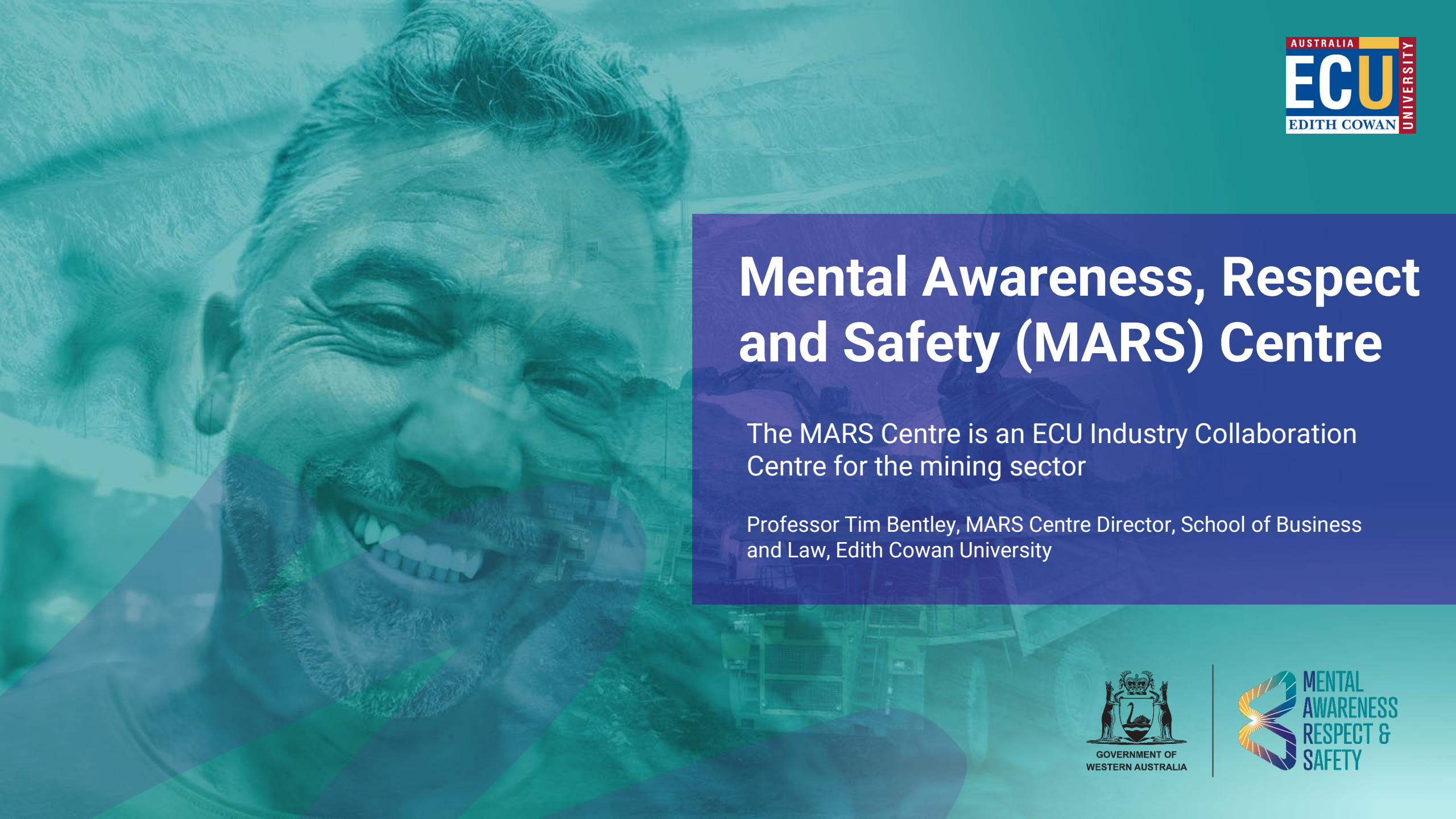
WELCOME TO

The ECU Mental Awareness, Respect & Safety (MARS) Centre Research Showcase Event

2024

Professor Tim Bentley

MARS Centre Director, School of Business and Law, Edith Cowan University



Mental Awareness, Respect and Safety (MARS) Centre

The MARS Centre is an ECU Industry Collaboration Centre for the mining sector

Professor Tim Bentley, MARS Centre Director, School of Business and Law, Edith Cowan University

GOVERNMENT OF WESTERN AUSTRALIA

MENTAL AWARENESS RESPECT & SAFETY

Collaboration Partnership

WA Government

Through the DEMIRS MARS Program

GOVERNMENT OF WESTERN AUSTRALIA

MENTAL AWARENESS RESPECT & SAFETY

WA Mining Industry

Participation in collaborative and co-designed projects focused on psychosocial risk and other WHS issues that challenge the sector

ECU MARS Centre

Education and research partner

AUSTRALIA ECU EDITH COWAN UNIVERSITY

Our Vision: Elevating Mining Sector WHS Leadership Capabilities

Through a focus on educating current and future leaders and collaborating with industry on cutting-edge research, the MARS Centre helps foster a culture of safety and respect in the mining sector.

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MENTAL AWARENESS RESPECT & SAFETY

MARS Centre Ecosystem for Mining Leadership Capability Development and Cultural Advancement

MARS Alumni:

Continuing Leadership Capability Development

Executive Peer Network Platform (Mining Execs & Senior Leaders)

Peer Community Platform

MARS Centre Program Overview

MARS Engagement Program

DEMIRS/Worksafe WA
MARS Program Initiatives
Mining Peak Bodies and Stakeholders
Unions
Academic and Science
Consultants & Industry Experts

MARS Research Program

MARS Workplace Barometer
MARS Digging Deeper
MARS Evaluation

MARS Teaching Program

GradCert (Commencing Sem 1, 2024)
Undergrad Minor (Sem 2, 2024)
Short Courses (2024/5)

MARS Digging Deeper Research Ethos:

Doing research WITH industry

Identifying Key MARS-Themed Research Challenges

Engagement with mining sector organisations and Government stakeholders

Priorities and recommendations from MARS Program research

Feedback from MARS Centre Peer Community

Understand the problem

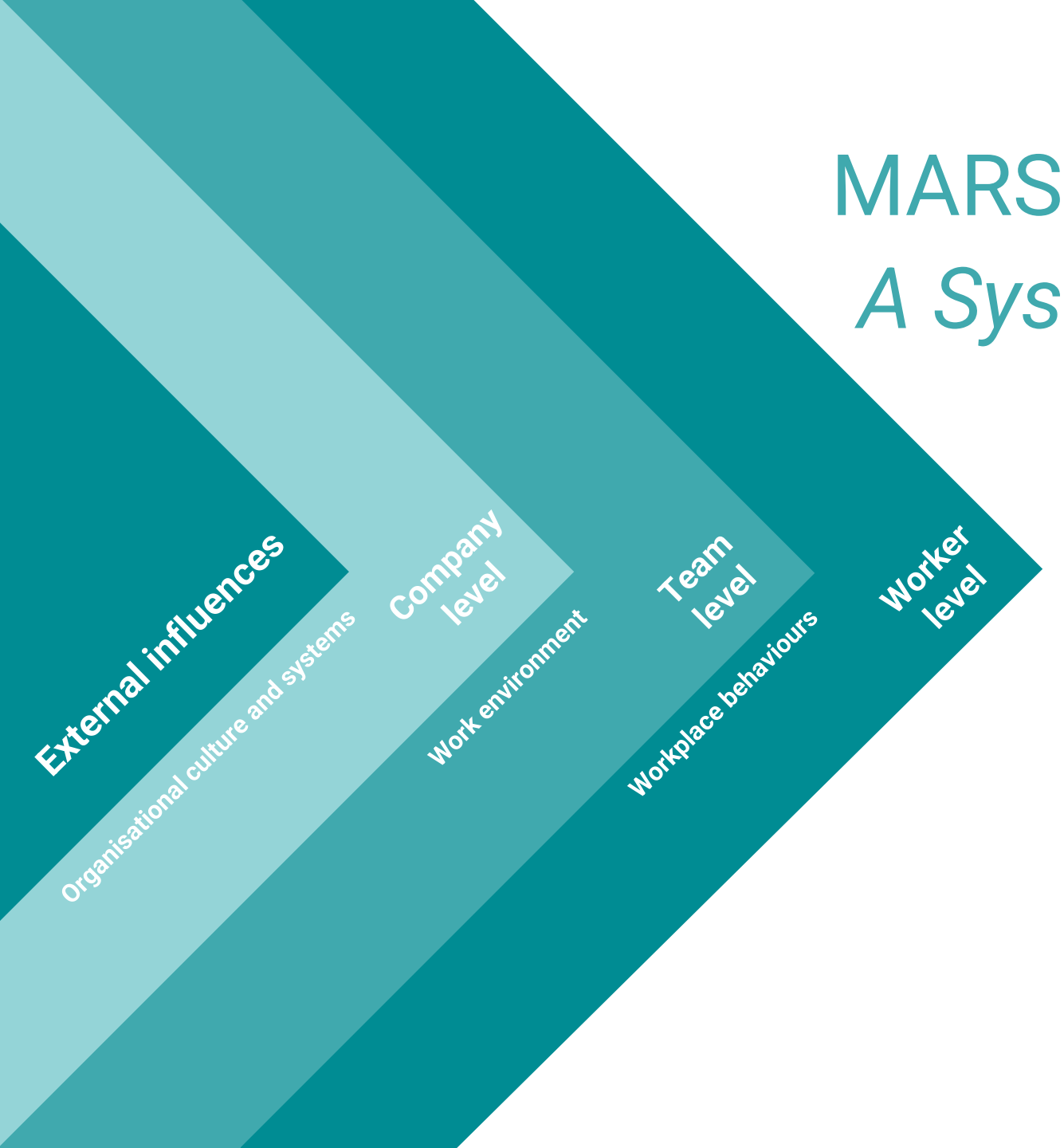
Examine the scope the problem with industry stakeholders; understand the mining context.
Build a collaborative research team including MARS Centre members, external research collaborators and partners.

Co-design research project

Engage one or more mining sector partner organisation into the project.
Co-design methodology and approach.
Secure necessary access and resources to conduct the research project.

Collaborate in research project

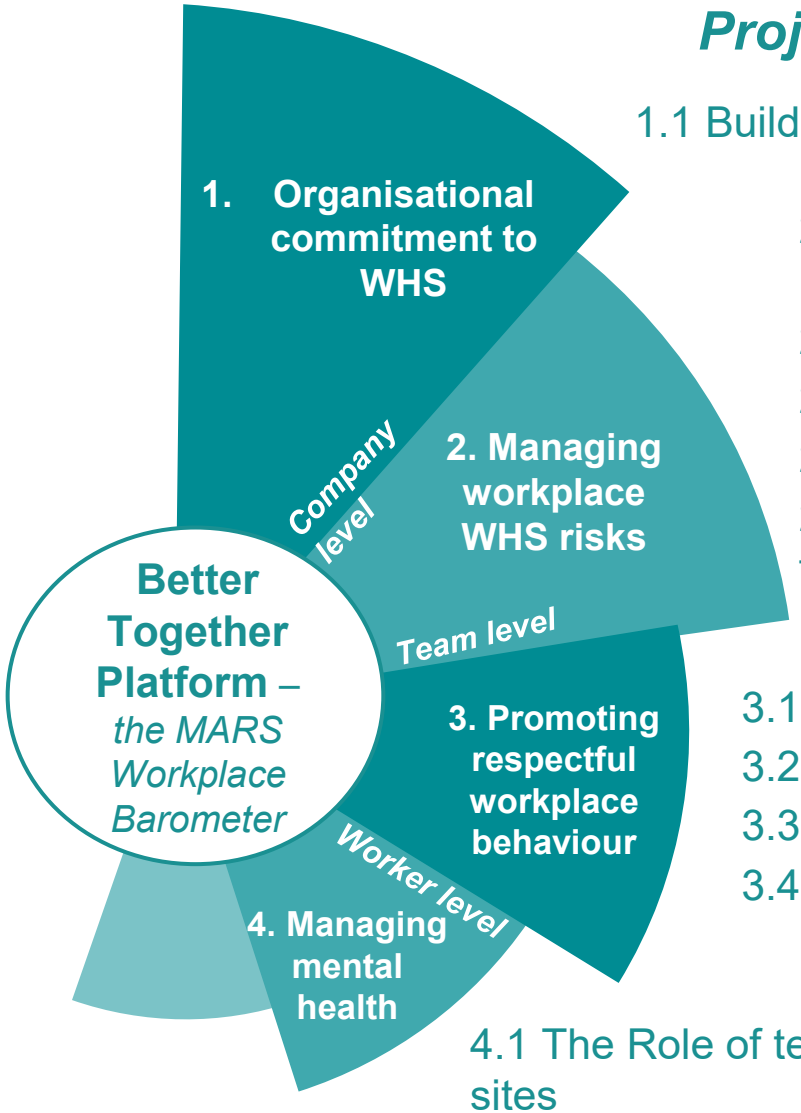
Partner with participating mining organisations in all research elements.
Collaborate on research reporting to ensure industry relevance and practical value.
Collaborate with industry to disseminate findings.



MARS Centre Research Model: *A Systems Thinking Approach*

The MARS Centre's Digging Deeper Research Program has a practical and solution-oriented focus. We adopt a systems thinking approach to address the complex WHS challenges within the mining sector that recognises the influence of interacting work system factors on individual behaviour and WHS outcomes.

Mapping MARS Centre Research with Key WHS Challenges



Active MARS Digging Deeper Research Projects:

1.1 Building a PSC system for the management of psychosocial risks

2.1 Developing an integrated approach to monitoring incident and injury risks
2.2 Health and exposure metrics as an Indicator of workplace health
2.3 Future proofing critical risk management
2.4 Understanding the impact of emerging technologies on WHS
2.5 Evaluation of the PHReD-T for developing work design competences for the prevention of psychosocial risk in mining

3.1 Supervisor impact on mining company gender equity initiatives
3.2 Advancing female inclusion in the mining sector
3.3 Elevating diversity and inclusion capability maturity
3.4 Elevating bullying and incivility capability maturity

4.1 The Role of team belonging in shaping mental health for FIFO workers on remote mine sites

AUSTRALIA ECU EDITH COWAN UNIVERSITY

For more information: mars@ecu.edu.au

GOVERNMENT OF WESTERN AUSTRALIA

MENTAL AWARENESS RESPECT & SAFETY

KEYNOTE SPEAKER
Professor Maureen Dollard

Director of the Psychosocial Safety Climate Global Observatory at the University of South Australia

PSC Global Observatory

Australian Government

Australian Research Council

Optimising Psychosocial Safety Climate: Assessing Risk is Necessary but not Sufficient

Maureen Dollard

ARC Laureate Fellow, Psychosocial Safety Climate Global Observatory ®

University of South Australia

PSC Global Observatory

Australian Government

Australian Research Council

University of South Australia

Centre for Workplace Excellence

Outline

- Current status
- The mental health of the mining sector
- The concept of PSC
- Human and workplace benefits and costs of PSC
- PSC Research Findings – What We Know
- How to improve PSC
- Implications

Current Status – Legal Requirements

The Model WHS regulations stipulate that:

- Risks should be eliminated at the highest level where possible (e.g. primary vs tertiary approaches).
- Risk assessments and consultation with workers should be undertaken to create effective risk controls.
- The work context and type of worker needs to be considered when contemplating risk and risk controls.
- We think -- Best outcomes are achieved by striving to create safe systems of work.
- Proactive identification, elimination, or minimisation of these psychosocial hazards is required – to be risk responsive.

