

# **Early indicators of injuries and accidents at work: An analysis of leading indicators as predictors of WSV data for Victorian workplaces**

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# Executive Summary

## Background and aims

This report presents results of the **OHS Practices Survey** conducted by a Monash University research team in 1,444 Victorian workplaces from September 2012 to January 2013 along with the collection of data on claims made and notices issued 12 months after the survey. The work is part of a larger research project that is being conducted by Monash University in partnership with WorkSafe Victoria, the Institute for Safety, Compensation and Recovery Research and SafeWork Australia.

In 2012, the Monash research team conducted a literature search that identified and piloted a tool that had been developed in Canada to measure OHS leading indicators (the 'Organizational Performance Metric or 'OPM')<sup>1</sup>. The **OHS Practices Survey**, which was conducted across 2012-13, is important research and contributes to a larger study that evaluates the OPM as a practical tool that could be used for predictive or benchmarking purposes.

The aim of this report is to present WorkSafe Victoria with a preliminary validation of the OPM across workplaces in Victoria and to examine how leading indicators of OHS (as measured by the OPM) are associated with WorkCover claims. The report presents analysis of 1) a psychometric evaluation of the OPM using data from single workplace informants; 2) an evaluation of the relationship between the OPM and WorkCover claims; and 3) a comparison of OPM scores across several subsets within the sample.

## Research method

A random sample of Victorian workplaces was selected from the WorkSafe Victoria premium database. Of those, 4,883 workplaces were invited to participate in the **OHS Practices Survey** between September 2012 and January 2013 and 1,444 workplaces agreed to participate, resulting in a 30% response rate. The survey was administered using two formats (telephone and online).

The survey contacted a single representative at each workplace with the aim of recruiting respondents from one of three specific groups per workplace: OHS managers, employee health and safety representatives and employees with no specific OHS duties. Overall, 712 OHS managers (49 percent), 483 employee health and safety representatives (34 percent) and 249 employees with no specific OHS role (17 percent) completed the survey. All ANZSIC industries were represented in the study but the most prevalent industries in the sample were Professional Scientific and Technical (13%), Construction (12%), Manufacturing (9%), Retail Trade (9%) and Health Care and Social Assistance (9%).

The survey contained several sections where respondents were asked to provide information about their role in their workplace, details of their workplace's context (e.g., workplace size), and their perceptions of OHS practices in their workplace.

## Key findings

The points below summarise the main findings from the analyses of the 2012-2013 survey of 1,444 Victorian workplaces.

1. **The OPM is a reliable measure of OHS leading indicators.** A higher score on the OPM indicates a higher level of agreement that OHS leading indicators are present in a workplace (possible scores range from 8 to 40). The OPM could be used as an initial 'flag' of leading indicators of OHS in a workplace.  
  
It is feasible to use the OPM as a tool to be completed by a single representative for a workplace. However, collecting the views of multiple respondents in a workplace would enable a more comprehensive picture and could provide the basis for conversations about OHS and any differences in views of leading indicators.
2. **Victorian workplaces perform well on OHS leading indicators.** The average (mean) score for the OPM across all respondents was 33.4 out of a possible score of 40 (SD = 4.2).
3. **The OPM is associated with other workplace practices.** We compared the responses to the OPM with responses to other tools measuring various workplace practices. The pattern of correlations between the OPM and workplace practices is
  - stronger for a measure that could be considered a leading indicator of OHS (a measure of 'safety practices');
  - weaker for a measure that could be considered a lagging indicator of OHS performance (a measure of 'disability management'); and
  - weaker for measures of employee centred constructs that are not directly related to OHS (a measure of 'corporate social responsibility practices' and a measure of 'people oriented culture').  
These findings suggest the OPM is a valid measure of OHS leading indicators and can be differentiated from other workplace practices, including lagging indicators of OHS.
4. **Methodological issues associated with the OPM.** The analysis of the OPM was confounded by two methodological issues:
  - Percentage response options: the percentage response options as used in the original North American studies led to a positive response bias that resulted in a substantial ceiling effect. Given the poor performance of the OPM using percentage response options, it was necessary to change to Likert-type response options which reduced this method effect.
  - Telephone survey methodology: data from the telephone survey were strongly positively skewed, particularly when using the percentage response options. While the effect was attenuated somewhat by using Likert response options, the switch to an online survey yielded a less skewed distribution for responses to the OPM. We recommend future use of this scale with Likert response options rather than the original percentage response options.
5. **The OPM across subgroups.** In general, there were only small variations in ratings for OHS leading indicators (as measured by the OPM) across subgroups within the

sample. Specifically, no substantial differences were observed on OPM scores on the basis of: workplace size, union representation, OHS role or organisational role. However, differences were observed when comparing across industries:

- The highest average scores on the OPM were reported in the Public Administration and Safety, Other Services and Construction industries.
- The lowest average scores on the OPM were reported in Financial and Insurance Services, Transport Postal and Warehousing, Professional Scientific and Technical Services, Retail Trade as well as Arts and Recreation Services. These latter five industries each had scores below the average OPM score for the total sample ( $M = 33.4$ ,  $SD = 4.2$ ).

6. **Relationship between OHS leading indicators and WorkCover claims.** The relationship between leading indicators (as measured by the OPM) and WorkCover claims is complex:

- associations between workplace scores on the OPM and WorkCover claims were observed but this outcome appeared to be confounded by methodological issues;
- associations between scores on the OPM and WorkCover claims were detected in the online survey but not the telephone survey;
- some associations were observed between scores on the OPM and WorkCover claims and notices in the three years prior to the survey; and
- an association was observed between scores on the OPM and notices received in the 12 months following the survey; however, no association was observed between scores on the OPM and claims in the 12 months following the survey which might be due to the short timeframe used in this component of the study.

These results may reflect the fact that WorkCover claims are relatively distant from the leading indicators measured by the OPM. Overall, we recommend that it would be fruitful to investigate relationships between the OPM and OHS outcome measures that are collected at the workplace and are more proximal than are claims.

## Conclusion

This study validated the OPM, a measure of leading indicators of OHS, in the Australian context for the first time. The results of the study suggest that while the OPM is a valid measure of leading indicators of OHS, its relationship to WorkCover claims and notices is more complex. From the results of this study it can be concluded that the OPM

1. could be used as an initial 'flag' of leading indicators of OHS in a workplace.
2. should be used with Likert response options rather than the original percentage response options.

Furthermore, in future research using the OPM, consideration should be given to

3. using the adapted wording of OPM items in order to more consistently address OHS.
4. investigating the relationships between the OPM and OHS outcomes collected in the workplace.
5. expanding the use of the OPM as a survey tool to be completed by multiple informants in a workplace.
6. adaptations in wording of OPM items to suit the Australian context or specific industry needs without compromising the intent of the items.

This survey and analysis are part of a larger study that will be completed in 2015. Several other reports will be available to extend our understanding of the OPM in the Australian context. We recommend that this report be viewed as a companion piece to the other reports, which will be available at <http://ohsleadindicators.org> and on the ISCRR website.

Overall, this research will contribute to our understanding of the effectiveness of the OPM as a measure of OHS leading indicators and as a benchmarking tool.

## Introduction

This report is part of a larger research project that aims to evaluate and validate the Organizational Performance Metric (OPM). The OPM is an eight-item scale that was developed at the Institute of Work and Health (Canada) where it was reported to be a good preliminary measure of the leading indicators of occupational health and safety (OHS) performance.<sup>1,2</sup>

Initially, a literature review was conducted to search for scales that measured leading indicators of OHS performance at the organisational level<sup>3</sup>. The results of that review indicated that very little scale development had been conducted for the leading indicators construct and that the OPM was the only scale found to directly address this construct and meet the criteria established for this project. However, numerous scales were found that contained items which addressed elements of the leading indicators construct, even though they were not designed specifically to measure leading indicators of OHS performance.

An evaluation of the psychometric properties of each scale showed that the OPM was one of the more extensively evaluated scales. While the other scales were often validated to a reasonable level, these measures are either too long to be administered easily<sup>4,5</sup> or require some modification to more readily measure the leading indicators construct.<sup>6</sup> The results of this review indicated that the OPM is the only organisation-level scale that has been developed which directly measures leading indicators of OHS performance. Amick and colleagues<sup>1,2</sup> have tested the OPM extensively in North America and initial reports of its utility as a preliminary measure of lead indicators of OHS have been promising.

