.071) |
| Strongly agree | 2.843*** | 1.045*** | (0.055) | 2.100*** | 0.742*** | (0.057) |
| *Firm's payroll size categories* | | | | | | |
| $1 to $4 million (very small size) (base) | | | | | | |
| > $4 million to $20 million (small size) | 1.116 | 0.110 | (0.083) | 1.161 | 0.149 | (0.091) |
| > $20 million to $80 million (medium size) | 1.229** | 0.206** | (0.091) | 1.338*** | 0.291*** | (0.096) |
| > $80 million (large size) | 1.300*** | 0.262*** | (0.084) | 1.331*** | 0.286*** | (0.091) |
| Payroll values missing | 1.340*** | 0.293*** | (0.071) | 1.290*** | 0.255*** | (0.078) |
| *Industry categories* | | | | | | |
| Manufacturing | 1.084 | 0.081 | (0.102) | 1.037 | 0.036 | (0.109) |
| Construction | 1.124 | 0.117 | (0.127) | 1.148 | 0.138 | (0.135) |
| Clerical and professional (base) | | | | | | |
| Trade | 1.065 | 0.063 | (0.108) | 1.002 | 0.002 | (0.114) |
| High-risk services | 1.165 | 0.153 | (0.096) | 0.933 | -0.069 | (0.103) |
| Low-risk services | 0.994 | -0.006 | (0.105) | 0.955 | -0.046 | (0.114) |
| Other industries | 1.108 | 0.103 | (0.124) | 0.977 | -0.023 | (0.137) |
| Industry is missing | 1.041 | 0.040 | (0.169) | 0.755 | -0.281 | (0.188) |
| **Location characteristics** | | | | | | |
| Metropolitan statistical area | 1.009 | 0.009 | (0.058) | 1.059 | 0.057 | (0.062) |
| County unemployment rate | 1.026* | 0.026* | (0.014) | 1.027* | 0.027* | (0.015) |