Good news… these risks are social factors so we can change them (because we created them!)

Prof Sharon Parker and colleagues (2023)

Mental Health and Mining Work in WA

- Levels of burnout and psychological distress are high
- More than one in three mining workers report regularly feeling emotionally exhausted.
- They advocate the need to prevent harm through better work design, leadership, and organisational and team culture.
- Toxic cultures of bullying and sexual harassment, especially for women.
- The negative impact of experiencing sexual harassment on mental health and well-being is a clear and important finding.
- Covert forms of sexual harassment such as sexism and misogyny remain high
- 5-41% of women mining workers reported experiencing sexist behavior and sexual hostility sometimes, often, or very often

Prof Sharon Parker et al (2023)

Mitigate Illness - Job and Organisational Factors That Help People Experiencing Poor Mental Health

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- the belief that their companies do not prioritise health and safety including mental health and well-being (Psychosocial Safety Climate)
- that they would face negative consequences such as leadership treating them differently in ways that would negatively impact their careers if they sought mental health support (Stigma).
- Stigma and discrimination can lead to worsened symptoms, lower self-esteem, and more difficulties at work.

Positive PSC Findings

- PSC was strongly and consistently related to most mental health and well-being outcomes.
- Workers who perceived a more positive PSC within their companies also tended to fare better across the board, with lower psychological distress, burnout, and intention to leave their companies, and higher job satisfaction and thriving.
- Well-designed work also goes hand in hand with a positive psychosocial safety climate (Safe Work Australia, 2022; Lawrie et al., 2018)

Prof Sharon Parker et al (2023)

Implications for Mining Companies

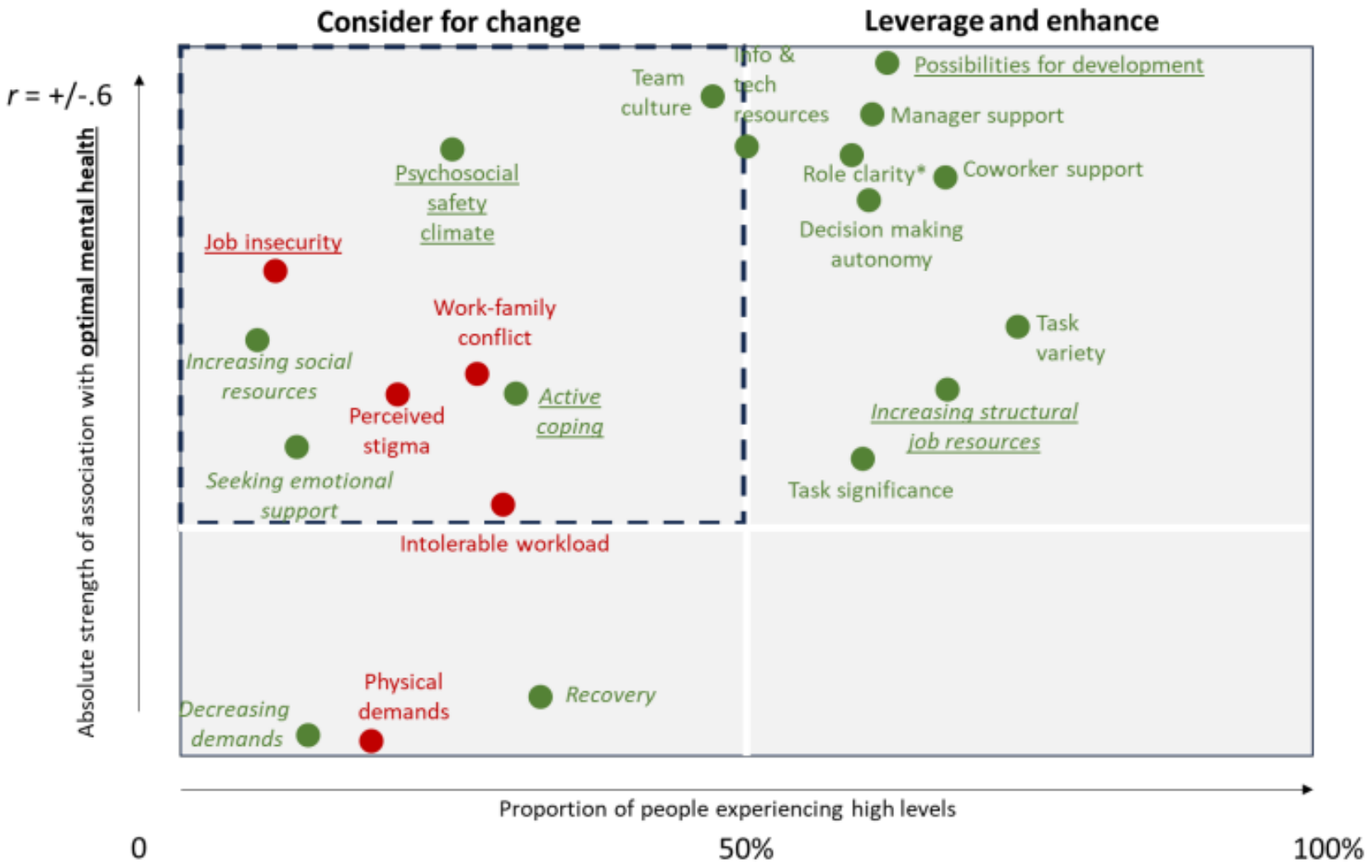
Those actively working to

- improve PSC (such as through showing genuine concern for worker mental health and well-being) and
- reduce stigma (such as through providing resources for, and promoting awareness of, mental health and well-being support structures and encouraging leaders to role model anti-stigma behaviours),
- are likely to also see mental health benefits in their workforce, particularly in lower levels of psychological distress and turnover, as well as more satisfied workers.

Prof Sharon Parker et al (2023)

Parker et al (2023)

Figure 11. Prevalence of potential drivers and strength of association with optimal mental health



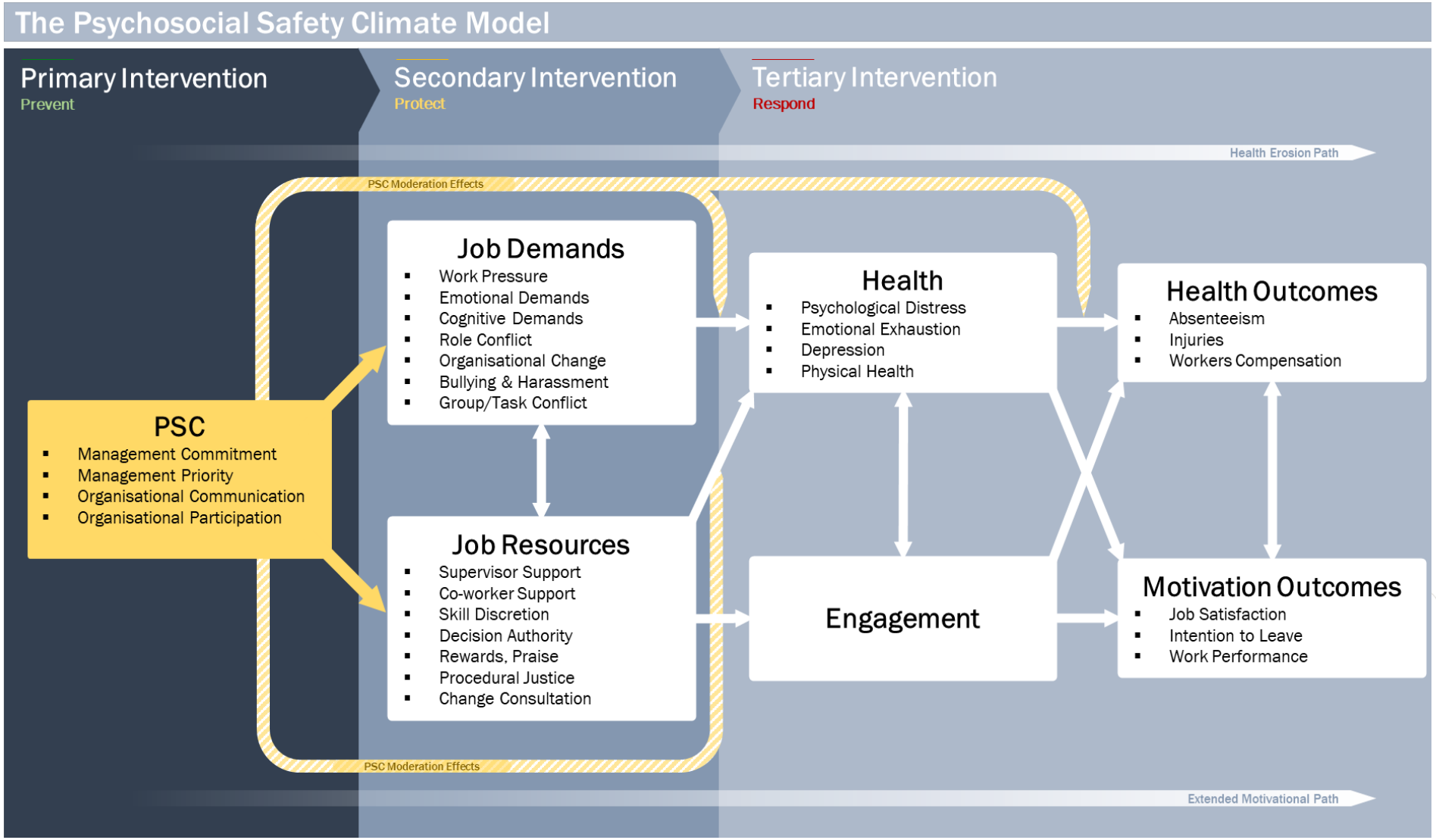
Note. Drivers that are underlined indicate areas that strongly and uniquely contribute to outcomes of optimal mental health. Drivers in italics indicate personal strategies.

What is Psychosocial Safety Climate (PSC)?

Psychosocial Safety Climate

- Organisation’s safety system for worker psychological health and safety
- Perceptions of this is the PSC (psychosocial safety climate)
- Driven by organisational values and systems for the protection of worker psychological health.
- Reflects senior management commitment and prioritisation, organisational participation, and general consultation in relation to stress prevention and safety at work.
- Determined by organisational policies, practices, and procedures for the protection of worker psychological health and safety.

PSC - The Cause of the Causes



Why Is Measuring PSC Important?

What if we stop people from falling into the waterfall in the first place?
Prevent

If you give people a life raft to cope with the fall, they might not break bones, but they're going to get wet
Protect

Without any support, people will fall to the bottom of the waterfall, we'll have to treat the broken bones
Respond

Primary Intervention

Secondary Intervention

Tertiary Intervention

The PSC 12 Measure

Management Commitment

1. In my workplace senior management acts quickly to correct problems/issues that affect employees' psychological health.
2. Senior management acts decisively when a concern of an employees' psychological status is raised.
3. Senior management show support for stress prevention through involvement and commitment.

Management Priority

4. Psychological well-being of staff is a priority for this organisation.
5. Senior management clearly considers the psychological health of employees to be of great importance.
6. Senior management considers employee psychological health to be as important as productivity.

Organisational Communication

7. There is good communication here about psychological safety issues which affect me.
8. Information about workplace psychological well-being is always brought to my attention by my manager/supervisor.
9. My contributions to resolving occupational health and safety concerns in the organisation are listened to.

Organisational Participation

10. Participation and consultation in psychological health and safety occurs with employees' unions and health and safety representatives in my workplace.
11. Employees are encouraged to become involved in psychological safety and health matters.
12. In my organisation the prevention of stress involves all levels of the organisation.

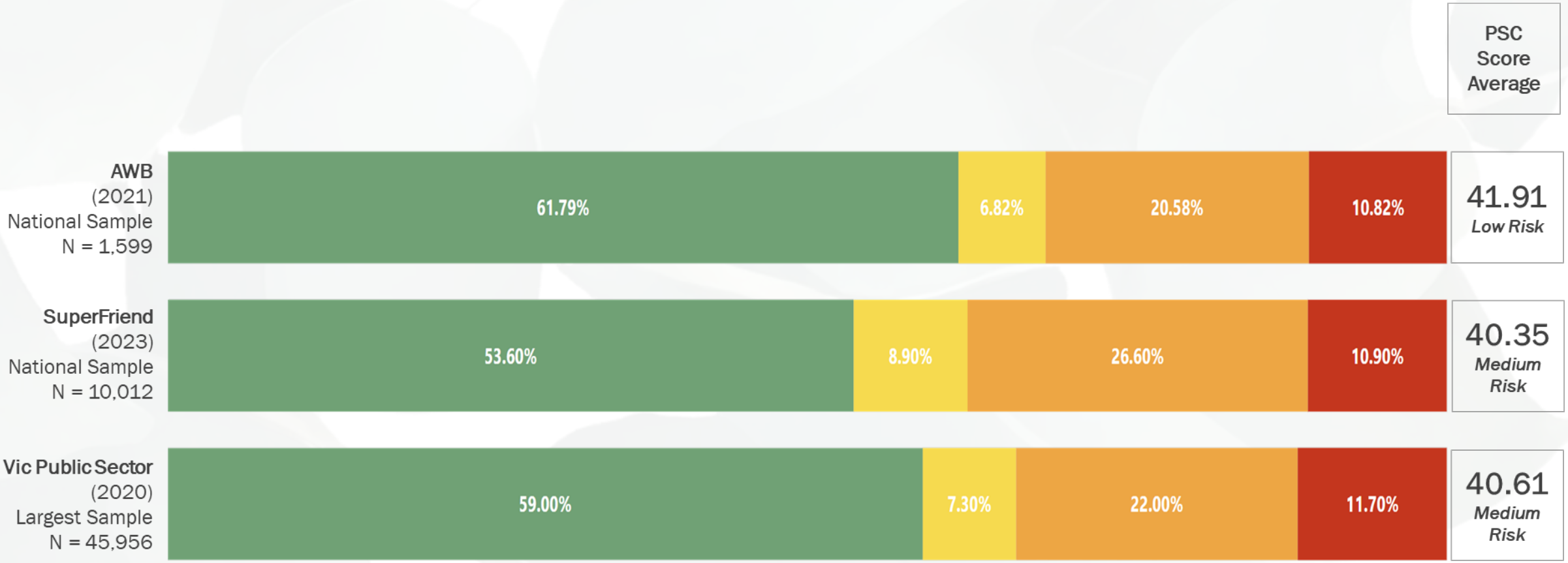
Hall et al. 2010. International Journal of Stress Management; © American Psychological Society

PSC Benchmark Standards

PSC SCORE /60	RISK LEVEL	PROGNOSIS
≥ 41	Low Risk	Performing well, but improvements in PSC levels might still be required.
< 41 > 37	Medium Risk	Improvements can be made in the implementation of PSC principles.
≤ 37 > 26	High Risk	High risk of job strain. Staff health and productivity compromised. Significant action required to improve PSC.
≤ 26	Very High Risk	Serious failures in organisational strategy. Urgent action needed to prevent worsening conditions and staff illness or injury.