The literature review was followed by exploratory cognitive interviews that were conducted with expert informants and stakeholders in OHS. The stakeholders/interviewees were asked a series of questions regarding leading indicators of OHS and were asked for their comments on the OPM. These interviews indicated that the OPM items represented the construct of leading indicators; were suitable for the purposes of this project; and would be informative for the prediction of injuries and workplace claims. These interviews indicated that while the OPM could be extended or supplemented to form a more comprehensive measure of lead indicators of OHS, in its present form as a preliminary and brief measure of lead indicators of OHS, it is considered to have reasonable content validity.

## Defining lead indicators of OHS performance<sup>1</sup>

OHS encompasses the psychosocial, physical and physiological conditions of an organisation's workforce. Leading indicators of OHS performance can be defined as measures of the positive steps that organisations and individuals take that may prevent an OHS incident from occurring. Baker and colleagues define leading indicators as: "*A metric that attempts to measure some variable that is believed to be an indicator or precursor of future safety performance*".<sup>7</sup> In other words, leading indicators can be said to measure the 'safety potential' of a workplace. Leading indicators are the key to a proactive approach to OHS and the measurement and monitoring of OHS performance. Leading indicators are, by definition, measures of the predictors, or root causes, of OHS performance.<sup>8,9</sup> Leading indicators can provide effective early warnings, by enabling risks or risk increases to be detected and mitigated, before an OHS incident occurs or a hazardous state is reached. OHS leading indicators may occur at a broad, macro-level (e.g., presence of OHS policy), and/or at the more specific level (e.g., number of hazards identified each month). Macro-level indicators may be able to be applied across workplace and industry contexts in order to benchmark and obtain a broad, comparable overview of OHS.

These may be complemented by more specific and sensitive micro-level indicators that allow for a more fine-grained understanding of OHS performance in a particular work context or organisation. There is recognised value in obtaining both macro- and micro-level indicators of OHS performance.

Despite the apparent value of leading indicators, there has been very little development of academic research that focuses on the measurement of leading indicators.<sup>10</sup> This may be at least partly explained by the perceived difficulty of measuring leading indicators.

To summarise the available literature, the major OHS leading indicators encompass the domains that are shown in Table 1. This list of the dimensions or domains of leading indicators is representative rather than exhaustive. Further, it is important to recognise that each domain is complex and detailed. Research conducted to date indicates that the OPM shows promise as a simple and practical measure of leading indicators in the Australian context. The OHS Practices Survey is an important step in the validation of the OPM.

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<sup>1</sup> The material in this section is provided as background explanation of OHS lead indicators. *Measuring the leading indicators of occupational health and safety: A snapshot review.*<sup>3</sup>

**Table 1: Leading Indicators of Occupational Health and Safety**

| <b>OHS Leading Indicators</b>                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>OHS systems (policies, procedures, practices).</b>                | These systems refer to workplace policies, processes and practices designed to control and monitor OHS, and are typically implemented and maintained by managers and in work groups. <sup>11</sup>                                                                                                                                                                                                                                                                                                                                   |
| <b>Management commitment and leadership</b>                          | As with any organisational initiative, management commitment is key to OHS. <sup>10,12</sup> This includes managers at all levels, from board and senior executive levels to front-line supervisors. Effective commitment is demonstrated in active engagement in areas such as information gathering about OHS, building trust so all employees view managers as committed to OHS, managers' behaviour demonstrating that they are OHS role models; and managers demonstrating that OHS is a high priority across the organisation. |
| <b>OHS training, interventions, information, tools and resources</b> | Along with the resourcing of OHS with suitably qualified OHS specialist expertise, the provision of OHS training, information, tools and resources are key leading indicators of OHS performance. <sup>10</sup> This includes preparedness to act and having a response plan in place.                                                                                                                                                                                                                                               |
| <b>Workplace OHS inspections and audits</b>                          | A phrase often attributed to management scholar Peter Drucker is "What gets measured, gets managed." An important implication of this is that the conduct of an audit or inspection may not in itself be adequate as a leading indicator of OHS performance. Inspections and audits should be designed to provide appropriate and comprehensive information. <sup>13</sup> Appropriate and timely corrective action should be taken to address issues identified in audits or inspections.                                           |
| <b>Consultation and communication about OHS</b>                      | This refers to regular, formal and informal communication and consultation about OHS. <sup>14</sup> Employee surveys may be one way of gathering information from employees regarding their perceptions of OHS.                                                                                                                                                                                                                                                                                                                      |
| <b>Prioritisation of OHS</b>                                         | The tendency for safety to be traded off against productivity has been discussed at length by OHS academics. <sup>15</sup> Rather than viewing safety and productivity as competing goals, OHS is embedded in the organisation as a high priority alongside efficiency and productivity can be viewed as a leading indicator of OHS performance.                                                                                                                                                                                     |
| <b>OHS empowerment and employee involvement in decision making</b>   | It is widely understood that employee involvement in decision making will lead to 'ownership' of their behaviour and positive outcomes, such as safety behaviour. <sup>16</sup> Several researchers have investigated the role of empowerment and engagement in OHS and found that empowerment of workers and supervisors to make decisions with regard to OHS (e.g., to stop work that is unsafe) is a leading indicator of OHS performance. <sup>17</sup>                                                                          |
| <b>OHS accountability</b>                                            | A workplace culture that emphasises a sense of shared responsibility and accountability for OHS, by actively applying scrutiny and transparency in reporting, is likely to influence behaviour in the workplace. <sup>8</sup>                                                                                                                                                                                                                                                                                                        |
| <b>Positive feedback and recognition for OHS</b>                     | It is suggested that high performance on OHS will be reinforced by positive feedback and recognition for past performance. Such recognition should not, however, include rewards that might lead to under-reporting of incidents or injuries. <sup>18</sup>                                                                                                                                                                                                                                                                          |
| <b>Risk management</b>                                               | This refers to the integration of risk management with the management of OHS; <sup>19</sup> aspects of risk management include risk assessment, control, inspection and maintenance. <sup>20</sup> Risks may be associated with psychosocial, physical and/or physiological dimensions of OHS.                                                                                                                                                                                                                                       |

## Report aims

The purpose of this report is to present the findings of the analyses for the validation of the OPM against WorkCover claims and notices data. Specific aims were to present WorkSafe Victoria with a validation of the OPM across workplaces in Victoria and to examine how leading indicators of OHS (as measured by the OPM) are associated with WorkCover claims. The report presents the results of analysis of 1) a psychometric evaluation of the OPM using data from single workplace informants; 2) a comparison of OPM scores across several subsets within the sample; and 3) an evaluation of the relationship between the OPM and WorkCover claims.

## Method

### Sample and procedure

Data for the present study were collected across an 18 month time period. Initially, participants were recruited to complete a questionnaire on OHS practices at their workplace. In addition to the workplace questionnaire, we collected data from WorkSafe Victoria for each workplace for the three year period prior to survey administration (2009 – 2011) and for a 12 month period following the survey. A random sample of 17,000 workplaces was drawn from the WorkSafe Victoria Premium database, which contains a list of all workplaces registered in Victoria. The sample was screened for current enforcement activity, which resulted in the deletion of 23 cases. The remaining 16,977 workplaces were either recruited to participate in a telephone survey (using CATI - computer assisted telephone interviewing) or an online survey. The use of both telephone and online surveys allowed us to examine if there were any differences in mode of administration.

The administration of the survey was managed by Searchlight Market Research who contacted one informant per workplace with the aim of recruiting from three groups of employees: 1) occupational health and safety managers; 2) employee health and safety representatives; and 3) employees with no official health and safety duties. In the first few days of the survey, checks were made by both Searchlight and Monash researchers to ensure the quality of the data. This included examining the distribution of items, monitoring workplace and respondent demographics and listening to interviews with respondents to ensure that they understood the questions.

The telephone survey was conducted from September 2012 to December 2012 with 825 workplaces participating. In January 2013 the survey was continued with an online questionnaire where a further 619 respondents were recruited into the study. Call outcomes for the workplaces selected for the study were screened out ( $n = 8,635$ : e.g., participation in a WorkSafe Victoria questionnaire in past six months); non-contactable ( $n = 3,006$ : e.g., faulty number, fax machine, no answer); non-responding workplaces that were contacted but did not wish to participate ( $n = 3,439$ : e.g., refused, terminated during interview, recruited but did not complete online survey); responding workplaces that were contacted and completed the questionnaire ( $n = 1,444$ ) and finally there were workplaces that were not contacted ( $n = 453$ ) due to the conclusion of the survey period.