*continued*

**Table TA.D6 Coefficients from Ordered Logistic Regressions for Satisfaction with Care and Provider (continued)**

| Control Variables | Satisfaction with Care (1: very satisfied, 2: somewhat satisfied, 3: somewhat dissatisfied, 4: very dissatisfied) | | | Satisfaction with Provider (1: very satisfied, 2: somewhat satisfied, 3: somewhat dissatisfied, 4: very dissatisfied) | | |
|---|---|---|---|---|---|---|
| | Odds Ratio | Coefficient | Standard Error | Odds Ratio | Coefficient | Standard Error |
| **Injury characteristics** | | | | | | |
| *Injury type categories* | | | | | | |
| Neurologic spine pain | 2.638*** | 0.970*** | (0.100) | 2.018*** | 0.702*** | (0.113) |
| Back and neck sprains, strains, and non-specific pain | 2.651*** | 0.975*** | (0.090) | 2.282*** | 0.825*** | (0.096) |
| Fractures (base) | | | | | | |
| Lacerations and contusions | 1.402*** | 0.338*** | (0.105) | 1.318** | 0.276** | (0.118) |
| Inflammations | 1.610*** | 0.476*** | (0.102) | 1.587*** | 0.462*** | (0.108) |
| Other sprains and strains | 1.828*** | 0.603*** | (0.081) | 1.747*** | 0.558*** | (0.089) |
| Upper extremity neurologic (carpal tunnel) | 1.680*** | 0.519*** | (0.154) | 1.435** | 0.361** | (0.167) |
| Other injuries | 1.501*** | 0.406*** | (0.084) | 1.301*** | 0.263*** | (0.094) |
| *Self-reported injury severity categories* | | | | | | |
| Severity under 25 points (base) | | | | | | |
| Severity 25 to 39 points | 1.392*** | 0.331*** | (0.059) | 1.235*** | 0.211*** | (0.063) |
| Severity 40 points and over | 2.239*** | 0.806*** | (0.067) | 1.872*** | 0.627*** | (0.072) |
| Severity is missing | 2.069*** | 0.727*** | (0.164) | 1.326 | 0.282 | (0.196) |
| Prior work injury | 1.081 | 0.078 | (0.084) | 1.054 | 0.053 | (0.087) |
| **Comorbidities** | | | | | | |
| Received treatment for cancer | 1.285* | 0.251* | (0.143) | 1.004 | 0.004 | (0.162) |
| Received treatment for diabetes | 1.249*** | 0.222*** | (0.078) | 1.169* | 0.156* | (0.082) |
| Received treatment for heart problems | 1.087 | 0.083 | (0.124) | 1.125 | 0.118 | (0.133) |
| Received treatment for hypertension | 0.998 | -0.002 | (0.057) | 0.999 | -0.001 | (0.060) |
| Received treatment for lung conditions | 1.123 | 0.116 | (0.085) | 1.025 | 0.025 | (0.090) |
| *Smoking history* | | | | | | |
| Did not smoke (base) | | | | | | |
| Smoked 1 to 9 years | 1.071 | 0.069 | (0.072) | 0.956 | -0.045 | (0.079) |
| Smoked 10 or more years | 1.134** | 0.126** | (0.052) | 0.973 | -0.027 | (0.056) |
| **Dummy variables for each state-specific survey** | | | | | | |
| Arkansas, 2011 (base) | | | | | | |
| Connecticut, 2011 | 0.755* | -0.281* | (0.153) | 0.654*** | -0.425*** | (0.162) |
| Florida, 2012 | 1.323* | 0.280* | (0.147) | 1.146 | 0.136 | (0.156) |
| Georgia, 2012 | 1.140 | 0.131 | (0.139) | 1.023 | 0.023 | (0.147) |
| Indiana, 2010 | 0.834 | -0.181 | (0.152) | 0.783 | -0.244 | (0.162) |
| Indiana, 2013 | 1.134 | 0.126 | (0.146) | 0.832 | -0.184 | (0.161) |
| Iowa, 2011 | 1.047 | 0.046 | (0.147) | 1.177 | 0.163 | (0.158) |
| Kentucky, 2012 | 0.754* | -0.283* | (0.151) | 0.652*** | -0.428*** | (0.158) |
| Massachusetts, 2010 | 0.569*** | -0.563*** | (0.151) | 0.535*** | -0.625*** | (0.164) |
| Massachusetts, 2013 | 0.712** | -0.339** | (0.148) | 0.547*** | -0.604*** | (0.164) |
| Michigan, 2010 | 0.753 | -0.284 | (0.174) | 0.645** | -0.438** | (0.181) |
| Michigan, 2013 | 1.016 | 0.016 | (0.159) | 0.768 | -0.264 | (0.171) |
| Minnesota, 2010 | 0.900 | -0.105 | (0.149) | 0.698** | -0.360** | (0.162) |
| North Carolina, 2010 | 0.789 | -0.237 | (0.150) | 0.865 | -0.145 | (0.157) |
| North Carolina, 2013 | 1.085 | 0.082 | (0.142) | 0.978 | -0.022 | (0.154) |
| Pennsylvania, 2010 | 0.816 | -0.203 | (0.149) | 1.078 | 0.075 | (0.158) |
| Tennessee, 2011 | 1.106 | 0.101 | (0.140) | 0.922 | -0.081 | (0.154) |
| Virginia, 2010 | 0.874 | -0.135 | (0.141) | 0.877 | -0.131 | (0.154) |
| Virginia, 2013 | 0.836 | -0.179 | (0.151) | 0.850 | -0.162 | (0.159) |
| Wisconsin, 2010 | 0.548*** | -0.602*** | (0.157) | 0.378*** | -0.974*** | (0.179) |
| Wisconsin, 2013 | 0.632*** | -0.459*** | (0.156) | 0.515*** | -0.663*** | (0.172) |
| Observations | | 8,444 | | | 8,417 | |
| Pseudo R-squared | | 0.072 | | | 0.053 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

**Table TA.D6b P-Value from Tests of Difference between 2010 and 2013 Surveys from Ordered Logistic Regressions for Satisfaction with Care and Provider**

| State | Satisfaction with Care | Satisfaction with Provider |
|---|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | | |
| Indiana | 0.048 | 0.723 |
| Massachusetts | 0.137 | 0.902 |
| Michigan | 0.091 | 0.346 |
| North Carolina | 0.031 | 0.428 |
| Virginia | 0.766 | 0.843 |
| Wisconsin | 0.394 | 0.105 |

*Note:* Tests of difference of survey dummy variable from regressions presented in Table TA.D6.