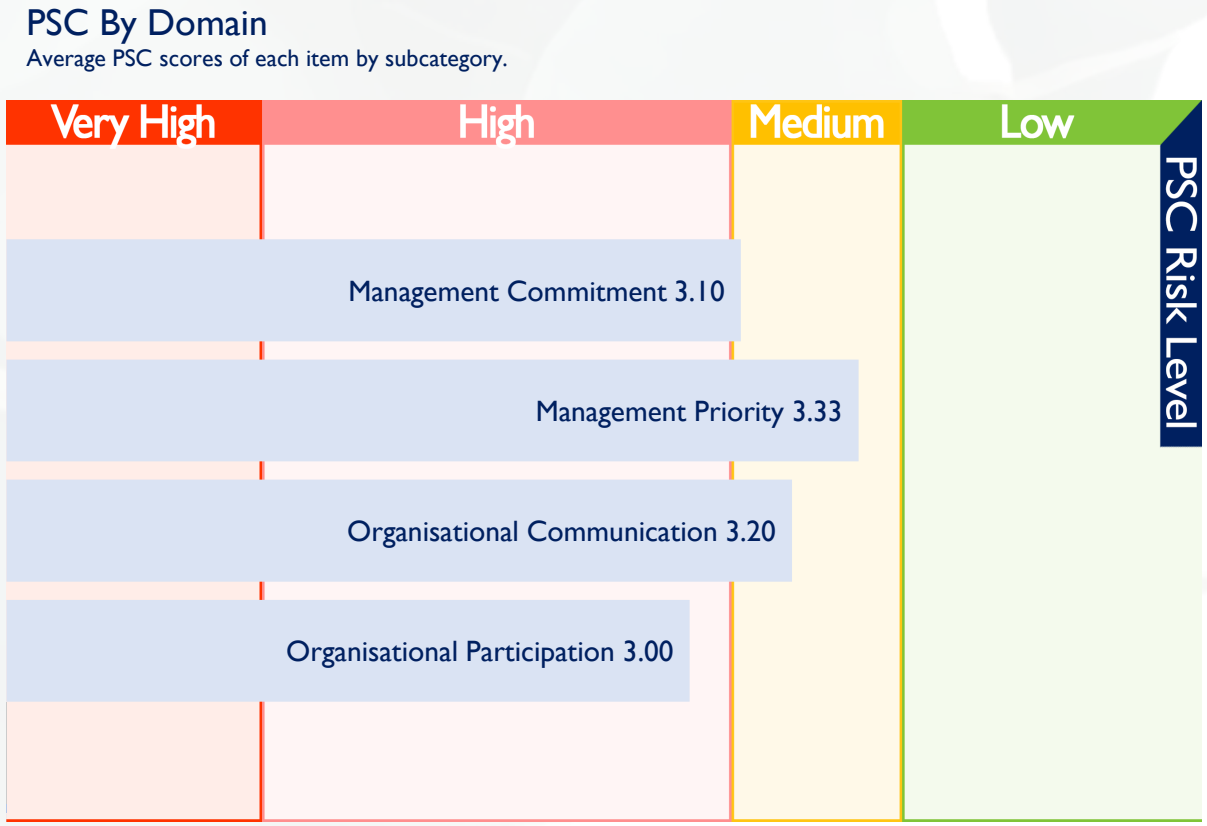
Bailey, T. S, Dollard, M. F.., & Richards, P. A. (2015). A national standard for psychosocial safety climate (PSC): PSC 41 as the benchmark for low risk of job strain and depressive symptoms. *Journal of Occupational Health Psychology, 20*(1):15-26. doi: 10.1037/a0038166. Epub 2014 Oct 27. PMID: 25347684.

PSC Benchmarks



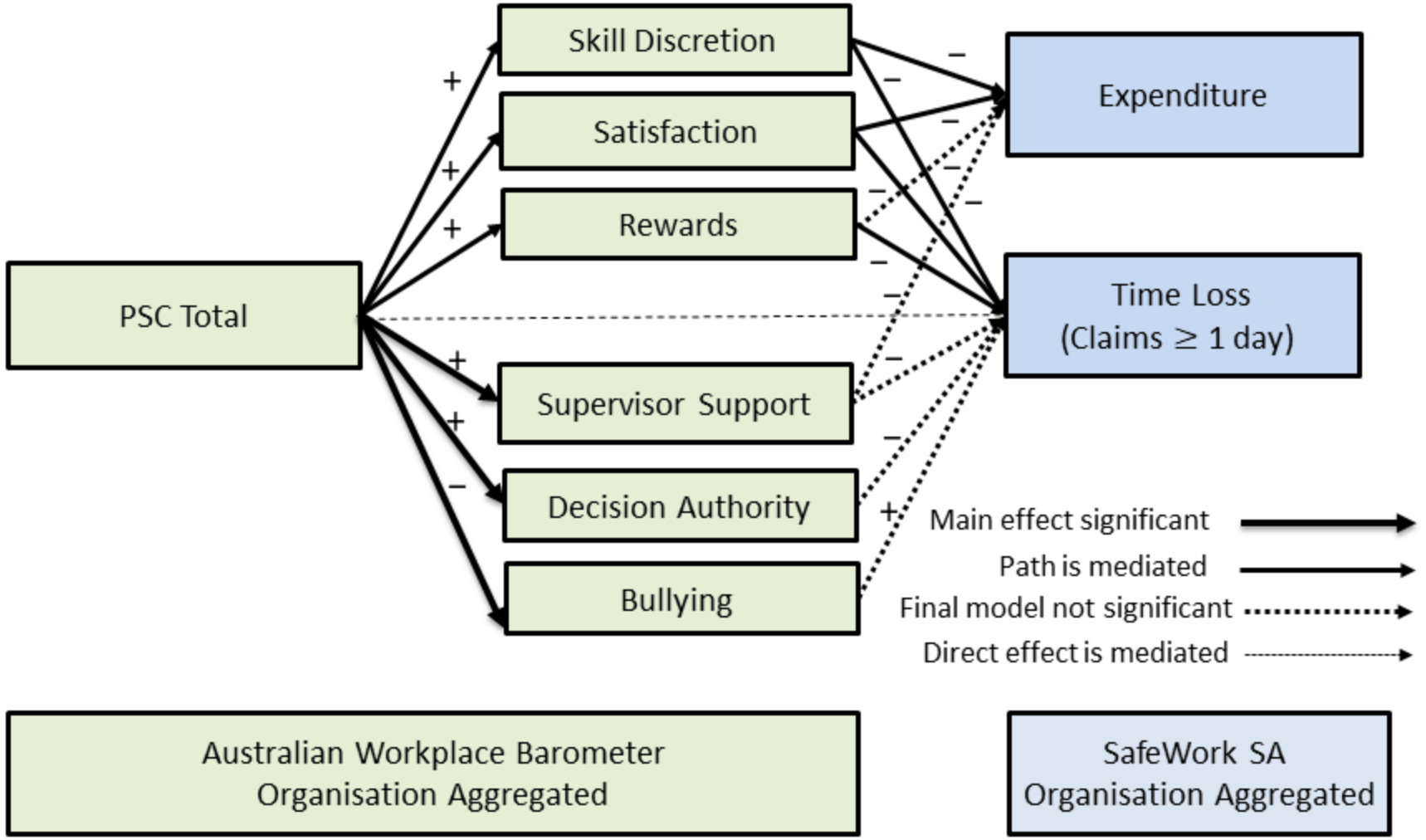
Understanding the PSC Domains

- PSC can be broken down into smaller sub-categories or areas:
  - Management Commitment
  - Management Priority
  - Organisational Communication
  - Organisational Participation
- These indicate where an organisation is going well, and which areas require attention.
- For example, here ‘Organisational Participation’ requires the greatest attention.

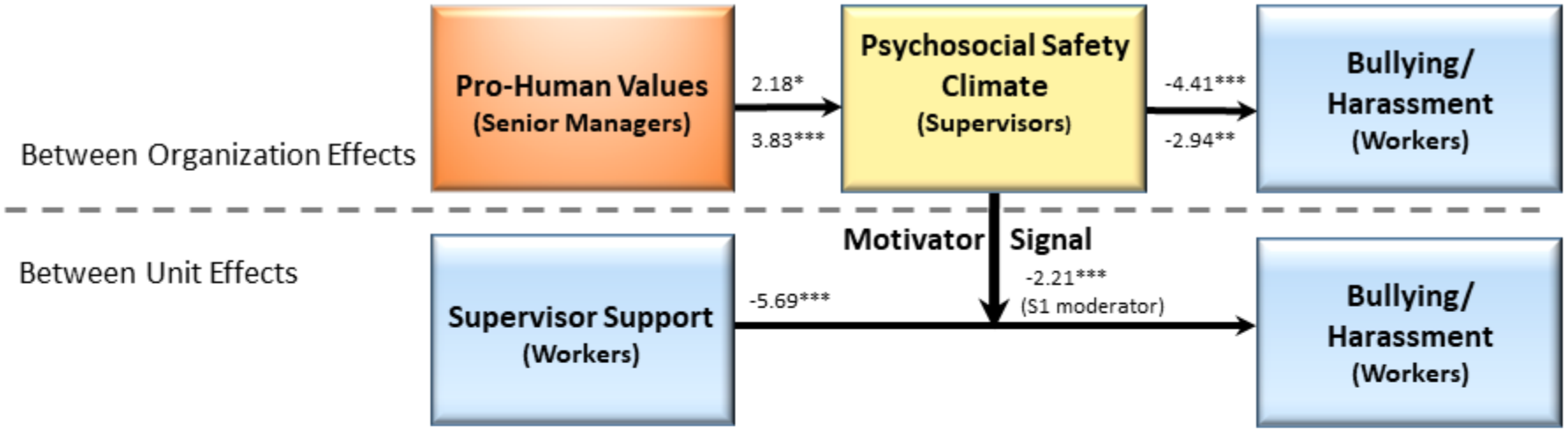


Post Injury Model:

Psychosocial Safety Climate, Psychosocial Factors, Time Loss and Expenditure



Senior Management Values Predict PSC and Work Conditions



Study 1, 33 Organizations, 413 work units, 5341 supervisors, 21753 workers.

Study 2, 105 Organizations, 4718 supervisors, 26112 workers.

PSC Research Findings – What We Know

PSC Global Observatory
Australian Government
Australian Research Council
University of South Australia
Centre for Workplace Excellence

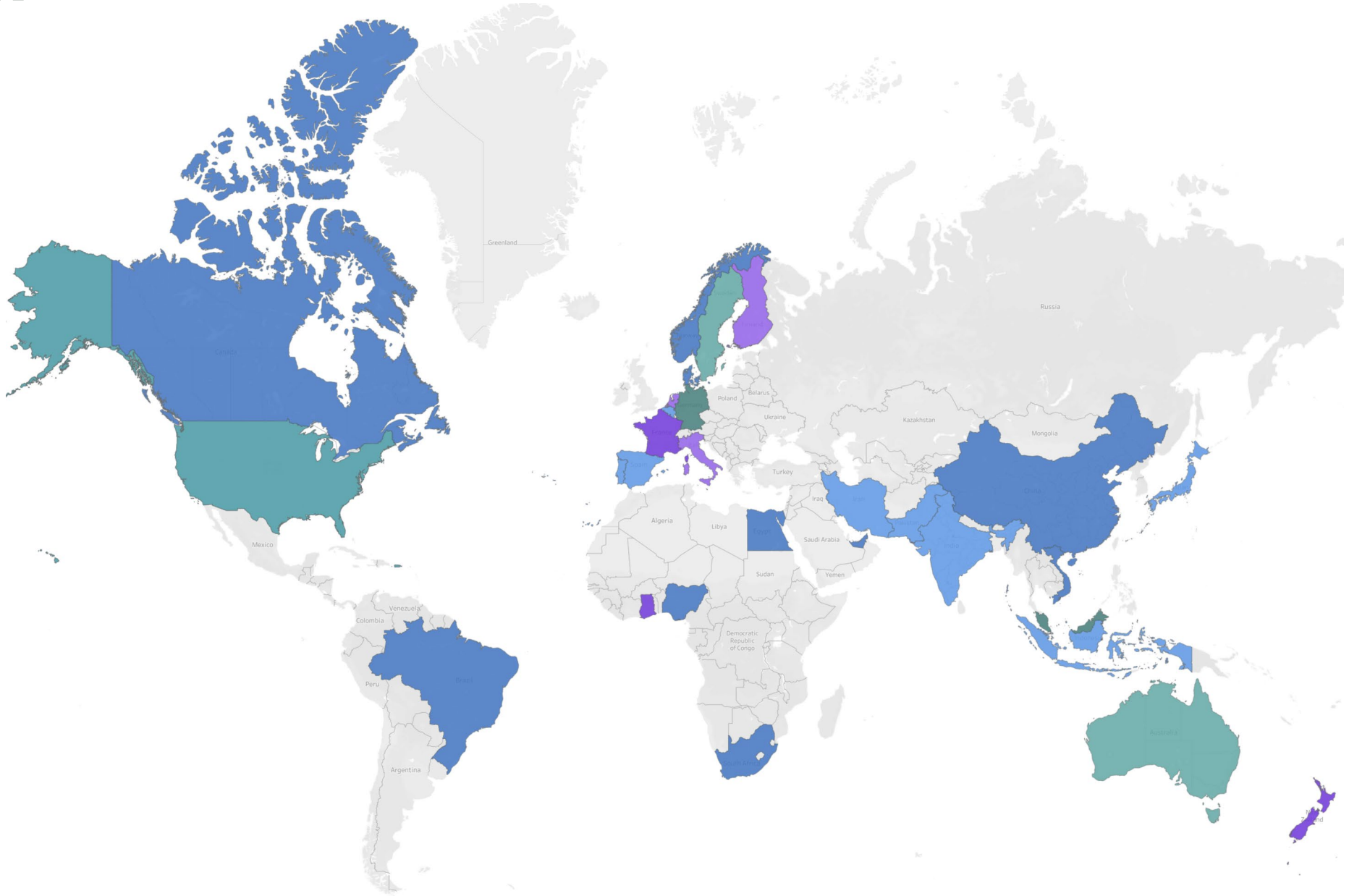
PSC Developments

- PSC is included in the US Quality of Worklife Survey.
- Included in Karasek's Job Content Questionnaire 2 Survey.
- In the Australian and NZ Workplace Barometers and the Victorian WorkWell Surveys.
- Minimum data requirement in the Victorian Public Sector Commission.
- Widely used around the world and recognised by leading organisational psychology journals.
- Concept behind an Australian Research Council Laureate Fellowship.