In summary, we invited 4,883 workplaces to participate in the survey, 1,444 agreed to participate, resulting in a response rate of 30%. The workplaces were identifiable to the researchers only by a code that allowed for the matching of data from the WorkSafe Victoria Premium database. Approval was obtained from the Monash University Human Research Ethics Committee for this study. No incentives were offered for the completion of the survey and respondents were assured of confidentiality.

## Measures

All survey respondents were screened to ensure that their workplace had not already participated in any WorkSafe Victoria surveys in the last six months. If not, they were given the opportunity to participate in the leading indicators of OHS Practices Survey.

### *Workplace information*

Respondents were asked several questions about their workplace and their role within their workplace. Specific questions about respondents were their main role in their organisation, their OHS role and, where appropriate, the length of time they had been a Health and Safety professional in their current workplace. Workplace questions included whether there was a written commitment to making the workplace safer; the percentage of the workforce who were members of a union; and the total number of employees and contractors in the workplace.

### *Perceptual measures*

The OPM is an eight-item scale that was developed at the Institute of Work and Health (Canada) to measure leading indicators of OHS performance.<sup>1,2</sup> This scale has undergone testing in other jurisdictions (in Canada and the USA) and those analyses indicate that the OPM is a reliable, unidimensional scale. The OPM was designed as a summated rating scale meaning the items can be summed to provide a total score. The score on the OPM indicates the respondent's level of agreement that OHS leading indicators are present in a workplace (possible scores range from 8 to 40).

The items of the OPM were measured on a 5-point scale that asks respondents to rate how often practices representing the leading indicators of OHS occur in their organisation. Earlier studies tested the OPM using a 5-point scale based on the percentage of time each practice occurred in a workplace. However, we trialled two 5-point scales with labelling that reflected the original percentage response labels (0% to 20%, 21% to 40%, 41% to 60%, 61% to 80%, 81% to 100%) and alternative Likert labels (1 strongly disagree to 5 strongly agree). These response options were considered to be comparable in that they are based on a 5-point scale that represents increasing levels of endorsement. The items of the OPM are shown in the following box.

Formal safety audits at regular intervals are a normal part of our business.

Everyone at this organisation values ongoing safety improvement in this organisation.

This organisation considers safety at least as important as production and quality in the way work is done.

Workers and supervisors have the information they need to work safely.

Employees are always involved in decisions affecting their health and safety.

Those in charge of safety have the authority to make the changes they have identified as necessary.

Those who act safely receive positive recognition.

Everyone has the tools and/or equipment they need to complete their work safely.

**Figure 1: Items of the OPM**

The additional measures used in the OHS Practices Survey were

- Organizational Policies and Practices scale (OPP-11)<sup>6</sup> - an 11-item scale with three subscales:
  - Safety Practices;
  - Disability Management; and
  - People Oriented Culture.
- Employee stakeholder subscale (six items) of the Corporate Social Responsibility Practices scale (CSR)<sup>21</sup>

Respondents were asked to rate each item in relation to the workplace they most often work in, rather than the organisation overall. The items were rated on a 5-point Likert scale ranging from (1) *strongly disagree* through to (5) *strongly agree*.

### *Objective measures*

For each workplace in the sample, the number of WorkCover claims was extracted from the claims database. Specific claim types were classified as follows:

- Musculoskeletal disease;
- Stress;
- Other injuries; and
- Death.

Claims were also categorised by the amount of time lost and whether claims were associated with days compensated. Claims were classified as

- 4 weeks' time lost;
- 13 weeks' time lost; and
- Compensated days (>0).

In addition to claims data, we collected data on the number of notices given to each workplace by WorkSafe Victoria inspectors, specifically

- Improvement notices;
- Prohibition notices; and
- Voluntary compliance notices.

All claims data and notices were collected retrospectively for a period of three years (2009-2011), and for a period of 12 months following the administration of the survey. Due to the staggered start times for the telephone and online surveys, the time period for the follow-up data for the telephone survey began earlier (September 2012 to August 2013) than the follow-up time period for the online survey (January 2013 to December 2013).

### **Statistical analysis**

The initial analysis involved an examination of the psychometric properties of the OPM:

- Data quality and acceptability;
- Exploratory factor analysis (EFA); and
- Reliability analysis (Cronbach's alpha).

We then assessed the validity of the OPM by examining correlations with other external measures which addressed three important elements of scale validity:

- Convergent validity: does the OPM measure correlate as expected (and more strongly) with measures of theoretically related variables?;
- Discriminant validity: is the OPM measure not related (or more weakly related) to measures of variables that it theoretically should not be related to? and
- Criterion validity: what is the association between the OPM and WorkCover claims and notices?

The initial analysis was conducted to assess the quality of the data (i.e., check for missing data), generate means and standard deviations, and conduct correlations among the individual OPM items. The assessment of data quality is based on<sup>22</sup>

- the amount of missing data, which must be minimal;
- the mean score for items, which should ideally be in the mid-range of possible scores; and
- item correlations where there should be significant and moderate correlations among the items.

Exploratory factor analysis was conducted using principal axis factoring. Due to the exploratory nature of the survey, seven iterations of the analysis were conducted to evaluate the two methods of administration (telephone, online) and the two types of response labels (percentage, Likert). Three sets of analysis were conducted on data collected from the telephone survey: percentage response labels (n = 600), Likert response labels (n = 225) and pooled (n = 825). It was considered appropriate to test the adequacy of pooling the data as the two types of response options were five-point scales representing increasing levels of endorsement. These three analyses were repeated for data collected from the online survey: percentage response labels (n = 308), Likert response labels (n = 311) and pooled (n = 619). A good solution requires a clean factor structure; a minimum of 50% explanatory variance; and good communalities (ideally >0.6).<sup>23</sup> Finally, Cronbach's alpha was used to examine the reliability of the scales from each analysis, with values of 0.7 and above being acceptable.<sup>24</sup>

The OPM was validated against other measures of OHS by examining the Pearson product-moment correlations and regression analyses among the OPM and several perceptual and objective measures of OHS. These measures were:

- Organizational policies and practices (OPP-11: 3 subscales);<sup>6</sup>
- Corporate social responsibility practices (employees);<sup>21</sup>
- WorkCover claims and notices for:
  - a three year period (2009-2011) prior to participation in the survey; and
  - the 12 month period following participation in the survey.

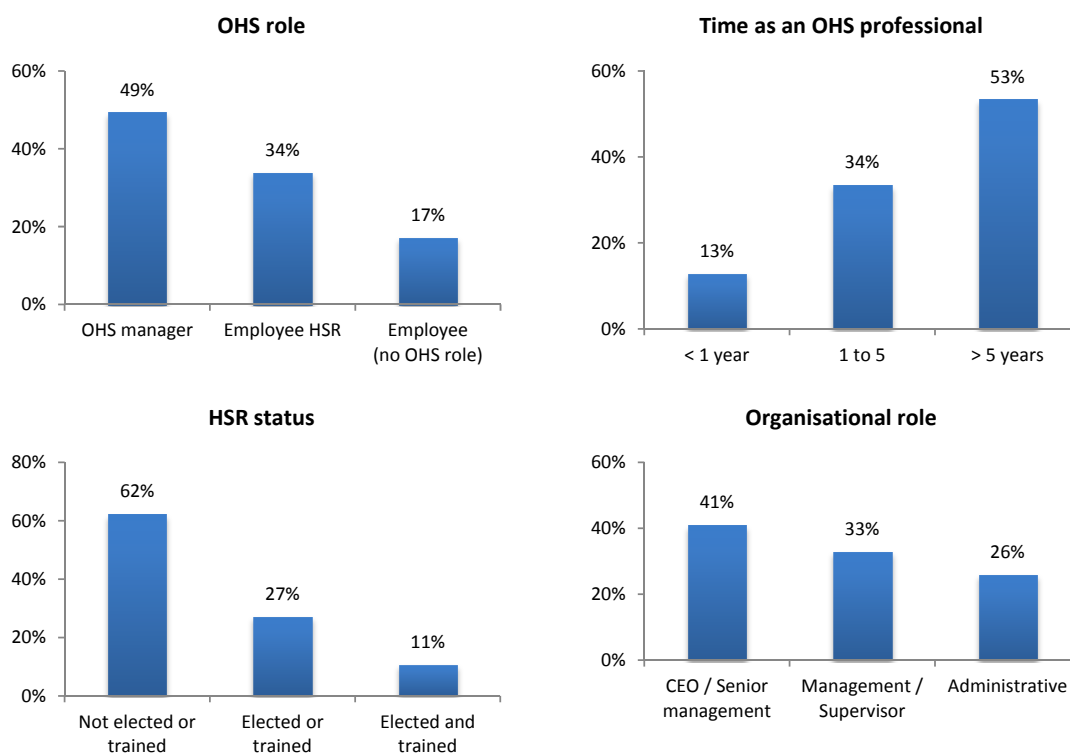
## Results

In this section we present the results of the survey as follows:

- a description of sample and workplace characteristics;
- WorkCover data;
- an evaluation of the OPM; and
- relationship between the OPM and WorkCover data.