**Table TA.D7 Odds Ratios from Logistic Regressions for Satisfaction Measures**

| Control Variables | Wanted to Change Initial Provider | | Wanted to Change Primary, Non-Initial Provider | |
|---|---|---|---|---|
| | Odds Ratio | Standard Error | Odds Ratio | Standard Error |
| **Worker demographics** | | | | |
| *Age group categories* | | | | |
| Age 15 to 24 | 0.942 | (0.131) | 0.989 | (0.279) |
| Age 25 to 39 (base) | | | | |
| Age 40 to 54 | 1.026 | (0.075) | 1.326* | (0.196) |
| Age 55 to 60 | 0.950 | (0.094) | 1.364 | (0.276) |
| Age over 60 | 0.863 | (0.094) | 1.225 | (0.279) |
| Gender is male | 0.927 | (0.060) | 0.789* | (0.103) |
| Marital status is married | 0.962 | (0.056) | 0.922 | (0.111) |
| *Educational attainment* | | | | |
| Less than high school graduate | 1.017 | (0.099) | 1.686*** | (0.338) |
| High school graduate (base) | | | | |
| Some college | 0.899 | (0.059) | 1.090 | (0.148) |
| College graduate or postgraduate | 0.995 | (0.086) | 1.000 | (0.179) |
| Chose to be interviewed in Spanish | 1.492*** | (0.207) | 1.377 | (0.419) |
| **Employment characteristics** | | | | |
| *Tenure categories* | | | | |
| ≤ 6 months | 1.093 | (0.098) | 0.910 | (0.163) |
| > 6 months to 1 year | 0.988 | (0.108) | 1.137 | (0.241) |
| > 1 to 5 years (base) | | | | |
| > 5 to 10 years | 1.130 | (0.101) | 0.896 | (0.162) |
| > 10 years | 1.036 | (0.088) | 0.747* | (0.131) |
| Tenure is missing | 1.052 | (0.111) | 0.855 | (0.185) |
| Log of preinjury wage | 1.107 | (0.071) | 1.087 | (0.153) |
| Part-time worker at the time of injury | 1.020 | (0.103) | 1.363 | (0.279) |
| Hourly worker at the time of injury | 1.176* | (0.103) | 1.067 | (0.175) |
| Hourly worker status is missing | 1.396 | (0.372) | 0.997 | (0.545) |
| Multiple employers in the year before injury | 1.051 | (0.079) | 0.977 | (0.153) |
| *Satisfied with job at the time of injury* | | | | |
| Completely satisfied (base) | | | | |
| Mostly satisfied | 1.069 | (0.068) | 1.061 | (0.138) |
| Somewhat or not at all satisfied | 1.120 | (0.082) | 1.109 | (0.166) |
| *Concerned about being fired* | | | | |
| Disagree (base) | | | | |
| Somewhat agree | 1.672*** | (0.138) | 1.863*** | (0.320) |
| Strongly agree | 2.310*** | (0.146) | 2.315*** | (0.306) |
| *Firm's payroll size categories* | | | | |
| $1 to $4 million (very small size) (base) | | | | |
| > $4 million to $20 million (small size) | 1.147 | (0.120) | 0.762 | (0.169) |
| > $20 million to $80 million (medium size) | 1.369*** | (0.153) | 1.247 | (0.289) |
| > $80 million (large size) | 1.541*** | (0.156) | 1.372 | (0.292) |
| Payroll values missing | 1.459*** | (0.129) | 1.229 | (0.222) |
| *Industry categories* | | | | |
| Manufacturing | 1.155 | (0.145) | 0.890 | (0.221) |
| Construction | 1.162 | (0.179) | 0.866 | (0.261) |
| Clerical and professional (base) | | | | |
| Trade | 1.192 | (0.156) | 0.617* | (0.159) |
| High-risk services | 1.139 | (0.134) | 0.602** | (0.139) |
| Low-risk services | 1.021 | (0.133) | 0.848 | (0.208) |
| Other industries | 1.282 | (0.194) | 0.680 | (0.211) |
| **Location characteristics** | | | | |
| Metropolitan statistical area | 1.188** | (0.082) | 0.940 | (0.136) |
| County unemployment rate | 1.016 | (0.018) | 0.995 | (0.033) |