PSC Research

Over 260 studies published on PSC worldwide on an organisation industry or national basis

National data of PSC has been collected in many countries including Australia, New Zealand, Sweden, and Germany

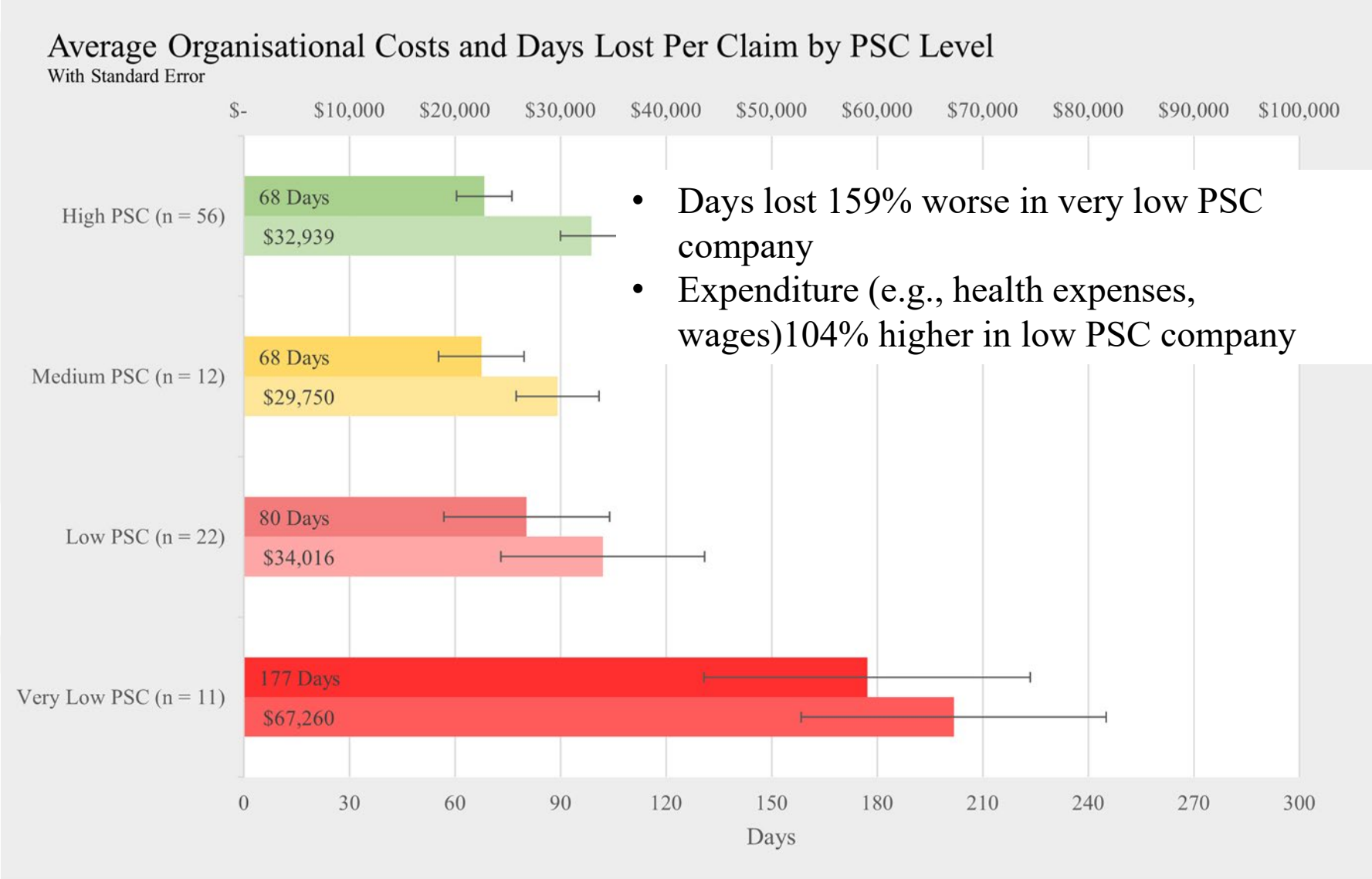


PSC and RTW – A Case Study

Findings Summary:

Very low PSC environments linked with:

- More days lost per claim
- Higher costs per claim



- Days lost 159% worse in very low PSC company
- Expenditure (e.g., health expenses, wages)104% higher in low PSC company

PSC as an organizational level determinant of working time lost and expenditure following workplace injuries and illnesses. Dollard, Loh, Becher, Neser, Richter, Zadow, Afsharian, Potter, Safety Science (in press).

PSC and Sickness Absence Cost – A Case Study

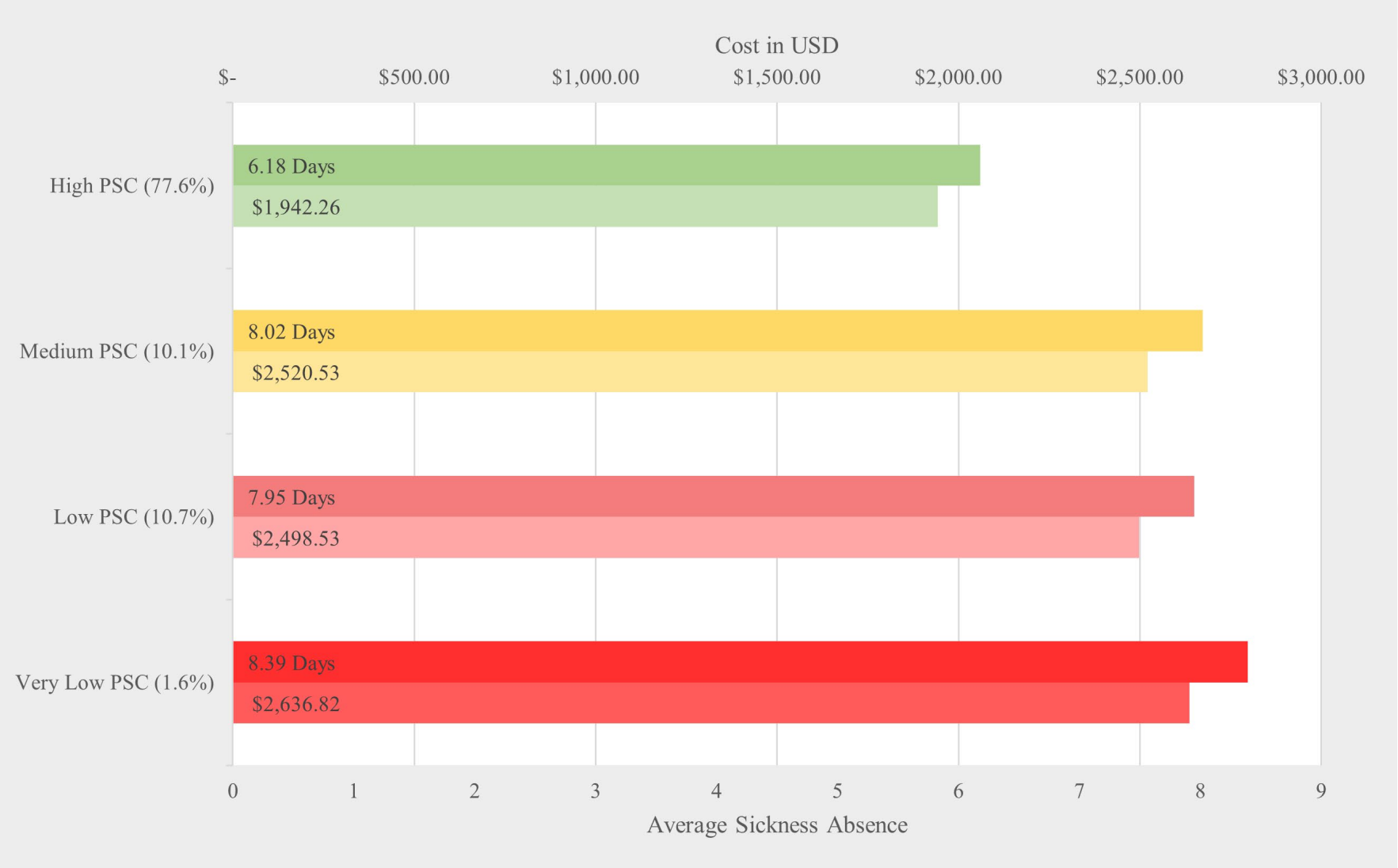
Findings Summary:

Very low PSC environments linked with:

- Higher rate of days lost of sickness absence
- Higher individual cost costs of sickness absence

When PSC was improved, sickness absence reduced by 36%.

A potential saving of USD$ 0.6 million per year.



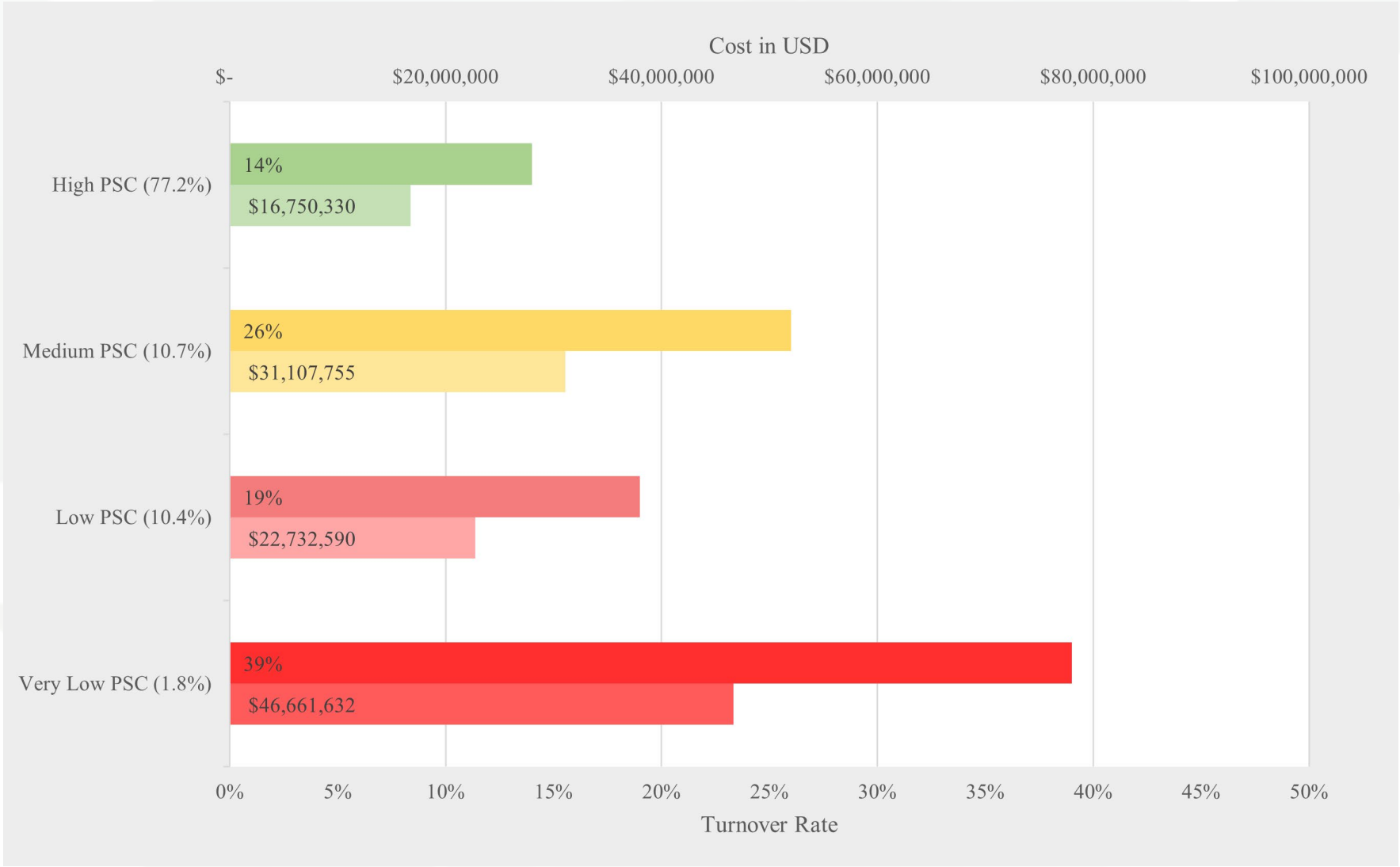
Loh et al., 2024

PSC and Turnover Cost – A Case Study

Findings Summary:

Very low PSC environments linked with:

- Higher rates of turnover
- Higher average cost of turnover



Loh et al., 2024

PSC and New Major Depression Symptoms

Findings Summary:

- Low PSC leads to a **3x increase** in risk for new major depression symptoms within **a year**
- High work engagement may increase long working hours and subsequent major depression symptoms

BMJ Open

Public health
Original research

Predicting new major depression symptoms from long working hours, psychosocial safety climate and work engagement: a population-based cohort study

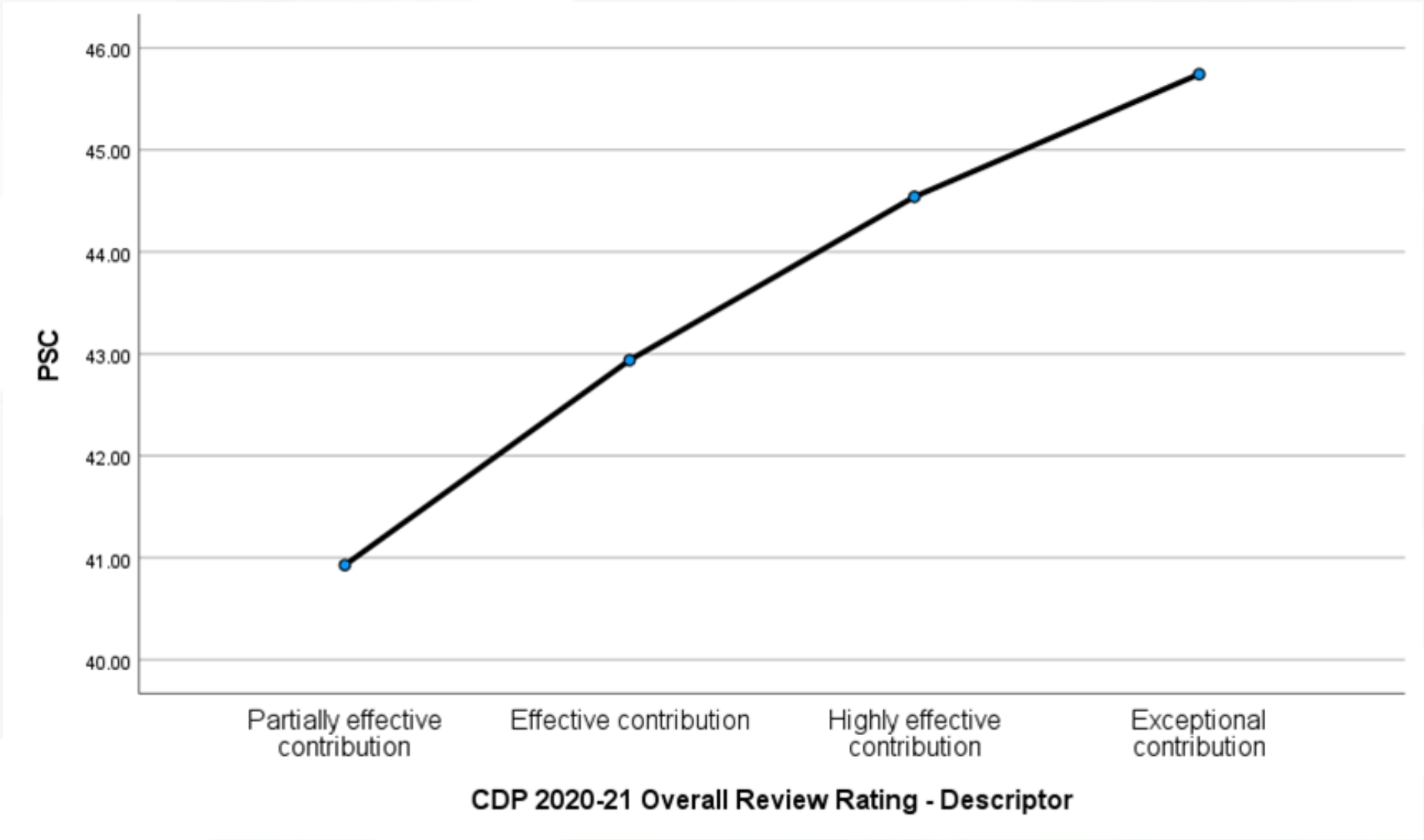
Amy Jane Zadow [1], Maureen F Dollard [1, 2], Christian Dormann [3], Paul Landsbergis [4]