### Description of the sample

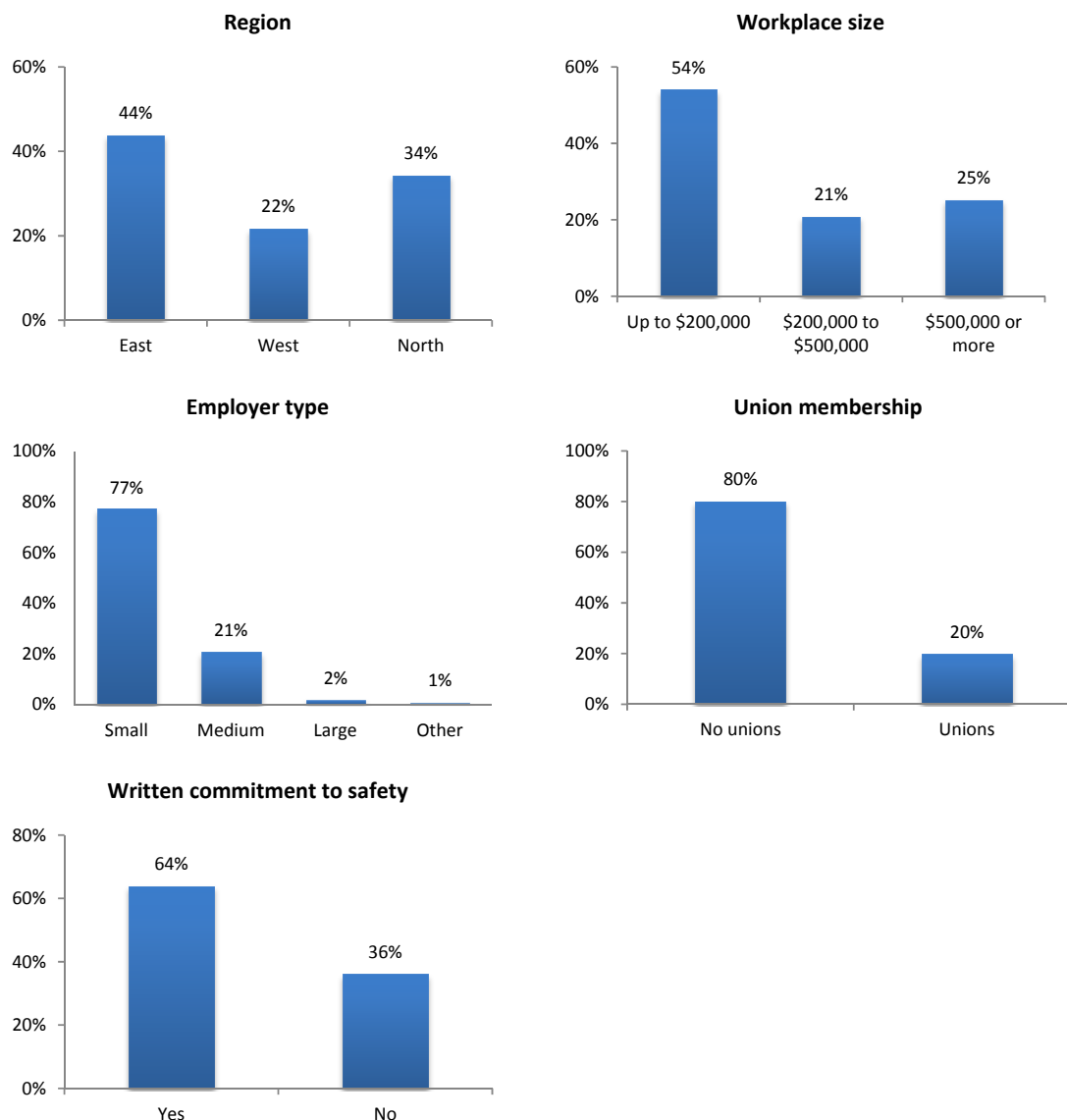
Figure 2 below displays a summary of the respondents and their workplaces. Nearly half of the respondents reported that they were an OHS manager with fewer respondents reporting that they held employee health and safety representative (HSR) or non-OHS roles. Respondents tended to have held their OHS role for more than five years. Respondents who described themselves as being an HSR were often not elected by their peers or trained. Respondents' roles in the organisation were generally management level or above.



**Figure 2: Respondent characteristics**

Figure 3 below shows that nearly half of the workplaces represented in the sample were located in the eastern region of Victoria. Workplaces tended to be small (as measured by

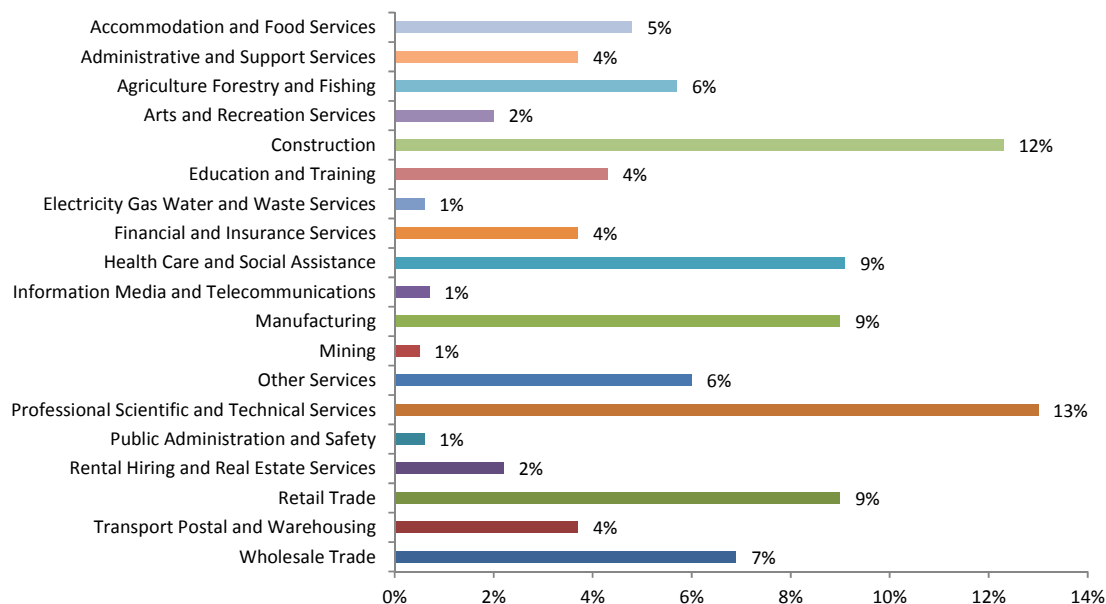
payroll<sup>2</sup>) and were generally from small, medium or large organisations with less than one percent of workplaces from other employer types (government, government recoupable or uninsured organisations). Low levels of union representation were reported in the sample and over half the workplaces represented in the sample had a written commitment to safety.



**Figure 3: Workplace characteristics**

<sup>2</sup> Remuneration is made up of the wages and other benefits paid to workers. Remuneration is the gross amount paid to workers, before tax. Rateable remuneration can include both cash and non-cash payments.