*continued*

**Table TA.D7 Odds Ratios from Logistic Regressions for Satisfaction Measures (continued)**

| Control Variables | Wanted to Change Initial Provider | | Wanted to Change Primary, Non-Initial Provider | |
|---|---|---|---|---|
| | Odds Ratio | Standard Error | Odds Ratio | Standard Error |
| **Injury characteristics** | | | | |
| *Injury type categories* | | | | |
| Neurologic spine pain | 2.078*** | (0.262) | 2.903*** | (0.862) |
| Back and neck sprains, strains, and non-specific pain | 2.055*** | (0.227) | 3.182*** | (0.860) |
| Fractures (base) | | | | |
| Lacerations and contusions | 1.212 | (0.161) | 1.905** | (0.602) |
| Inflammations | 2.261*** | (0.275) | 1.805** | (0.526) |
| Other sprains and strains | 1.631*** | (0.166) | 2.264*** | (0.579) |
| Upper extremity neurologic (carpal tunnel) | 1.653*** | (0.311) | 1.545 | (0.676) |
| Other injuries | 1.262** | (0.135) | 1.920** | (0.504) |
| *Self-reported injury severity categories* | | | | |
| Severity under 25 points (base) | | | | |
| Severity 25 to 39 points | 1.464*** | (0.107) | 1.544** | (0.263) |
| Severity 40 points and over | 2.183*** | (0.177) | 2.193*** | (0.398) |
| Prior work injury | 1.281** | (0.126) | 0.669* | (0.148) |
| **Comorbidities** | | | | |
| Received treatment for cancer | 1.113 | (0.187) | 0.842 | (0.289) |
| Received treatment for diabetes | 1.044 | (0.103) | 1.078 | (0.210) |
| Received treatment for heart problems | 1.064 | (0.162) | 0.714 | (0.229) |
| Received treatment for hypertension | 0.932 | (0.063) | 0.863 | (0.121) |
| Received treatment for lung conditions | 0.972 | (0.096) | 1.022 | (0.215) |
| *Smoking history* | | | | |
| Did not smoke (base) | | | | |
| Smoked 1 to 9 years | 1.037 | (0.092) | 1.359* | (0.240) |
| Smoked 10 or more years | 1.026 | (0.064) | 1.125 | (0.142) |
| **Dummy variables for each state-specific survey** | | | | |
| Arkansas, 2011 (base) | | | | |
| Connecticut, 2011 | 0.778 | (0.136) | 0.660 | (0.249) |
| Florida, 2012 | 0.829 | (0.144) | 1.418 | (0.472) |
| Georgia, 2012 | 0.821 | (0.137) | 0.994 | (0.350) |
| Indiana, 2010 | 0.759 | (0.137) | 0.787 | (0.291) |
| Indiana, 2013 | 0.820 | (0.142) | 0.521* | (0.202) |
| Iowa, 2011 | 0.949 | (0.170) | 0.997 | (0.350) |
| Kentucky, 2012 | 0.661** | (0.114) | 0.588 | (0.223) |
| Massachusetts, 2010 | 0.501*** | (0.092) | 0.360** | (0.153) |
| Massachusetts, 2013 | 0.442*** | (0.082) | 0.510 | (0.217) |
| Michigan, 2010 | 0.763 | (0.152) | 0.456* | (0.195) |
| Michigan, 2013 | 0.708* | (0.129) | 0.847 | (0.317) |
| Minnesota, 2010 | 0.583*** | (0.108) | 0.724 | (0.279) |
| North Carolina, 2010 | 0.776 | (0.135) | 1.201 | (0.416) |
| North Carolina, 2013 | 0.865 | (0.147) | 0.754 | (0.276) |
| Pennsylvania, 2010 | 0.842 | (0.146) | 1.205 | (0.436) |
| Tennessee, 2011 | 0.838 | (0.142) | 1.353 | (0.455) |
| Virginia, 2010 | 0.624*** | (0.110) | 1.248 | (0.447) |
| Virginia, 2013 | 0.551*** | (0.100) | 1.122 | (0.416) |
| Wisconsin, 2010 | 0.444*** | (0.086) | 0.514 | (0.217) |
| Wisconsin, 2013 | 0.549*** | (0.103) | 0.752 | (0.295) |
| Observations | 8,467 | | 2,445 | |
| Pseudo R-squared | 0.075 | | 0.105 | |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