Correspondence to Dr Amy Jane Zadow; amy.zadow@unisa.edu.au

Abstract

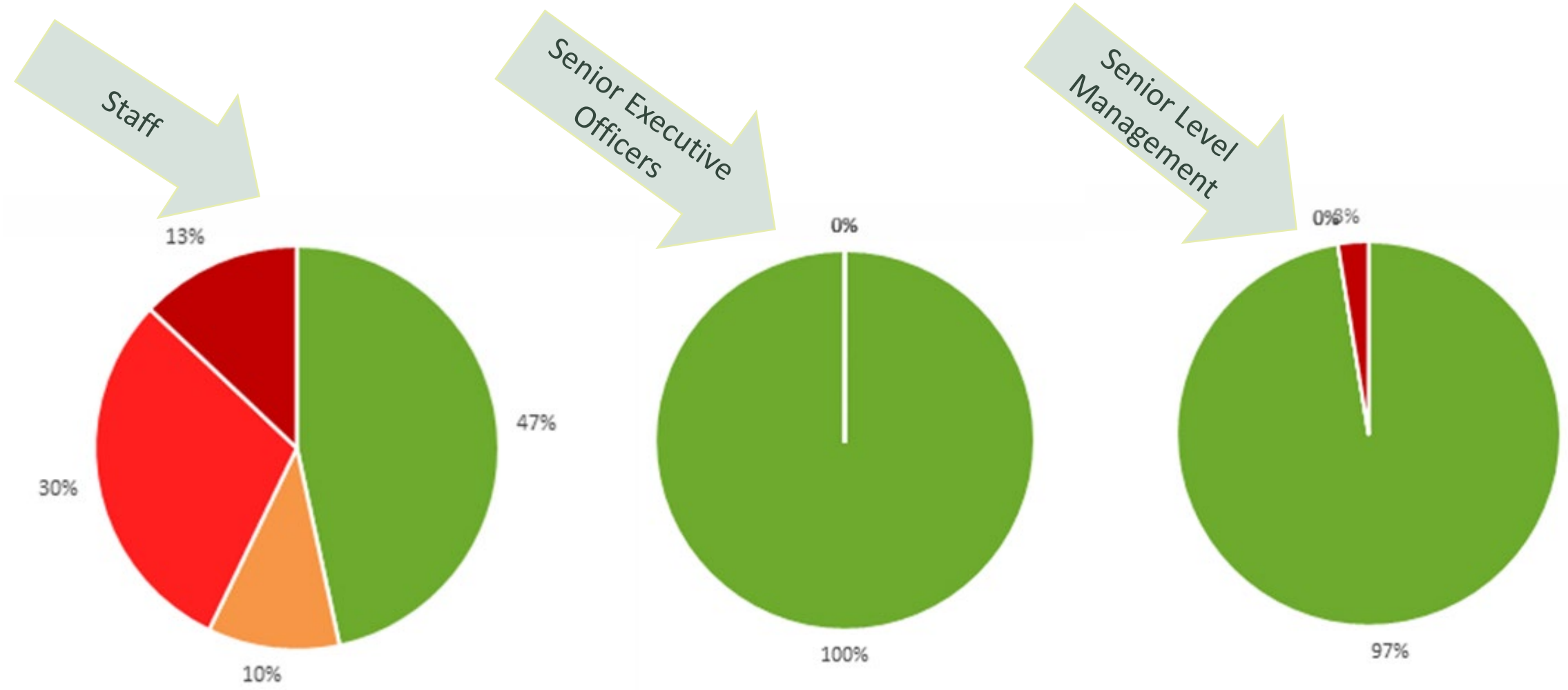
Objectives This study sought to assess the association between long working hours, psychosocial safety climate (PSC), work engagement (WE) and new major depression symptoms emerging over the next 12 months. PSC is the work climate supporting workplace psychological health.

PSC Linked to Supervisor Rating of Performance



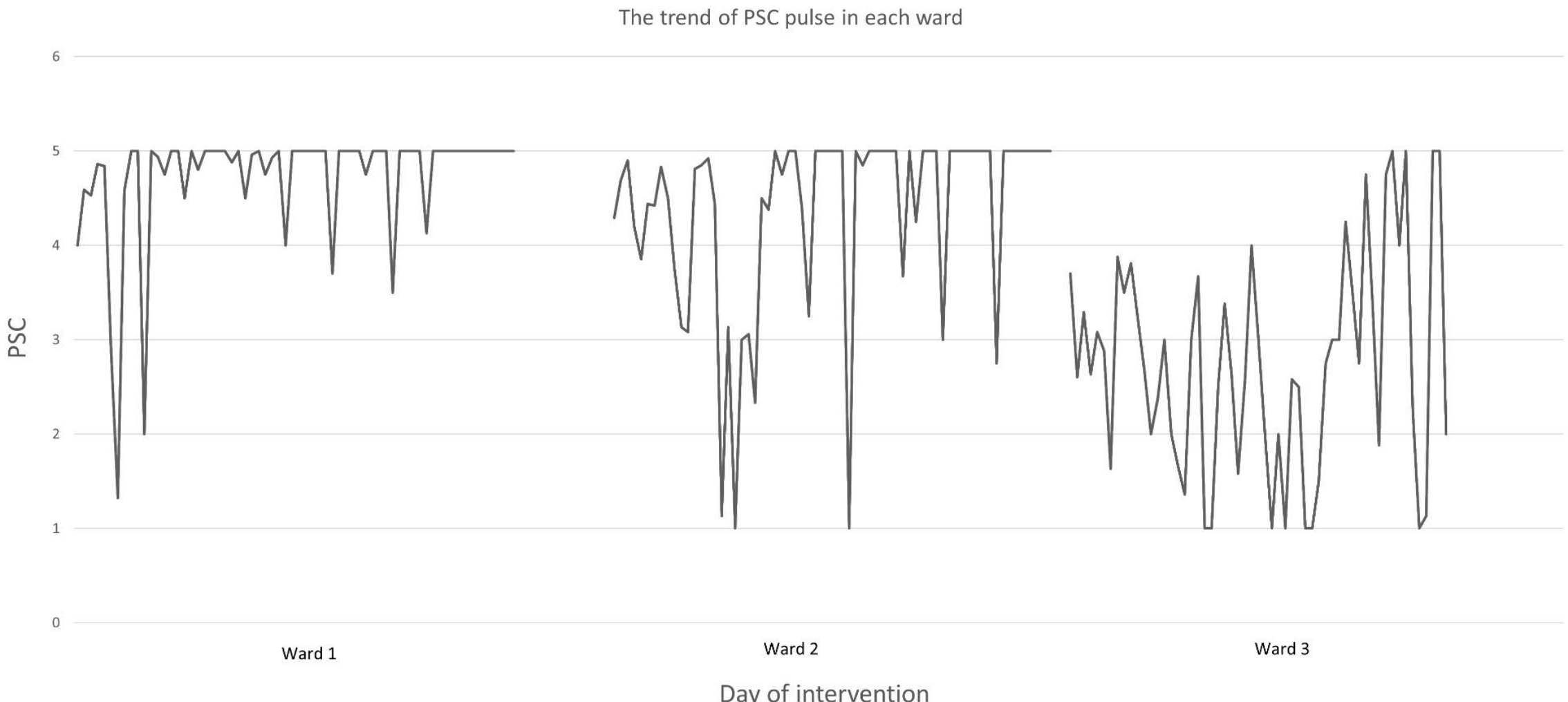
Loh & Dollard, 2022

Leaders and Workers See PSC Differently



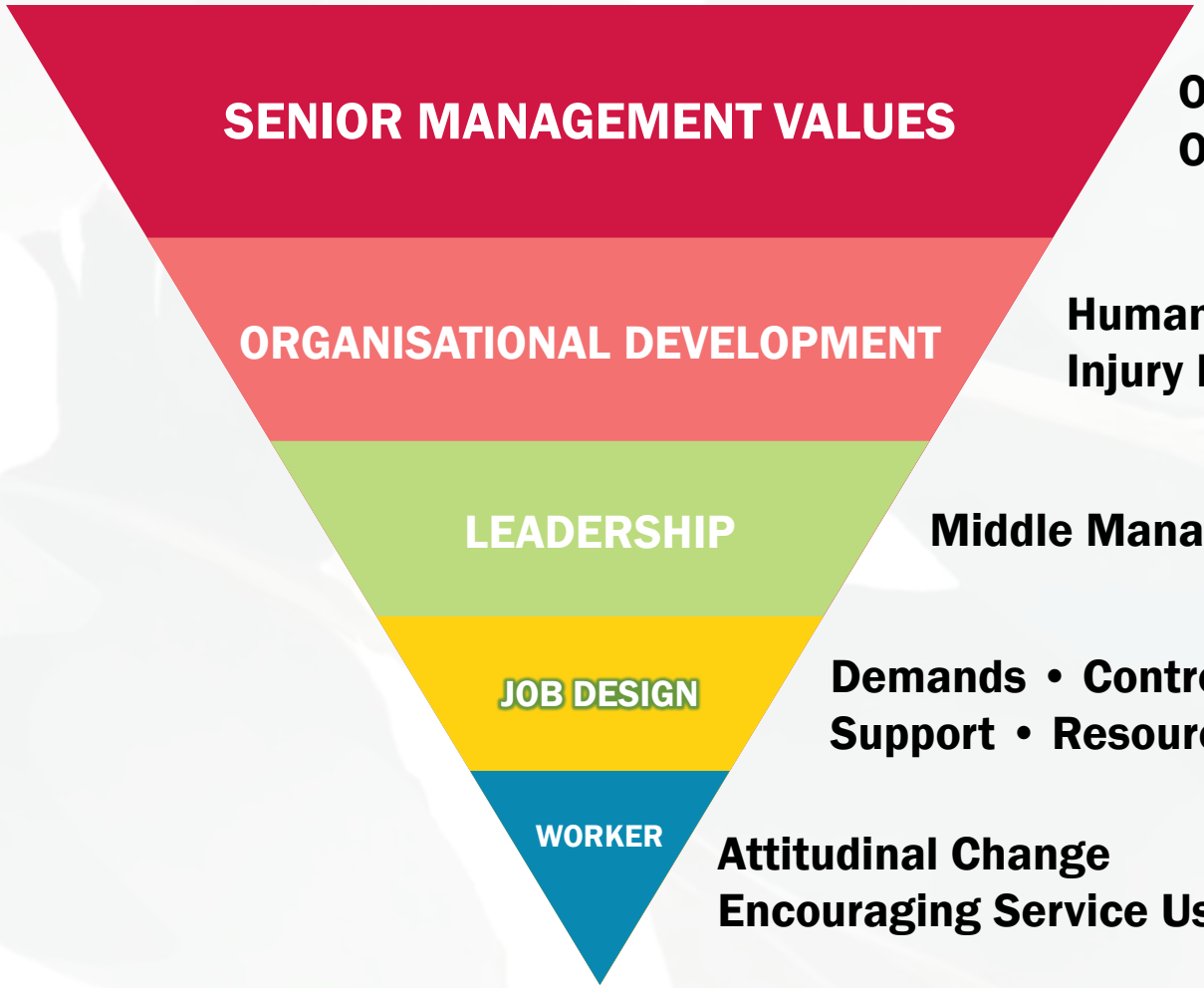
David et al., 2022

Real time monitoring of PSC



How Can We Build PSC?

PSC Tiers of Intervention: Actions at Each Level



Organisational Policy
Organisational Procedure

Human Resource Management • OHS Units
Injury Management • Injury Prevention

Middle Management Implementation

Demands • Controls
Support • Resources

Attitudinal Change
Encouraging Service Use

Dollard, M. F., & Bailey, T. S. (2014). *The Australian workplace barometer: Psychosocial safety climate and working conditions in Australia*. Australian Academic Press.

PSC Tiers of Intervention: Actions at Each Level

SENIOR MANAGEMENT VALUES

- Clear policy on workplace stress management
- Zero tolerance policy for bullying and harassment
- Psychosocial hazard training for senior management
- Clear report reception policies for leaders
- Open discussion on stress and hazards

ORGANISATIONAL DEVELOPMENT

- Induction training on appropriate workplace behaviours
- Employee access to effective risk and hazard reporting systems
- Physical and psychosocial safety OHS officer who monitors
- Regular, team-level psychosocial safety hazard training
- Regular employee surveys with actioned outcomes

LEADERSHIP

- Regular middle manager walk-throughs checking in on employees
- Leadership role models appropriate workplace behaviours
- Management is trained in identifying and responding to psychosocial hazards, bullying and harassment
- Regular supervision or debrief meetings between employees and line managers

JOB DESIGN

- Adequate resourcing for employees to do their job well
- Adequate staffing to spread the workload to a reasonable level
- Team-level promotion of equity and discouraging excessive competition
- Reward systems to make people feel valued and recognised
- Employees have work flexibility/job control

WORKER

- Employee Assistance Program (EAP) awareness and promotion
- Correct use of risk and hazard reporting systems
- Appropriate employee behaviour and not engaging in bullying or harassment
- Positive work culture contributions from employees

Dollard, M. F., & Bailey, T. S. (2014). *The Australian workplace barometer : Psychosocial safety climate and working conditions in Australia*. Australian Academic Press.