All industry sectors were represented in the survey; however, as shown in Figure 4 below most participating workplaces were from professional scientific and technical services, construction, manufacturing, retail trade, and health care and social assistance. Some sectors were represented by less than one percent of workplaces in the survey: Electricity, Gas, Water and Waste Services, Information Media and Telecommunications, Mining, and Public Administration and Safety. These percentages are largely representative of the distribution of industries in the population from which they were drawn.

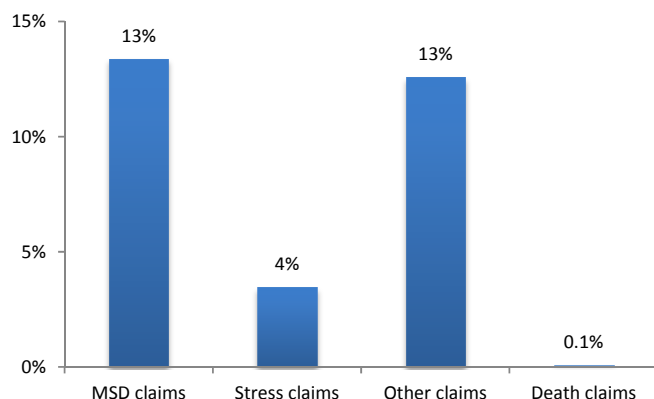


**Figure 4: Industry representation**

## WorkCover claims and notices

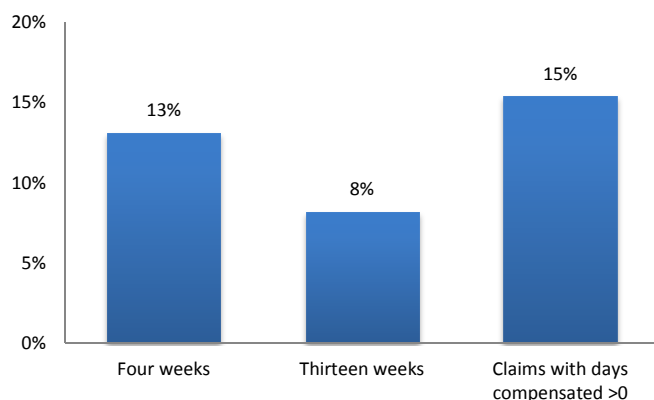
### *Claims and notices prior to the survey*

Twenty-seven percent of workplaces that responded to the survey had made at least one WorkCover claim during the three year time period prior to the survey (2009 to 2011). Figure 5 below displays the percentage of workplaces that made each type of claim during this time period. Thirteen percent of workplaces made claims for musculo-skeletal injuries, four percent for stress and 13 percent for 'other' claims. Very few claims associated with the death of an employee were made by responding workplaces during this time period.



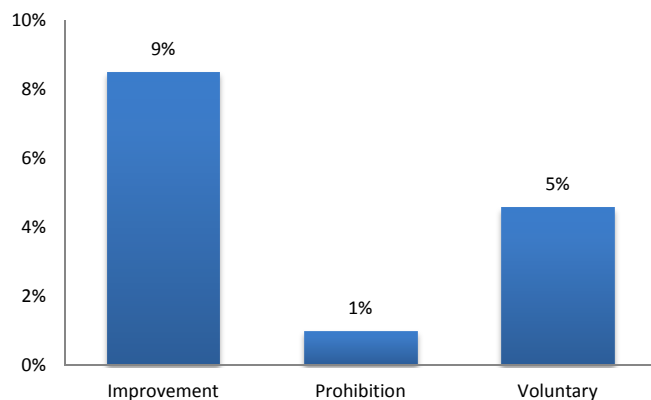
**Figure 5: WorkCover claims by claim type prior to survey administration**

WorkCover claims were also categorised according to the amount of time lost and days compensated. Thirteen percent of workplaces in the sample had claims associated with 4 week time loss and eight percent of workplaces had claims associated with 13 week time loss. Fifteen percent of workplaces had claims with one or more days compensated.



**Figure 6: WorkCover claims associated with time loss prior to survey administration**

Figure 7 below displays the percent of workplaces within the sample that received notices in the 2009-2011 time period. The figure shows that improvement notices were the most common notice issued, followed by voluntary compliance notices. Few prohibition notices were issued during this time period.

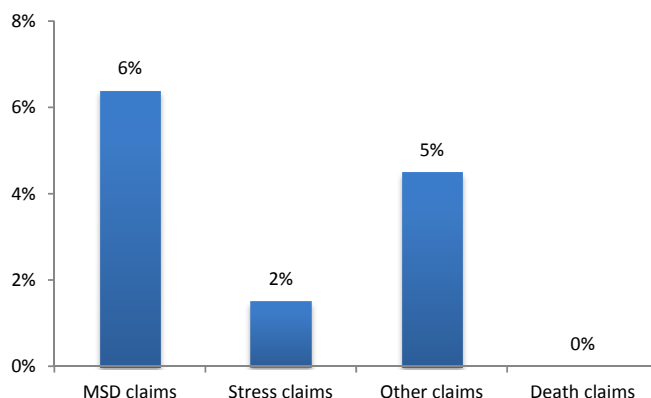


**Figure 7: Notices issued by WorkSafe Victoria prior to survey administration**

#### *Claims and notices in the 12 months post survey administration*

At the end of June 2014 when the subsequent claims and notices data was retrieved from the WorkSafe database, 89 percent of the original participating workplaces were listed as active and in operation. The data for claims made and notices given in the 12 months following the survey are based on this subset of the survey sample. Figure 8 below displays the percentage of workplaces that made each type of claim during this time period.

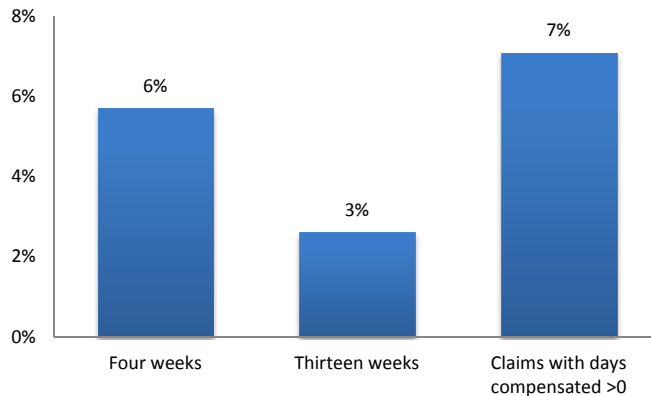
WorkCover claims were made for musculo-skeletal injuries in six percent of participating workplaces; stress claims were made in two percent of workplaces and five percent of participating workplaces had made claims that were classified as 'other'. No claims associated with the death of an employee were made by responding workplaces in the twelve months following the survey.



**Figure 8: WorkCover claims in the 12 months post survey administration**

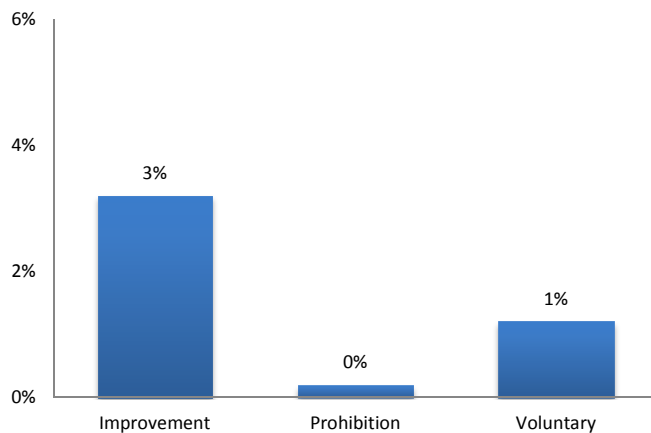
Figure 9 below shows that six percent of workplaces in the sample in the post-survey period had claims associated with 4 weeks of time loss while three percent of workplaces had

claims associated with 13 weeks of time loss. Seven percent of workplaces had claims with one or more days compensated.



**Figure 9: WorkCover claims associated with time in the 12 months post survey**

Figure 10 below displays the percent of workplaces within the sample that received notices in the twelve months following their participation in the survey. The figure shows that improvement notices were the most common notice issued followed by voluntary compliance notices. Only two workplaces (less than 1 percent of responding workplaces) received prohibition notices during the 12 months following the survey.