* Statistically significant at the 10 percent level; ** statistically significant at the 5 percent level; *** statistically significant at the 1 percent level.

**Table TA.D7b P-Value from Tests of Difference between 2010 and 2013 Surveys from Logistic Regressions for Satisfaction Measures**

| State | Wanted to Change Initial Provider | Wanted to Change Primary, Non-Initial Provider |
|---|---|---|
| **P-value from tests of difference between 2010 and 2013 surveys dummy variables** | | |
| Indiana | 0.682 | 0.303 |
| Massachusetts | 0.512 | 0.452 |
| Michigan | 0.712 | 0.135 |
| North Carolina | 0.536 | 0.189 |
| Virginia | 0.492 | 0.769 |
| Wisconsin | 0.315 | 0.389 |

*Note:* Tests of difference of survey dummy variable from regressions presented in Table TA.D7.

## EXPLORING DIFFERENCES IN OUTCOMES BASED ON TIME BETWEEN THE INJURY AND THE INTERVIEW

Since the surveys were conducted between 29 and 52 months after the injury (with an average and median duration of 35 months after the injury), it is important to examine whether workers' responses differed with the time between the injury and the interview. Some readers may be concerned that workers interviewed 29 months after the injury would have different recall of their experiences compared with workers interviewed at closer to 52 months. Other readers may be concerned that those interviewed closer to 52 months would have had more opportunity to return to work, or had more "exposure" to the medical care delivery system such that they would represent a fundamentally different experience with the workers' compensation system and that it might not be valid to compare them with those who had a shorter "exposure" to the workers' compensation system.

We examined these concerns while statistically accounting for other injury, worker, and workplace characteristics (similar to what we did in the analysis presented in Tables TA.D1–TA.D7). Table TA.D8 shows the estimate of interest—the coefficient for how the number of months from the injury to the interview is related to worker outcomes. In most specifications, worker outcomes did not vary much with the time between the injury and the interview. For instance, the coefficient estimate in panel A of Table TA.D8 from the recovery regression was 0.002. This implies that a one-year increase in time between the injury and the interview was associated with a 0.024 point higher recovery of health and functioning—a very small difference in average recovery. We found that estimates from most other regressions were also small. Only one of the estimates presented in Table TA.D8 was statistically significant. In particular, workers were less likely to report that they wanted to change their primary, non-initial provider due to dissatisfaction with care. We have also examined specifications that allow for a non-linear effect of the time after the injury (by controlling for different groups of time between the injury and the interview), and we found no strong evidence that differences in outcomes across workers were driven by time lag between their injuries and interviews.

## DIFFERENCES IN OUTCOMES IN ARKANSAS DUE TO LONGER TIME BETWEEN INJURIES AND INTERVIEWS

The time lag between the injury and interview was longer for Arkansas because we sampled workers injured in 2010 and 2011 and conducted interviews in 2014. For the 2014 interviews conducted in three other states, we sampled workers injured in 2011. For the 2013 interviews conducted in eight states, we sampled workers with injuries that occurred in 2010. Similarly, for the three states interviewed in 2015, we sampled workers injured in 2012. Because Arkansas is a smaller state, we had to sample workers injured in 2010 and 2011 in order to get a similar number of completed surveys as in other states. We explored how this sampling may affect our results by comparing predicted worker outcomes for the full sample in Arkansas (2010 and 2011 injuries, estimates that are presented in Chapter 3) and the sample of 2011 injuries.[2] We found small differences in case-mix adjusted outcomes in Table TA.D9. For instance, we found a 1 point difference in recovery of health and functioning, a less than 1 percentage point difference in return-to-work measures, and