Example - Radical Organisational Change

Findings Summary:

- 4-day working week (paid 5) NZ study → PSC increased
- PSC results were significant and high at the end of the trial

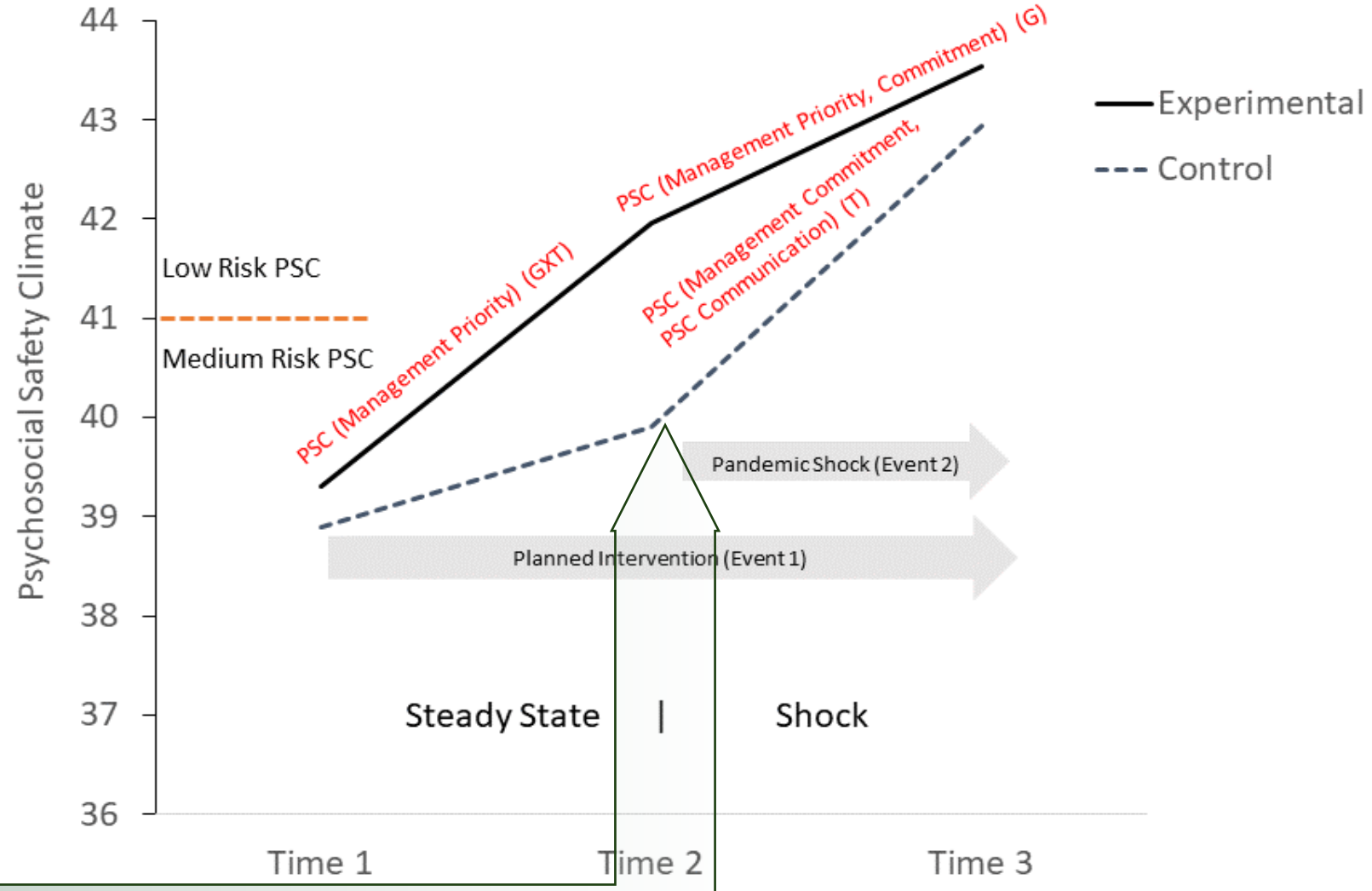
Two types were selected: (1) *Perceived Organizational Support* (**POS**) which reflects the way an employee see's their organisation caring about their wellbeing. A high score reflects strong perceptions. There is a host of data showing this construct heavily influences employee job outcomes (satisfaction, commitment, performance, retention), and some effect on wellbeing. (2) *Psychosocial Safety Climate* (**PSC**) reflects worker perceptions of the way their organisation cares for their psychological health and safety, and is related to psychological wellbeing and engagement.

Expectation? We would expect employees to report higher perceptions due to the focus of the 4-day trial.

Term	Pre-Test score[a]	Post-Test score[a]	Sig Difference?
POS	3.78	3.91	Yes (p=.01)
PSC	3.53	3.72	Yes (p=.01)
[a] = scoring range is 1 (low) to 5 (high). Midpoint is 3.0.			
The findings provide support for an increase in these perceptions across the trial. While statistically significant, the increases are modest. However, this *might* reflect that these perceptions had already begun to be influenced (increased) around notification of the trial. That seems quite feasible to me.			
In comparison to other NZ data (especially POS) the usual range would be around 3.3 to 3.6 – so your starting point (3.78) was very high to begin with! The score of 3.91 post-trial reflects a great positive perception by employees! The score for PSC again is quite high (by international comparison) at pre-trial and the growth post-trial is significant and high. In summary, employees really think PG cares about their wellbeing and their psychological health and safety.			

Haar, J. (2018), Overview of the Perpetual Guardian 4-day (paid 5) Work Trial. Auckland University of Technology.

Example - Building PSC Through Intervention



PSC can change through intervention

Dollard, M. F., & Bailey, T. (2021). Building psychosocial safety climate in turbulent times: The case of COVID-19. Journal of Applied Psychology, 106(7), 951.

Key Processes We Used for Improving PSC

- Capacity Building
- Assessment + Benchmarking
- Mentoring and Coaching
- Shared experience - Community of Practice
- Action Plans

How We Built PSC – Action Plan Example

What is the issue? Psychological Psychosocial Wellbeing	Which area/s would be influenced the most? Management Priority Management Commitment Organisational Communication Organisational	Priorities (1 = highest priority)	How do you currently manage the issue?	Why address this area?	Action Details	Who is responsible for the action/s?	Action Steps (SMART objectives)	Comments
Example… *There's a disconnect between staff and leader perceptions and staff are unsure leaders know what the issues are*	*Management priority Management commitment Organisational communication*	*1*	*We raise issues individually and directly to our managers*	*We would feel more heard and our perceptions of what is going on will be more aligned*	*Increase discussions regarding psychological & psychosocial safety between staff & leaders by adding PSC discussion point to every team meeting agenda*	*Staff Leaders HR WHS*	*1) Contact manager to advise this is an action to be implemented (**person/s responsible**)* *2) Contact admin to include PSC discussion on agenda with WHS (**person/s responsible**)* *3) Advise all staff before the first meeting that this will be discussed (**person/s responsible**)* *4) Lead the meeting discussion on PSC to open communications (**person/s responsible**)* *5) Adjust and record conversation points and reconnect as an AG to discuss barriers and opportunties (**All AG members**)*	***20/4/22:** Contacts made and next AG meeting scheduled to discuss outcomes*

Client Organisation Provided Information

PSC Report Card: Wave 3

ORG NAME

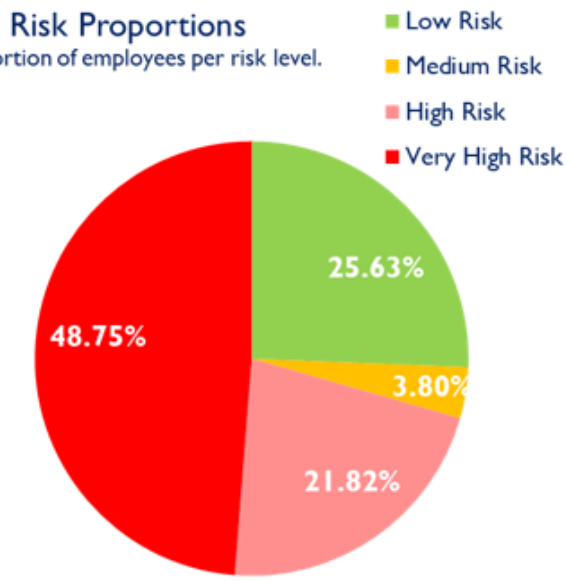
PSC Global Observatory · Australian Government · Australian Research Council · University of South Australia · Centre for Workplace Excellence

PSC Risk Levels
Burnout
Engagement
Scorecard

PSC Risk Levels

Action Needed (Overall PSC Score: 29.81)
High Risk

PSC Risk Proportions
Proportion of employees per risk level.



PSC refers to the workplace climate for employee psychological health. The PSC-12 is scored ranging from 12 to 60. PSC benchmarks indicate risk levels for future job strain and depression. An organisational PSC score falling in the very high risk category indicates the urgent need for intervention to prevent serious and escalating psychological health problems and psychosocial problems at work (increased conflict, bullying, reduced productivity).

For ORG NAME, **78** employees completed the survey. **25.63%** of employees have a PSC risk score in the low risk range, and the average score of all employees is **29.81 (high risk)**.

70.57% employees are in either a **high** or **very high risk** category. Overall, this result suggests employees within ORG NAME are *on average* at **High Risk** of future strain and symptoms of depression. Without intervention, PSC levels may reach a **very high risk** level.

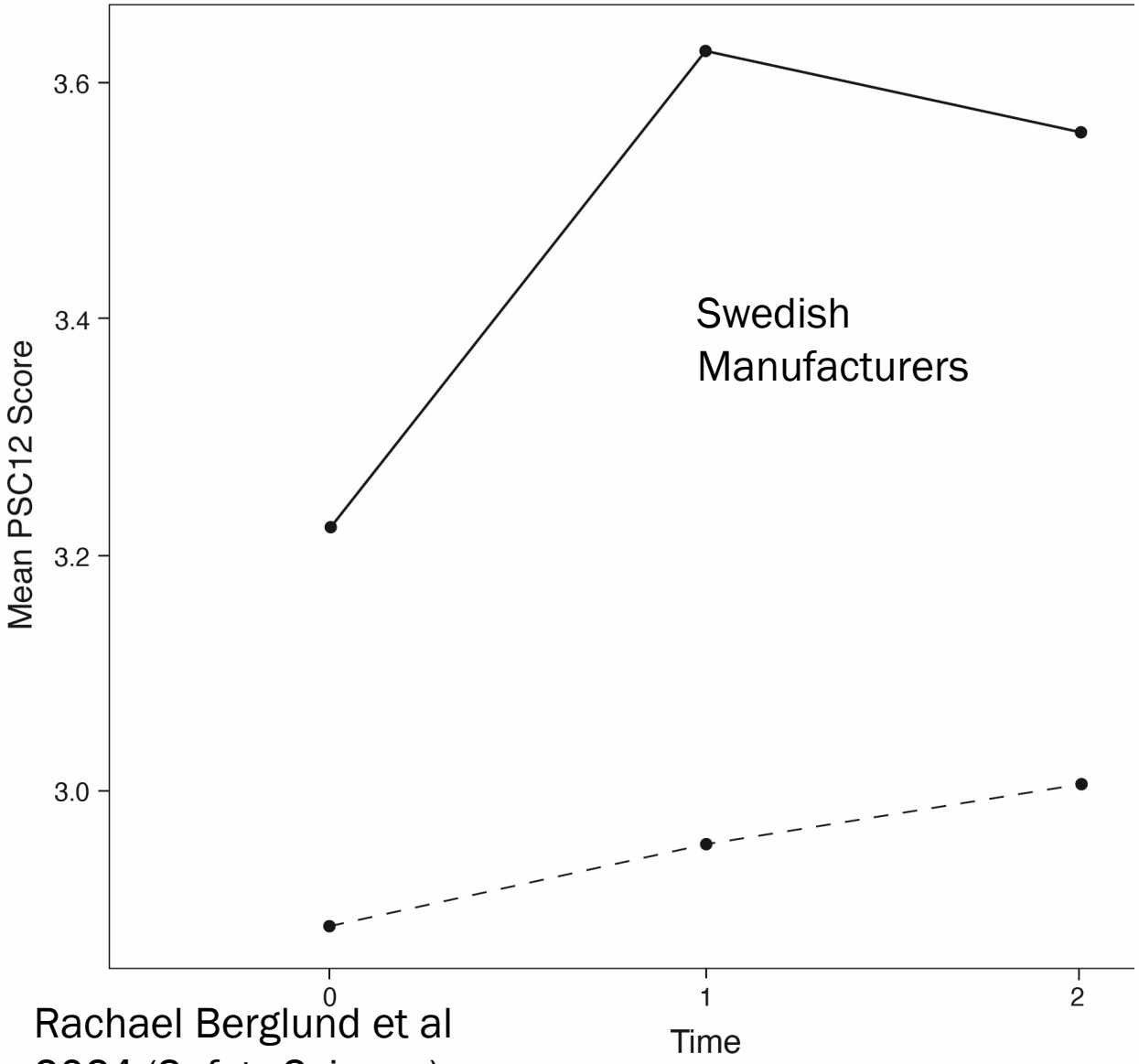
The PSC Risk Scale

Low Risk
≥ 41
Performing well, but improvements in PSC levels might still be required.