**Figure 10: Number of notices issued to workplaces in the 12 months post survey**

## Evaluating the OPM

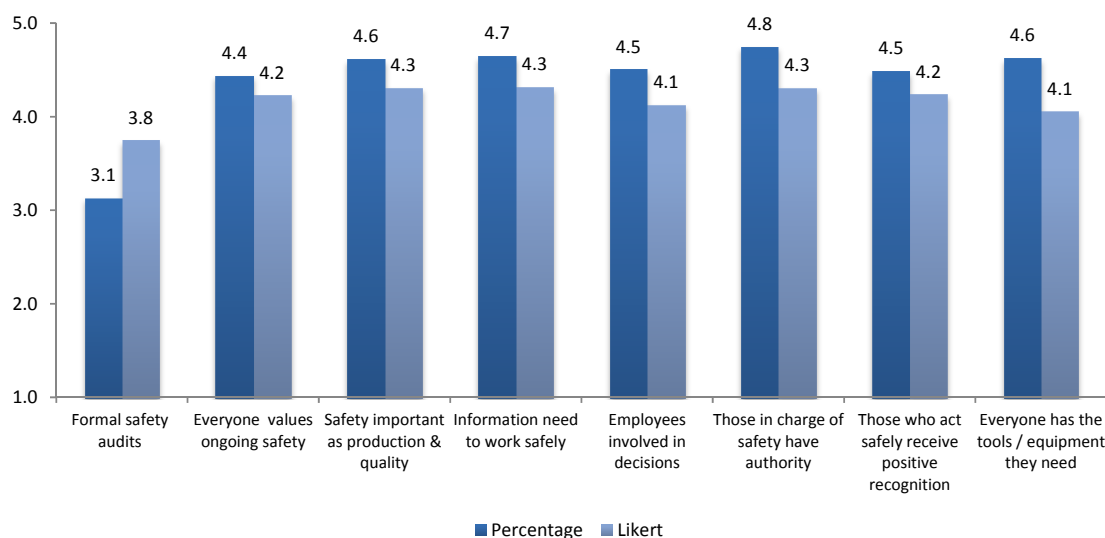
Preliminary analysis revealed that respondent scores for items of the OPM tended to be at or close to the maximum possible score, known as a positive response bias, when administered using the percentage response labels. This problem was ameliorated somewhat by revising the response options to the Likert response labels. The revision to the use of Likert response labelling reduced the skewness of the data and greatly reduced the ceiling effect. The administration of the online survey confirmed the propensity for a positive response bias when using the percentage response labels. However, using the online survey methodology also reduced this effect for both percentage and Likert labelling conditions.

Figure 11 below compares the average (mean) score for individual items of the OPM for percentage and Likert-type response options using data from both telephone and online surveys. While individual item ratings were higher for the percentage response options, the pattern of ratings was similar, regardless of which response option was used. The lowest rated item in both conditions was

- Formal safety audits at regular intervals are a normal part of our workplace.

The highest rated items in both groups were

- This organisation considers safety at least as important as production and quality in the way the work is done;
- Workers and supervisors have the information they need to work safely; and
- Those in charge of safety have the authority to make the changes they have identified as necessary.



**Figure 11: Average scores on individual OPM items for the whole sample**

### *Exploratory factor analysis*

The latent structure of the OPM was also evaluated in a series of analyses that investigated the impact of method of administration and the response options on model fit. The two methods of administration (telephone and online surveys) and the two types of response options (percentage, Likert) were compared. While the percentage and Likert response labels were different, both employed five-point response options where higher values represented a more positive endorsement of the items. Table 2 below displays each step in the analysis process used to evaluate the latent structure of the OPM in this study.

**Table 2: Procedure for analysing the latent structure of the OPM**

| Step | Method of administration | Analysis                                |
|------|--------------------------|-----------------------------------------|
| 1    | Telephone survey         | Percentage response options             |
| 2    |                          | Likert response options                 |
| 3    |                          | Pooled data using both response options |
| 4    | Online survey            | Percentage response options             |
| 5    |                          | Likert response options                 |
| 6    |                          | Pooled data using both response options |
| 7    | All respondents          | All data using whole sample             |

Using data from the telephone survey, the eight items of the OPM were subject to exploratory factor and reliability analyses. The analyses using the percentage and the Likert response labels, as well as the pooled percentage and Likert data (steps one to three), consistently revealed poor model fit. The OPM:

- demonstrated **poor explanatory variance (less than 40 percent)** in the underlying construct; and
- **average reliability** when administered through a telephone survey ( $\alpha = 0.71$ ).

Using data from the online survey, the eight items of the OPM were subject to exploratory factor analysis. The analyses using the percentage and the Likert response labels as well as the pooled percentage and Likert data (steps four to six) revealed average model fit. The OPM:

- demonstrated **sub-optimal explanatory variance (slightly less than 50 percent)** in the underlying construct; and
- **very good reliability** when administered through an online survey ( $\alpha = 0.85$ ).

Finally, the eight items of the OPM were subject to exploratory factor and reliability analyses using data from the whole sample. The analyses again revealed poor model fit. The OPM:

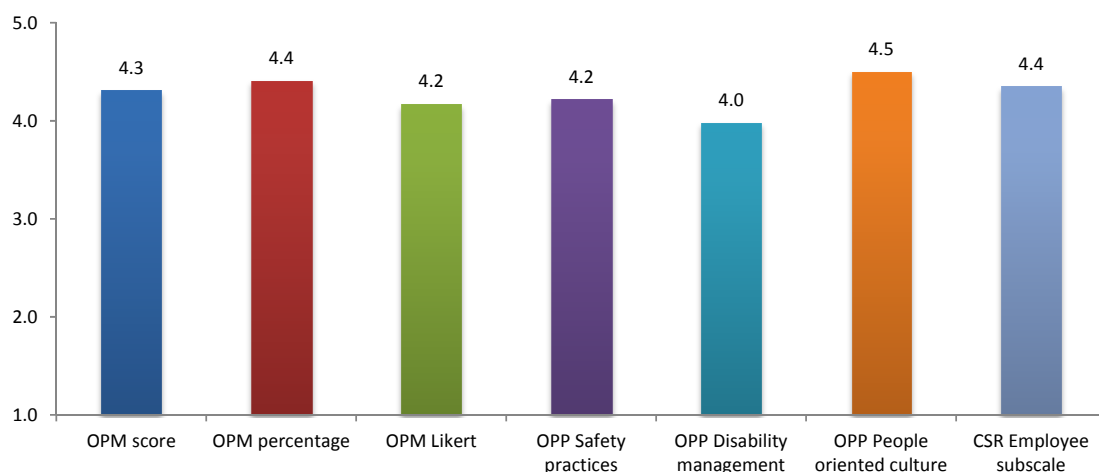
- demonstrated **poor explanatory variance (less than 40 percent)** in the underlying construct; and
- **very good reliability** ( $\alpha = 0.85$ ).

The improved model fit for the online survey suggests that the positive response bias in the data from the telephone sample had a detrimental effect on the model fit. Additionally, the model fit was substantially improved in conditions examining data where only the Likert labels were used.

#### *Comparing the OPM to other perceptual measures*

Figure 12 below displays the averaged total scores for each perceptual measure used in the survey. These scales have been averaged by dividing the total scale score by the number of items to enable comparison across scales of differing lengths.

The different conditions under which the OPM scale was administered resulted in three OPM scores: an average score for respondents who used the percentage response options, an average score for those that used the Likert response options and an average score that combined both versions of the scale. The measure that received the highest score for workplaces in the sample was the people-oriented culture subscale from the Organizational Policies and Practices scale (OPP-11)<sup>6</sup> followed by the employee subscale of the Corporate Social Responsibility Practices scale (CSR)<sup>21</sup> and the OPM as measured using percentage response options.



**Figure 12: Comparison of averaged perceptual scale scores**

The OPM was validated against other perceptual and objective measures of safety and workplace context to evaluate convergent, discriminant and criterion validity. These analyses were conducted on all versions of the OPM: the OPM with percentage response options, the

OPM with Likert response options and the OPM using pooled data with both response options.

There were **positive associations** between **the OPM** and

- all three subscales of the Organizational Policies & Practices scale (OPP-11); and
- Corporate Social Responsibility Practices (employee subscale).