[2] We derived predictions for the 2011 sample by reestimating all regression models presented in Tables TA.D1–TA.D7 while excluding Arkansas injuries that happened in 2010. Arkansas observations from 2011 were reweighted to reflect the population from which they were drawn.

a 4 percent difference in median weeks before a substantial return to work. We also found small differences for most measures of satisfaction with care and provider. For instance, workers in the 2011 sample were 2 percentage points more likely to report "big problems" getting the services that they or their provider wanted and 1 percentage point more likely to report "big problems" getting the provider that they wanted than the workers in the overall Arkansas sample. Note that we found a 5 percentage point difference in the likelihood that workers wanted to change their primary, non-initial provider due to dissatisfaction with care. This difference, however, is not statistically different from zero, since it is estimated from the sample of claims where the primary provider was a non-initial provider.

**Table TA.D8 Estimates from Multiple Regressions for Variable Capturing Time between the Injury and the Interview**

| Selected Control Variables | Coefficient or Odds Ratio | Standard Error |
|---|---|---|
| **A. OLS estimates for "recovery" (coefficient)** | | |
| Months between the injury and the interview | 0.002 | (0.050) |
| **B. Logit estimates for "not working at the time of the interview due to injury" (odds ratio)** | | |
| Months between the injury and the interview | 0.983 | (0.012) |
| **C. Logit estimates for "no substantial return to work due to injury" (odds ratio)** | | |
| Months between the injury and the interview | 1.010 | (0.012) |
| **D. Logit estimates for "no substantial return to work within 1 year after injury due to injury" (odds ratio)** | | |
| Months between the injury and the interview | 1.009 | (0.012) |
| **E. Duration model for "speed of initial return to work" (coefficient)** | | |
| Months between the injury and the interview | -0.004 | (0.006) |
| **F. Logit regression for "reporting earning much less at the time of interview" (odds ratio)** | | |
| Months between the injury and the interview | 0.980 | (0.021) |
| **G. Ordered logistics regression for "problems getting care"** | | |
| Months between the injury and the interview | 0.992 | (0.010) |
| **H. Ordered logistics regression for "problems getting provider"** | | |
| Months between the injury and the interview | 0.996 | (0.010) |
| **I. Ordered logistics regression for "satisfaction with care"** | | |
| Months between the injury and the interview | 0.996 | (0.008) |
| **J. Ordered logistics regression for "satisfaction with provider"** | | |
| Months between the injury and the interview | 0.996 | (0.009) |
| **K. Logit regression for "wanted to change initial provider" (odds ratio)** | | |
| Months between the injury and the interview | 0.987 | (0.010) |
| **L. Logit regression for "wanted to change primary, non-initial provider" (odds ratio)** | | |
| Months between the injury and the interview | 0.966* | (0.020) |

*Notes:* Sample of workers in 15 states. Workers in Minnesota and Pennsylvania were injured in 2010 and interviewed in 2013. Workers in Connecticut, Iowa, and Tennessee were injured in 2011 and interviewed in 2014. Workers in Arkansas were injured in 2010 and 2011 and interviewed in 2014. Florida, Georgia, and Kentucky workers were injured in 2012 and interviewed in 2015. Workers in Indiana, Massachusetts, Michigan, North Carolina, Virginia, and Wisconsin were injured in 2010 and 2013 and interviewed in 2013 and 2016, respectively. All workers experienced more than seven days of lost time.

Estimates include controls for all other measures presented in Tables TA.D1–TA.D7.

* Statistically significant at the 10 percent level.

*Key:* OLS: ordinary least squares.