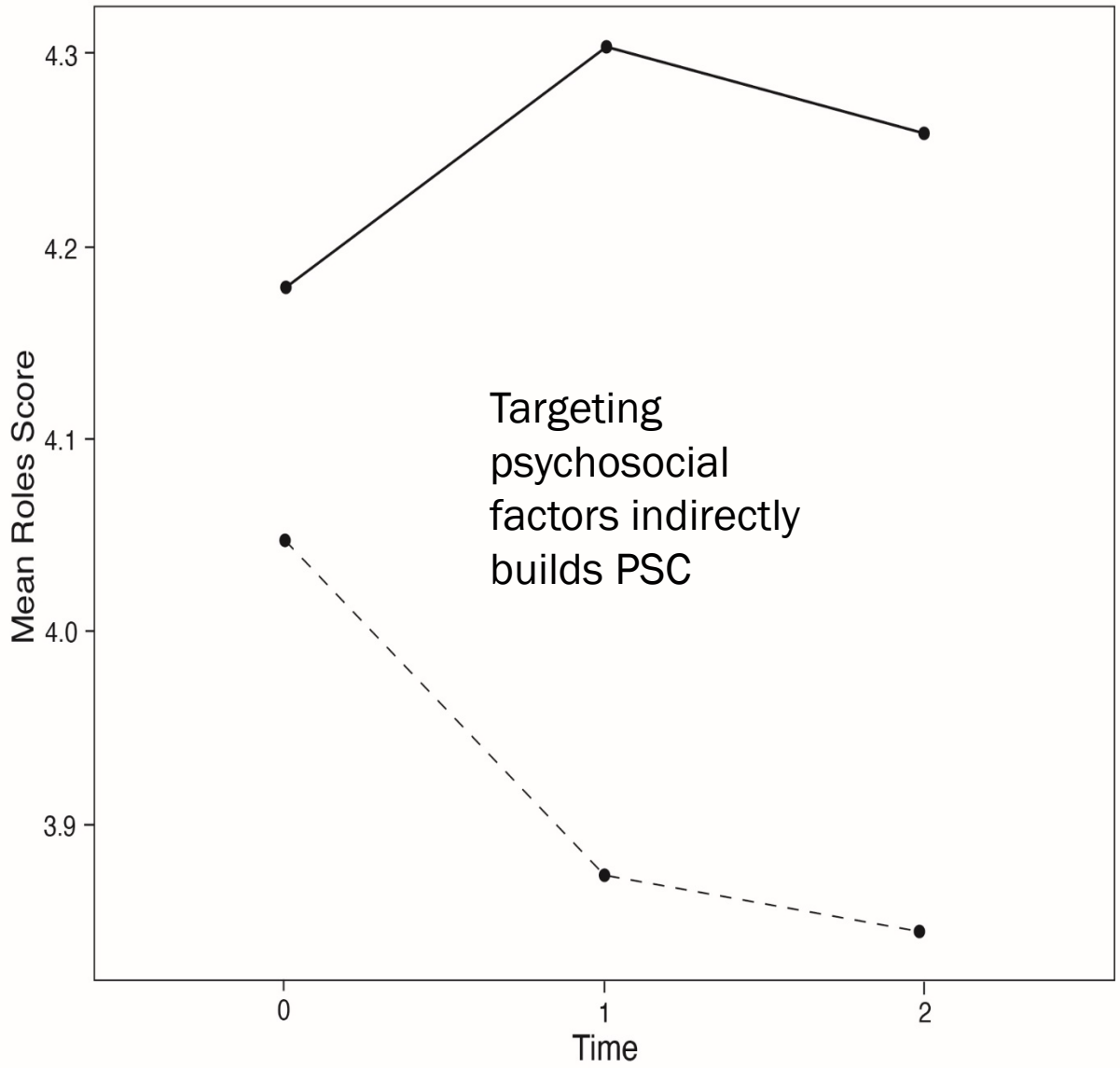
Medium Risk
< 41 and > 37
Improvements can be made in the implementation of PSC principles.

High Risk
≤ 37 and > 26
High risk of job strain. Staff health and productivity

maureen.dollard@unisa.edu.au

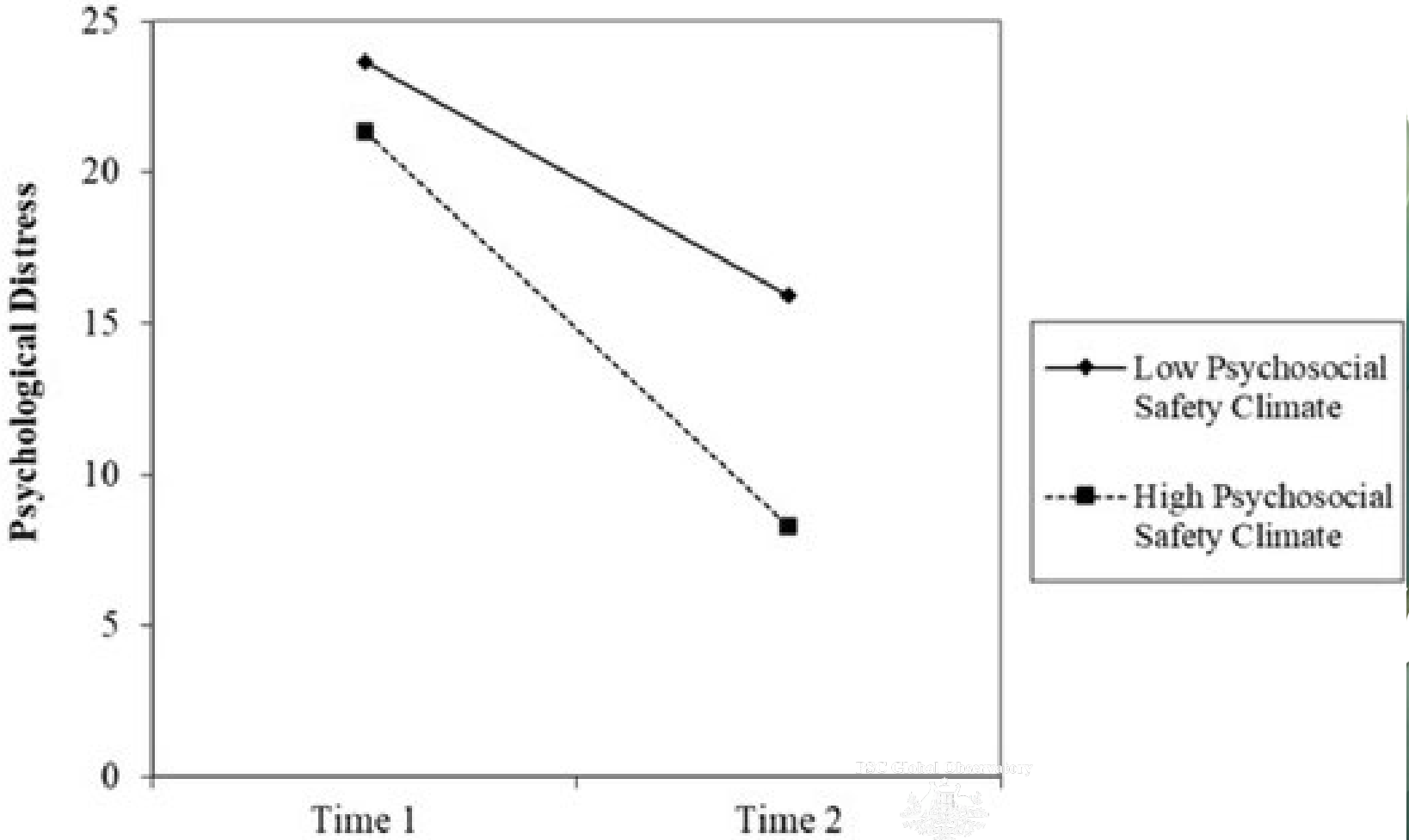


Rachael Berglund et al 2024 (Safety Science)



Efficacy of EAP Interventions

Significant reduction in psychological distress due to the EAP (individual effect) → particularly at high levels of PSC (organisational effect).



Bouzikos, S., Afsharian, A., Dollard, M., & Brecht, O. (2022). Contextualising the Effectiveness of an Employee Assistance Program Intervention on Psychological Health: The Role of Corporate Climate. *International Journal of Environmental Research and Public Health*, *19*(9), 5067.

Why Is Measuring PSC Important?

- Address legal obligations (WA adopted Model Act and under the ILO Fundamental Human Rights for Healthy and Safe Work (2022)).
- PSC levels can provide information on future risk of stressful work conditions on psychological health.
- PSC can be used to assess, benchmark, mitigate, evaluate and improve systems of safe work for psychological health.
- Good for business – more productivity and engagement = less sickness absence, less turnover and workers compensation claims.
- Provides an evidence base for policy and practice changes.
- Provides a return on investment for organisations.

Implications

- PSC is an evidence based **leading indicator** and risk factor, best target for stress prevention/intervention (top management support, all levels involved etc).
- It is the root cause or ‘causes of the causes’ of work stress
- Focus on building PSC as a first point of intervention/organisational change/ any technological innovation
- Improving PSC can lead to improvements in psychological health and productivity
- PSC should be a KPI for strategic ethical management
- Workplace injuries or worker health should be contextualised by PSC
- Need safe and better feedback systems

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Implications

- Practical tool for use by employers, workers, unions, in organisations, nationally and internationally
- PSC can be used to evaluate the implementation of new psychosocial regulations
- Workers compensation—need to look at PSC, occupational physicians and GPs should assess PSC for any presenting worker
- PSC is an evidence based risk predictive of future hazards and health effects needs to be monitored and evaluated as much as the orthodox psychosocial risks (e.g., job demands, control, bullying).

Thank you!

Contact Us

PSC Global Observatory

Australian Government
Australian Research Council

University of South Australia

Centre for Workplace Excellence

Psychosocial Safety Climate Global Observatory

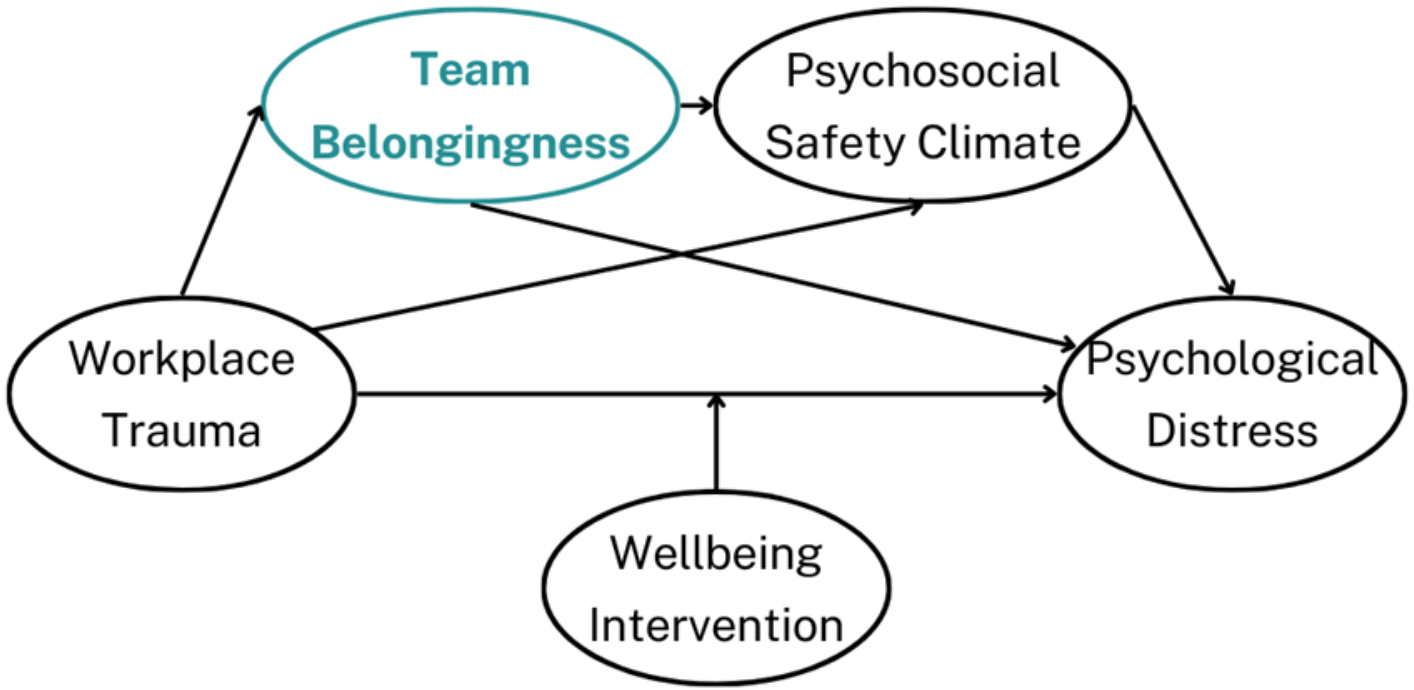
stresscafe.net

Maureen.dollard@unisa.edu.au

The role of team belongingness in shaping mental health for fly-in/fly-out workers on remote mine sites

Dr Aglae Hernandez Grande
Dr Fleur Sharafizad
Dr Hossein Ali Abadi
Dr Esme Franken
Professor Ben Farr-Wharton

Based on our first responder organisation study



(Hernandez Grande et al., 2024)

Background

1. **30% of Australian mining workers** were found to experience **‘high’** or **‘very high’ psychological distress** (MARS Program Landmark Study, 2023).

2. Individuals in the mining sector have a **significantly higher suicide rate** (25 per 100 000 population) than the Australian population (12.3 per 100 000).

Research Aim

Explore how team belongingness can shape mental health and wellbeing in a FIFO context.

Methods

Context

- **Remote mine** site in Goldfields
- Site under **construction**
- About 1,000 workers on site
- Sample includes **client** employees and **business partners** (contractors)