This pattern of correlations indicates that the associations with the OPM are

- stronger for a measure that could be considered a leading indicator of OHS (safety practices);
- weaker for a measure that could be considered a lagging indicator of OHS performance (disability management); and
- weaker for measures of employee centred constructs that are not directly related to OHS (CSR employee and people oriented culture).

The OPM is more strongly associated with leading indicators of OHS and can be differentiated from other workplace constructs including lagging indicators of OHS, showing evidence of both convergent and discriminant validity.

### **Group comparisons on OPM scores**

Several subgroups were compared on workplace OPM scores from the entire sample. The sample was compared on the basis of

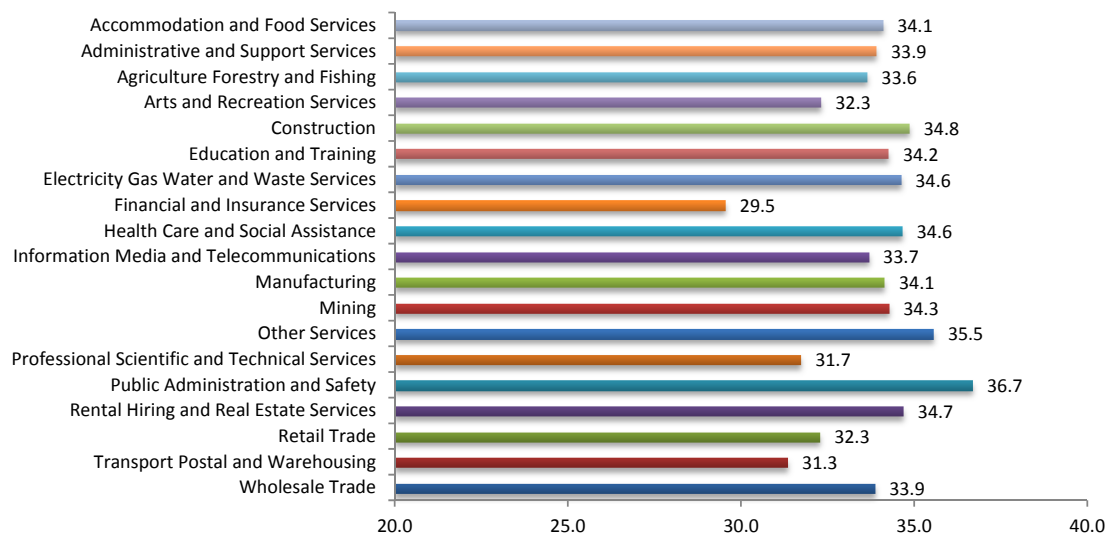
Workplace context:

- industry;
- workplace size; and
- union representation.

Respondent characteristics:

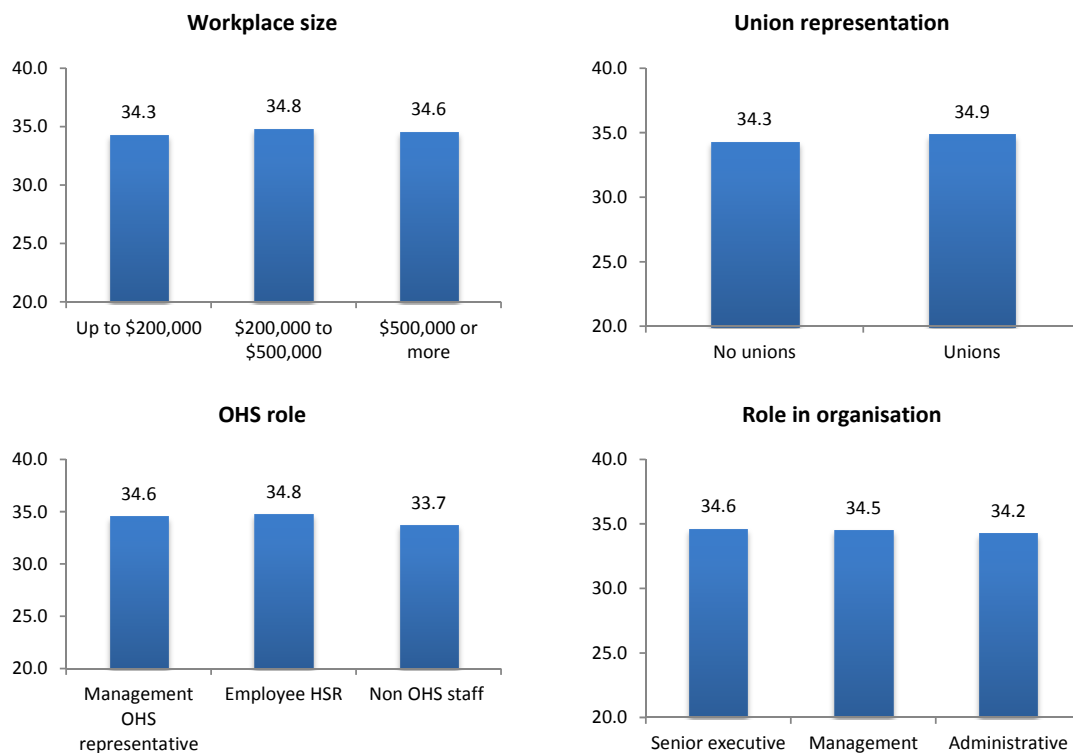
- OHS role; and
- role in the organisation.

Figure 13 below displays variation in OPM scores across industry type, with average scores being much lower in some industries: Arts and Recreation Services, Financial and Insurance Services, Professional Scientific and Technical Services, Retail Trade, as well as Transport Postal and Warehousing. These five industries each had lower scores on the OPM compared to the average OPM score for the overall sample ( $M = 33.4$ ,  $SD = 4.2$ ).



**Figure 13: Workplace OPM scores across industry**

Figure 14 shows that there were minimal differences in OPM scores across other workplace or respondent characteristics.



**Figure 14: OPM scores across workplace and respondent characteristics**

## Adapting the wording of the OPM

With regard to face validity, inspection of the OPM items lead us to consider adaptations to the scale. Some of the original items address safety while others address OHS. In order to adequately and consistently address OHS, we recommend that the OPM items should be adapted to replace 'safety' with 'health and safety.' The adapted items would then appear as:

Formal OHS audits at regular intervals are a normal part of our business.

Everyone at this organisation values ongoing OHS improvement in this organisation.

This organisation considers safety at least as important as production and quality in the way work is done.

Workers and supervisors have the information they need to work safely.

Employees are always involved in decisions affecting their health and safety.

Those in charge of OHS have the authority to make the changes they have identified as necessary.

Those who act safely receive positive recognition.

Everyone has the tools and/or equipment they need to complete their work safely.

**Figure 15: Adapted Items of the OPM**

Other considerations about wording of specific items are that adaptations in wording of OPM items could be appropriate to suit the Australian context or specific industry needs without compromising the intent of the items. An example of an appropriate adaptation might include:

- If using the OPM in the education sector, OPM item#3 might be re-worded as:  
This organisation considers educational outcomes at least as important as production and quality in the way work is done

## Relationship between the OPM and WorkCover claims and notices

### *OPM and WorkCover claims prior to the survey*

Criterion validity of the OPM was assessed using correlations with claims for the

- whole sample (telephone and online surveys);
- telephone survey only; and
- online survey only.

We also used total scores from the OPM in three ways:

- OPM (pooled) where we merged the data for percentage and Likert options into one group;
- OPM (percentage) where we only used data with percentage response options; and
- OPM (Likert) where we only used data with Likert response options.

Using data from the **whole sample** there was

A **positive association** between the **claims** prior to the survey and the

- OPM using Likert response options only.

A **positive association** between **notices issued prior to the survey** and the

- OPM pooling percentage and Likert response options.

Higher scores on the OPM score (Likert) were associated with a greater number of claims issued prior to the survey; and higher scores on the OPM (pooled) was associated with greater number of notices issued in the preceding three year period.

There were **no associations** between the **claims** or **notices issued** prior to the survey and the

- OPM using percentage response options only.

The sample was then split by method of administration to determine if the positive response bias observed in the telephone survey had confounded the results of the correlations with claims.

Using data from the **telephone survey**:

There were **no associations** between the **claims** prior to the survey and the

- OPM pooling percentage and Likert response options;
- OPM using percentage response options only; and
- OPM using Likert response options only.

However, there were **positive associations** between **notices issued** prior to the survey and

- OPM pooling percentage and Likert response options; and
- OPM using Likert response options only.