**Table TA.D9 Comparing Predictions for Arkansas for Full Sample of Injuries and for 2011 Injuries**

| Outcome Measure | Full Sample | 2011 Sample | Difference |
|---|---|---|---|
| Recovery of health and functioning | 17 | 16 | 1 |
| % not working at interview due to injury | 16% | 16% | 0 |
| % who never returned to work or returned to work but never worked for at least a month due to injury | 15% | 14% | -1 |
| % with no substantial return to work as of 1 year postinjury due to injury | 18% | 17% | -1 |
| Median weeks from injury to initial return to work that lasted for at least a month (across all workers) | 9 | 8 | -4% |
| % reporting earning "a lot less" due to injury at the time of interview | 8% | 9% | 0 |
| % reporting "no problems" getting services that they or their primary provider wanted | 71% | 68% | -3 |
| % reporting "big problems" getting services that they or their primary provider wanted | 16% | 18% | 2 |
| % reporting "no problems" getting primary provider they wanted | 74% | 73% | -2 |
| % reporting "big problems" getting primary provider they wanted | 15% | 16% | 1 |
| **Satisfaction with overall care** | | | |
| % who were "somewhat" or "very" satisfied | 76% | 74% | -2 |
| % who were "very dissatisfied" | 8% | 9% | 1 |
| **Satisfaction with primary provider** | | | |
| % who were "somewhat" or "very" satisfied | 81% | 79% | -2 |
| % who were "very dissatisfied" | 12% | 13% | 1 |
| **Wanted to change providers due to dissatisfaction with care** | | | |
| Initial provider | 29% | 30% | 1 |
| Primary, non-initial provider | 21% | 26% | 5 |

*Note:* Values may not add up due to rounding.

## CHANGES IN OUTCOMES: SENSITIVITY TO EMPIRICAL SPECIFICATIONS

Table TA.D10 shows whether the estimates of the difference in outcomes for the state between injury years 2010 and 2013 are sensitive to changes in empirical specification. In specification (1) we show estimates in the raw differences in outcomes between two years. The main concern about this approach is that it does not allow for controls for potential differences in case mix between 2010 and 2013 samples. For instance, it does not account for potential differences between 2010 and 2013 samples in age, gender, and injury type. Specification (2) shows the results from case-mix adjusted differences using only state-specific data for each state. Specification (3) shows results from the primary specification that we use in the analysis. Note that the characterization of change in outcomes is similar between specifications (2) and (3) for Virginia, with one exception. Using state-specific regressions, we observed that Virginia workers injured in 2013, when compared with those injured in 2010, reported a higher percentage earning "a lot less" due to injury at the time of the interview.

Specifications in Table TA.D11 examine whether the results are sensitive to excluding controls for local area unemployment rates. Specification (1) is the one used in the rest of the report. It is based on the regression models presented in Tables TA.D1–TA.D7. Specification (2) excludes the local area unemployment

rate from the list of case-mix variables. If one is concerned that regressions with controls for the unemployment rate may over-control for local characteristics, then estimates from specification (2) may be more appropriate. We observed similar trends including or excluding the unemployment rate from regressions.

**Table TA.D10 Alternative Specifications of the Tests of Difference in Outcomes in Virginia between 2010 and 2013**

| Outcome Measure | Without Adjusting for Differences in Case Mix (1) | | Within-State Regressions (2) | | 21-State-Year Regression (3) | |
|---|---|---|---|---|---|---|
| | Difference | P-Value | Difference | P-Value | Difference | P-Value |
| **Recovery of physical health and functioning**[a] | | | | | | |
| Improvement in health status from injury to interview | 0.0 | 0.968 | -0.3 | 0.784 | -0.4 | 0.656 |
| **Return to work (as of 3 years postinjury)** | | | | | | |
| Percentage never returned to work due to injury | -1.7 | 0.373 | -0.6 | 0.783 | -0.8 | 0.673 |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | 0.8 | 0.717 | 2.2 | 0.430 | 1.6 | 0.473 |
| Time from injury to first substantial return to work (median weeks)[b] | 0.2 | 0.879 | 0.2 | 0.836 | 0.9 | 0.427 |
| Percentage with no substantial return to work 1 year postinjury due to injury | 0.3 | 0.898 | 1.9 | 0.489 | 1.0 | 0.683 |
| **Earnings recovery** | | | | | | |
| Percentage who reported earning "a lot less" due to injury at the time of interview | 2.9 | 0.141 | 4.1 | 0.098 | 2.5 | 0.200 |
| **Access to health care** | | | | | | |
| *Problems getting desired medical services* | | | | | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | 1.1 | 0.587 | -0.6 | 0.803 | 0.5 | 0.814 |
| *Problems getting desired medical provider* | | | | | | |
| Percentage reporting "big problems" getting the primary provider they wanted | 2.3 | 0.256 | 1.3 | 0.535 | 1.5 | 0.441 |
| **Satisfaction with care** | | | | | | |
| *Satisfaction with overall care* | | | | | | |
| Percentage who were "very dissatisfied" | -0.1 | 0.966 | 0.0 | 0.986 | -0.5 | 0.766 |
| *Satisfaction with primary provider* | | | | | | |
| Percentage who were "very dissatisfied" | 0.4 | 0.796 | 0.0 | 0.990 | -0.3 | 0.843 |

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from the injury to the time of the interview.

**Table TA.D11 Sensitivity of Estimates in Difference in Outcomes in Virginia between 2010 and 2013 to Unemployment Rate Controls**

| Outcome Measure | With Controls for Unemployment Rate (1) | | Without Controls for Unemployment Rate (2) | |
|---|---|---|---|---|
| | Difference | P-Value | Difference | P-Value |
| **Recovery of physical health and functioning**[a] | | | | |
| Improvement in health status from injury to interview | -0.4 | 0.656 | 0.1 | 0.925 |
| **Return to work (as of 3 years postinjury)** | | | | |
| Percentage never returned to work due to injury | -0.8 | 0.673 | -1.5 | 0.396 |
| Percentage never returned to work or returned to work but never sustained for at least a month due to injury | 1.6 | 0.473 | 0.4 | 0.832 |
| Time from injury to first substantial return to work (median weeks)[b] | 0.9 | 0.427 | 0.6 | 0.564 |
| Percentage with no substantial return to work 1 year postinjury due to injury | 1.0 | 0.683 | -0.2 | 0.924 |
| **Earnings recovery** | | | | |
| Percentage who reported earning "a lot less" due to injury at the time of interview | 2.5 | 0.200 | 3.0 | 0.134 |
| **Access to health care** | | | | |
| *Problems getting desired medical services* | | | | |
| Percentage reporting "big problems" getting services they or their primary provider wanted | 0.5 | 0.814 | 0.5 | 0.811 |
| *Problems getting desired medical provider* | | | | |
| Percentage reporting "big problems" getting the primary provider they wanted | 1.5 | 0.441 | 1.7 | 0.369 |
| **Satisfaction with care** | | | | |
| *Satisfaction with overall care* | | | | |
| Percentage who were "very dissatisfied" | -0.5 | 0.766 | -1.0 | 0.546 |
| *Satisfaction with primary provider* | | | | |
| Percentage who were "very dissatisfied" | -0.3 | 0.843 | -0.7 | 0.609 |

[a] Increase in the SF-12v2® score from the week after injury to the time of the interview. A higher score indicates better recovery. SF-12v2® scores range from 0 to 100. SF-12v2® is a registered trademark of the Medical Outcomes Trust and Optum.

[b] The duration question was asked only among workers who had a substantial return to work. For workers without a substantial return to work by the time of the interview, this measure was set as weeks from the injury to the time of the interview.

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To be a catalyst for significant improvements in workers' compensation systems, providing the public with objective, credible, high-quality research on important public policy issues.

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Founded in 1983, the Workers Compensation Research Institute (WCRI) is an independent, not-for-profit research organization which strives to help those interested in making improvements to the workers' compensation system by providing highly-regarded, objective data and analysis.

The Institute does not take positions on the issues it researches; rather, it provides information obtained through studies and data collection efforts, which conform to recognized scientific methods. Objectivity is further ensured through rigorous, unbiased peer review procedures.

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- Original research studies of major issues confronting workers' compensation systems (for example, outcomes for injured workers).
- Studies of individual state systems where policymakers have shown an interest in change and where there is an unmet need for objective information.
- Studies of states that have undergone major legislative changes to measure the impact of those reforms and draw possible lessons for other states.
- Presentations on research findings to legislators, workers' compensation administrators, industry groups, and other stakeholders.

With WCRI's research, policymakers and other system stakeholders—employers, insurers, and labor unions—can monitor state systems on a regular basis and identify incremental changes to improve system performance. This results in a more enduring, efficient, and equitable system that better serves the needs of workers and employers.