In summary, higher scores on the OPM (pooled), as well as the OPM (Likert) were associated with greater number of notices issued in the preceding three year period.

Using data from the **online survey**:

**Positive associations** were observed between **total claims** prior to the survey and the

- OPM pooling percentage and Likert response options; and
- OPM using Likert response options only.

Higher scores on the OPM score (percentage and Likert pooled) and the OPM (Likert) were associated with greater number of **total claims** in the preceding three years.

**Positive associations** were observed between **musculo-skeletal disorder claims** prior to the survey and the

- OPM pooling percentage and Likert response options.

Higher scores on the OPM score (pooled) were associated with greater number of **claims classified as musculo-skeletal disorder** in the preceding three years.

**Positive associations** were also observed between **other claims** prior to the survey and the

- OPM pooling percentage and Likert response options;
- OPM using percentage response options only; and
- OPM using Likert response options only.

Higher scores on the OPM were associated with greater number of **claims classified as other** in the preceding three year period.

*OPM and WorkCover claims in the 12 months following the survey*

Using data from **both surveys**:

There were **no associations** between the **claims** in the 12 months following the survey and the

- OPM pooling percentage and Likert response options;
- OPM using percentage response options only; and
- OPM using Likert response options only.

There was a **positive association** between **notices issued** in the 12 months following the survey and the:

- OPM using Likert response options only.

Higher scores on the OPM were associated with greater number of **notices** issued in the following 12 months.

There were **no associations** between **notices issued** in the 12 months following the survey and the

- OPM pooling percentage and Likert response options; and
- OPM using percentage response options only.

Using data from the **telephone survey**:

There were **no associations** between the **claims** or **notices issued** in the 12 months following the survey and the

- OPM pooling percentage and Likert response options; and
- OPM using percentage response options only; and
- OPM using Likert response options only.

Using data from the **online survey**:

There were **no associations** between the **claims** or **notices issued** in the 12 months following the survey and the

- OPM pooling percentage and Likert response options; and
- OPM using percentage response options only; and
- OPM using Likert response options only.

To determine the predictive validity of the OPM (pooled) with respect to claims in the 12 months following the survey we conducted a negative binomial regression with the robust estimator using SPSS version 21<sup>25</sup>. Initially, the OPM was entered as a sole predictor of total

claims. Additional models were conducted to examine the effect of workplace related variables: the presence of unions, workplace size and prior WorkCover claims. Due to the positive response bias in the telephone survey, only data from the online survey were analysed.

In the initial regression the OPM was not a significant predictor of claims; and when prior claims were taken into account, the OPM remained a non-significant predictor of claims in the 12 months following the survey.

## Summary and Conclusion

This report has presented the key findings from a survey of Victorian workplaces. The aims of this report were to conduct a preliminary validation of the OPM across workplaces in Victoria and to examine how leading indicators of OHS (as measured by the OPM using a single informant per workplace) were associated with WorkCover claims. Consistent with earlier studies, the results indicate that the OPM is a reliable and valid measure of OHS leading indicators and that it might be of use as an initial 'flag' or measure of OHS potential in a workplace. However, certain caveats need to be applied with regard to its use.

The latent structure of the OPM was evaluated under two survey conditions using two types of response options. The combination of the original percentage response options and administration through a telephone survey resulted in a substantial positive response bias, which was attenuated by changing the response options to Likert labels and further reduced when the OPM was administered through the online survey. This range restriction observed in the telephone survey data appeared to have reduced the magnitude of the inter-correlations between individual items of the OPM, resulting in poor explanatory variance in the exploratory factor analyses conducted using the data from that stage of the study. The use of Likert response options and online methodology resulted in an improved factor structure, and while no model reached the minimum 50%, the analyses with the Likert response options resulted in the highest explanatory variance. The reliability of the OPM was also very good when administered online and this is particularly evident in the Likert analysis. This indicates that the OPM shows promise but might be problematic when used as part of a telephone survey or with percentage response options.

We tested the validity of the OPM by evaluating its relationship with other perceptual measures of OHS and claims data. There were moderate to strong associations between the OPM and a measure of safety practices which indicate that it is a valid measure of OHS, particularly leading indicators of OHS. While workplace scores on the OPM were associated with disability management (a lagging indicator of OHS) and measures of commitment to a positive people culture and CSR, these associations were weaker than the association with safety practices. This pattern of correlations indicates that the OPM is a valid measure of leading indicators of OHS, rather than other aspects of OHS or organisational culture. That is, it represents leading indicators of OHS rather than lagging indicators of OHS or other employee-centric organisational practices.

Workplace scores on the OPM showed that respondents had positive views of OHS leading indicators in their workplaces. OPM scores varied across industry with several industries receiving low scores on the OPM: Financial and Insurance Services, Transport Postal and Warehousing, Professional Scientific and Technical Services, Retail Trade as well as Arts and Recreation Services. These five industries each had lower scores on the OPM compared to the average OPM score for the overall sample. However, OPM scores across other subgroups within the sample (workplace size, union representation, OHS role, organisational role) revealed that the average OPM scores attributed to the workplace by respondents were similar across groups. This suggests that the OPM might be useful to identify differences between workplaces, without being compromised by specific workforce characteristics.

The OPM was clearly valid in terms of its relationship with other perceptual measures. The relationship with claims data is more complex and the outcomes might have been confounded by methodological issues. Correlations conducted using the whole sample revealed no associations between scores on the OPM and claims in the three years prior to the survey. The lack of relationship between scores on the OPM and claims in the sample overall might have arisen from the positive response bias observed in the telephone survey. Splitting the sample on the basis of method of administration resulted in positive associations between scores on the OPM (Likert version) and claims data in the online survey, but not in the telephone survey which indicates that the telephone administration is a confounding factor. Higher scores on the OPM were associated with a greater number of claims being made. This association between higher scores on the OPM and a greater number of past claims might represent workplace improvements following claims made or notices received. Further testing of the OPM using the Likert response options in a larger sample would clarify this issue, particularly given that WorkCover claims are rare events and a large sample would be required to detect a relationship between perceptual measures, such as the OPM, and claims.

No associations were observed between scores on the OPM and claims made or notices issued in the 12 months following the survey under either survey methodology. A follow-up regression tested the relationships between workplace OPM scores and WorkCover claims at 12 months post survey administration. This analysis revealed no significant relationship between workplace scores on the OPM and claims made in the twelve months following the survey. The mixed results from this survey, particularly the discrepancies between the claims before and after survey administration, might be due to claims being rare events. By collecting data for only 12 months after the survey we have attempted to detect relationships over a comparatively short time frame that naturally restricts the amount of available data compared to the three years of data prior to the survey. Observing the relationship between claims and data over longer time periods could be helpful in determining whether a high level construct such as the OPM is associated with claims at a later date.

A relationship with claims was only partially supported, suggesting that the relationship between leading indicators of OHS and claims is a complex issue. There are several possible confounding factors in the prediction of claims in this study. Methodological issues such as the percentage response options, the use of telephone survey methodology or the use of a single informant to ascertain workplace OHS practices might have attenuated the relationship between the OPM and claims.

This study validated the OPM, a measure of leading indicators of OHS, in the Australian context for the first time. The results of the study suggest that while the OPM is a valid measure of leading indicators of OHS, its relationship to WorkCover claims and notices is a more complex issue. From the results of this study it can be concluded that the OPM

3. could be used as an initial 'flag' of leading indicators of OHS in a workplace.
4. should be used with Likert response options rather than the original percentage response options.

Furthermore, in future research using the OPM, consideration should be given to

4. using the adapted wording of OPM items in order to more consistently address OHS.
4. investigating the relationships between the OPM and OHS outcomes collected in the workplace.
5. expanding the use of the OPM as a survey tool to be completed by multiple informants in a workplace.
6. adaptations in wording of OPM items to suit the Australian context or specific industry needs without compromising the intent of the items.

This survey and analysis are part of a larger study that will be completed in 2015. Several other reports will be available to extend our understanding of the OPM in the Australian context. We recommend that this report be viewed as a companion piece to the other reports, which will be available at <http://ohsleadindicators.org> and on the ISCRR website.

Overall, this research will contribute to our understanding of the effectiveness of the OPM as a measure of OHS leading indicators and as a benchmarking tool.

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