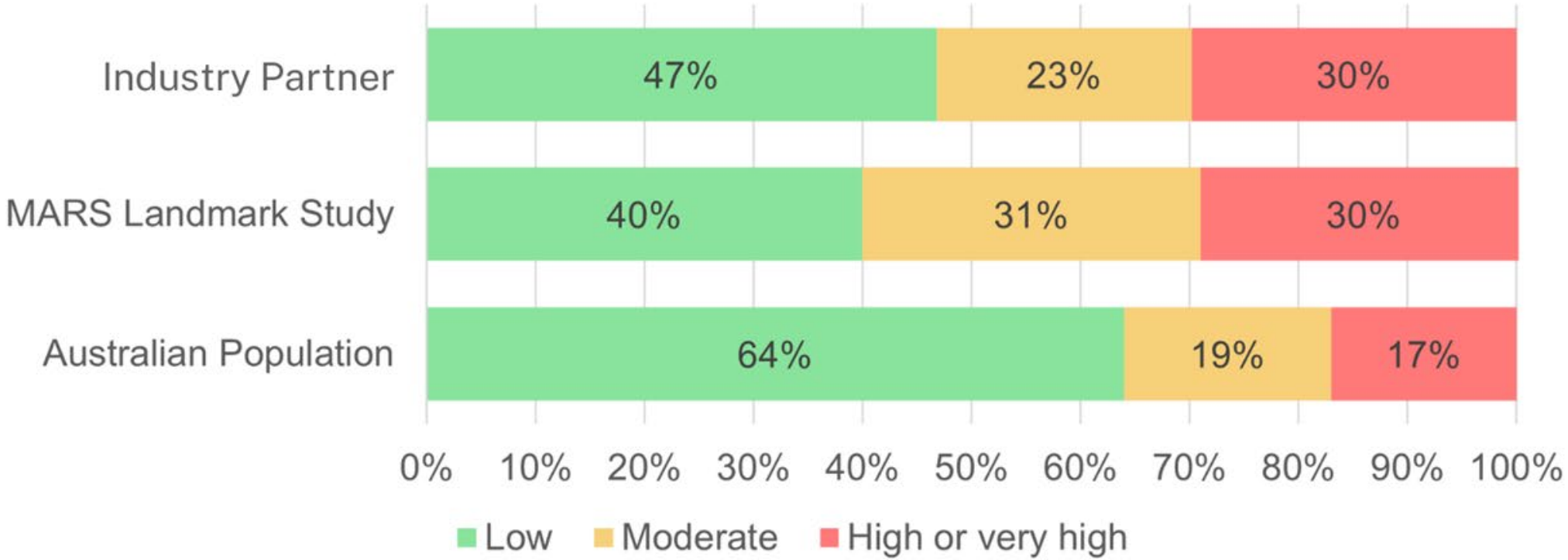
Quantitative

- 72 surveys
- March 26, 2024 - April 26, 2024

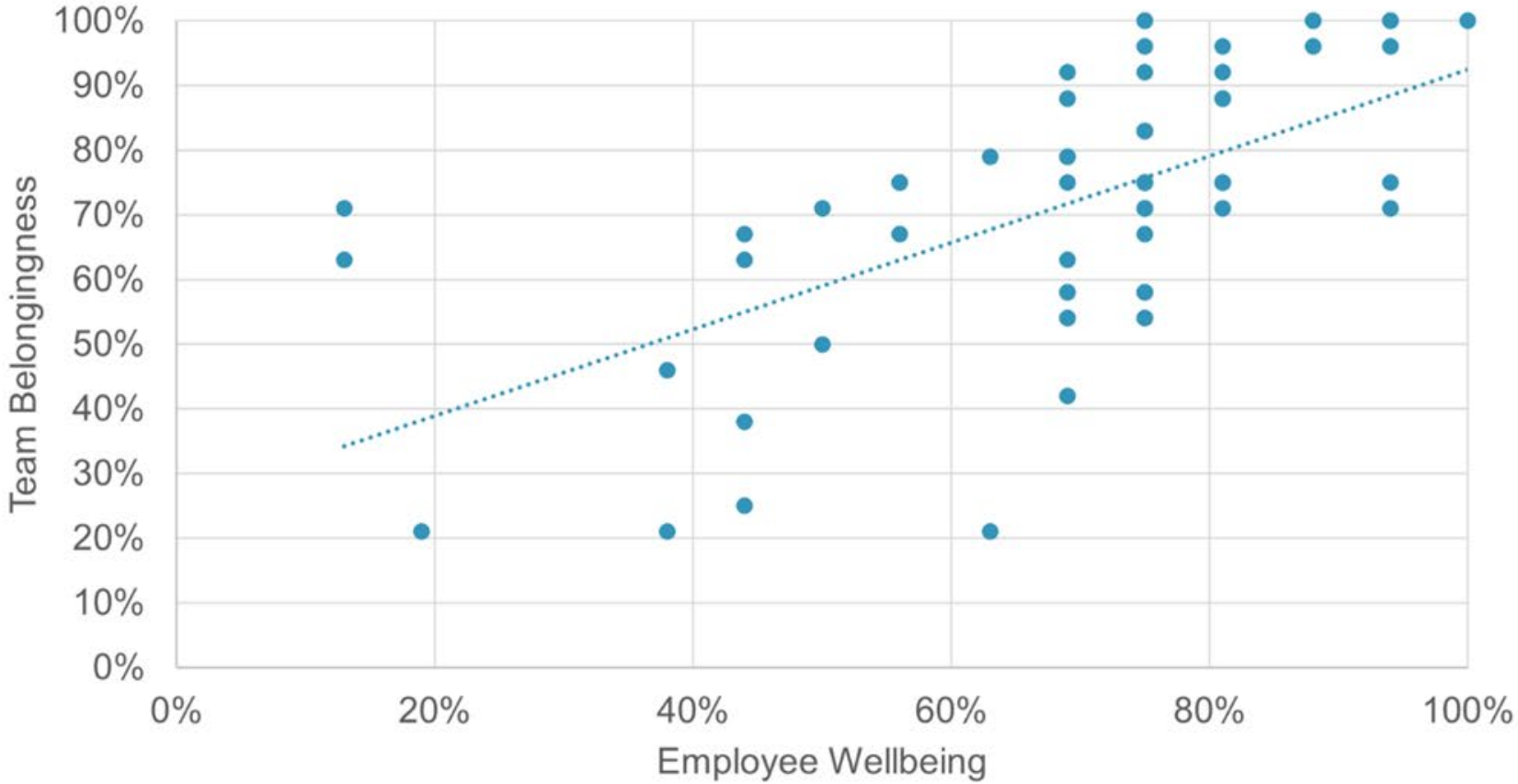
Qualitative

- 53 face-to-face interviews
- April 2 - April 6, 2024

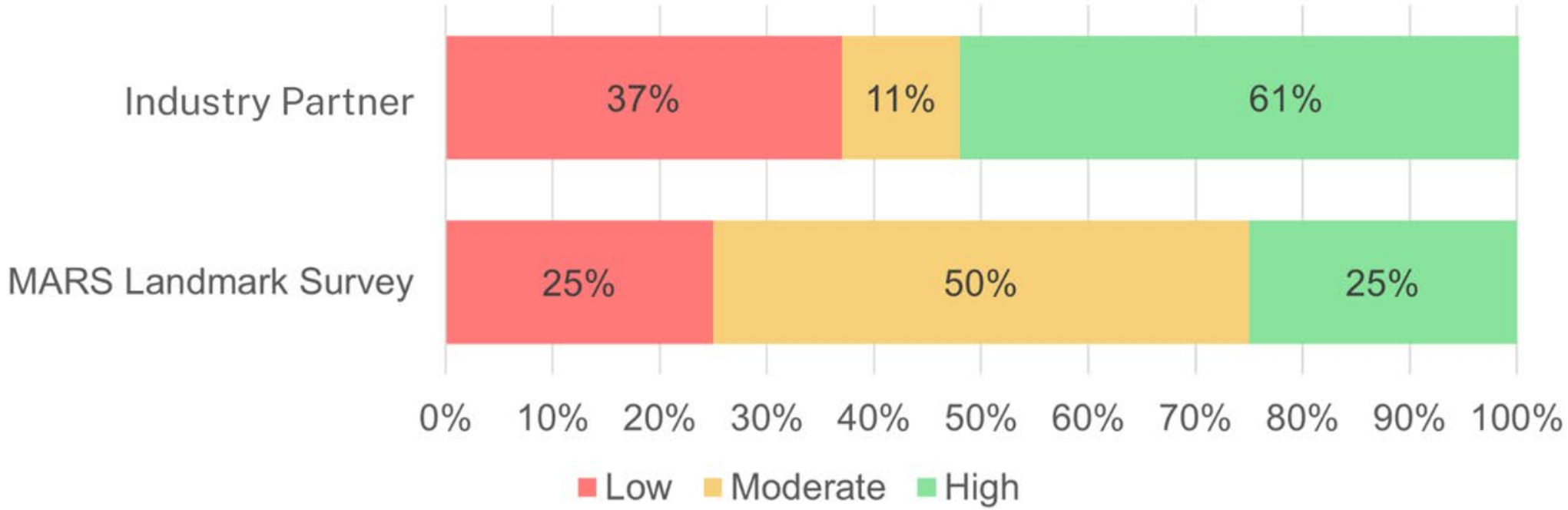
Psychological Distress



Team Belongingness and Employee Wellbeing



Psychosocial Safety Climate



Wellbeing Indicators

Section 2.
Client Employees vs Business Partners

Qualitative Results

Team Belongingness

- *Family on site*
- *Someone to talk to*
- *Shared experiences*
- *Humour and banter*
- *Wellbeing*

Barriers

- *Personal differences*
- *Work design (physical isolation)*
- *Focus on personal goals*
- *Privacy*
- *Work vs personal life*

Wellbeing

- *Enhanced resilience*
- *Job engagement*
- *Reduced sense of isolation*
- *Feeling more productive*
- *Mental health support*

Activities to build team belongingness

Qualitative Results

1. *Collective fitness classes.*
2. *Activities, such as ‘paint and sip’.*
3. *Christmas or other special day celebrations on- and off-site.*
4. *Provision of a venue where colleagues can spend time together outside of work hours.*

Key Findings

30% of respondents reported high or very high psychological distress, in line with the industry scores, but significantly higher than the Australian population (17%).

Team belongingness is **positively associated** with **employee wellbeing.**

Team belongingness supports employee wellbeing through shared experiences, humour, and a sense of "**being in it together**".

Client employees reported **better wellbeing scores** than **business partners.**

Team belongingness was **72% on average**. However, there was a significant difference between **client employees (82%)** and **business partners (59%).**

Team belongingness **enhances resilience**, **engagement**, **productivity**, and **mental health** while **reducing isolation**.

Industry Takeaways

Psychological assistance programs
Organisations should ensure that everyone working with them are aware of these.

Support team belongingness
Develop belongingness initiatives in the village, including a communal area that is open 24h.

Supervisors training and development
Provide ongoing training and development in interpersonal skills for managers/supervisors.

Wellbeing support for business partners
Gather business partners' input to build more support structures for business partners.

Yeah, we're pretty good at supporting each other. We've all got a similar mindset, I think. We're all away from our friends and our family, so we just want to make sure we're looking after each other and having a good time. We're all kind of sharing that experience, being away from everyone ...

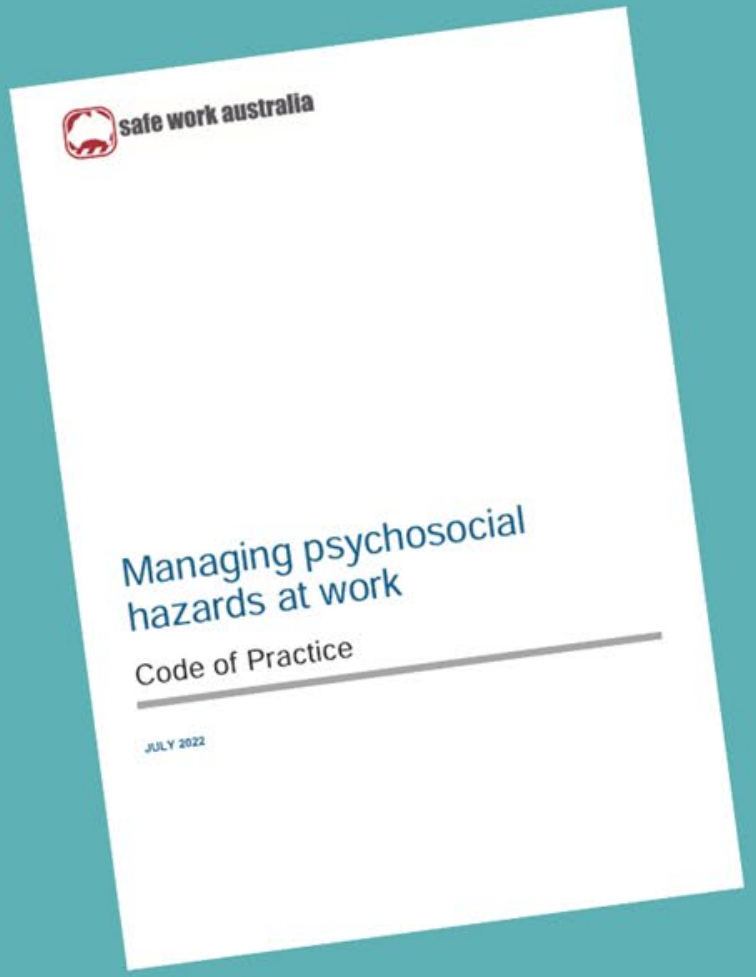
Mr Hayden Spencer

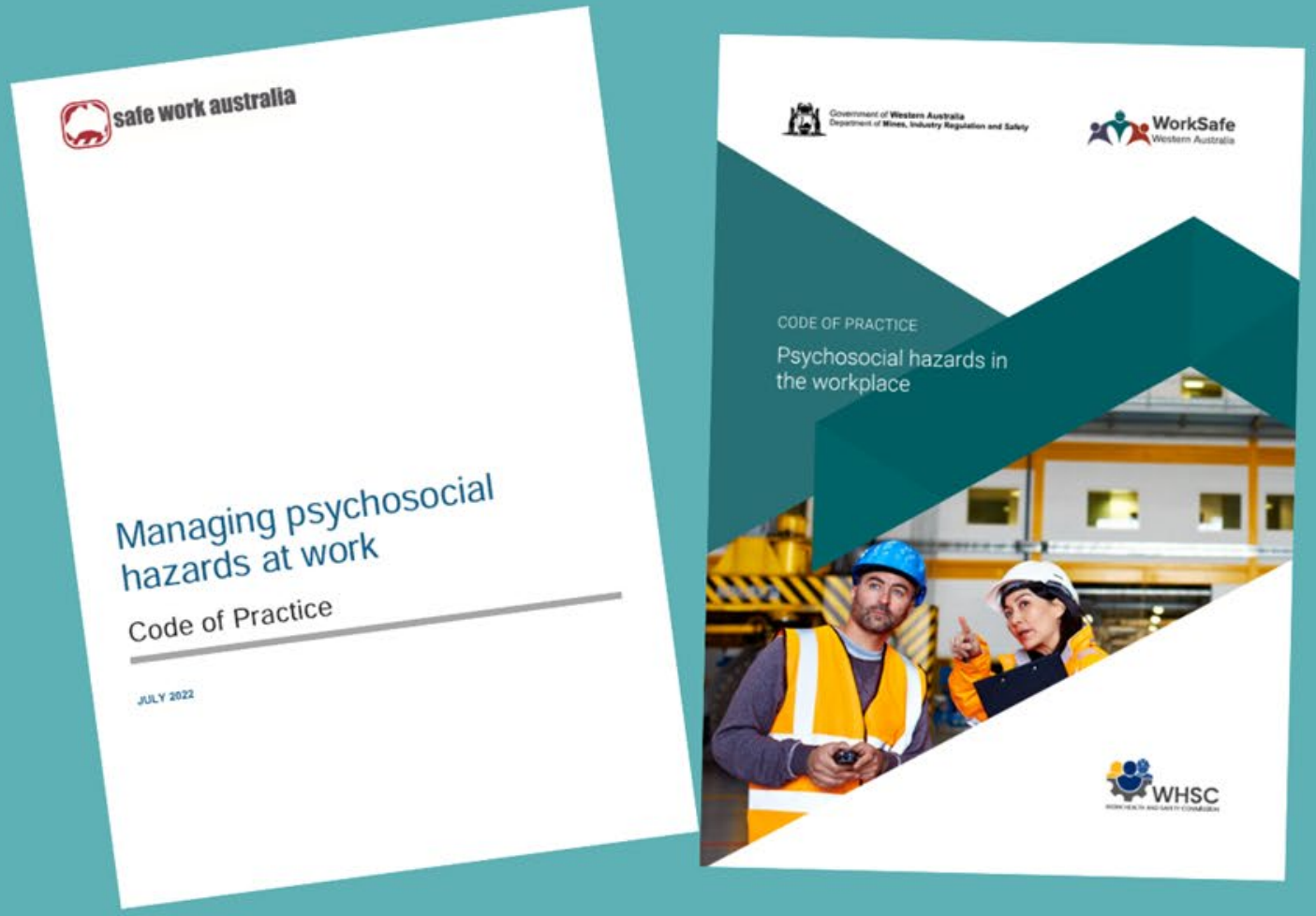
Health & Safety Manager
Liontown Resources Ltd

The Better Together Platform: MARS Workplace Barometer

A toolkit for collecting data, benchmarking results, and offering recommendations for wellbeing improvement within the mining industry.

Dr Aglae Hernandez Grande
Dr Fleur Sharafizad


safe work australia
Managing psychosocial hazards at work
Code of Practice
JULY 2022


safe work australia
Managing psychosocial hazards at work
Code of Practice
JULY 2022
Government of Western Australia
Department of Mines, Industry Regulation and Safety
WorkSafe
Western Australia
CODE OF PRACTICE
Psychosocial hazards in the workplace
WHSC


safe work australia
Managing psychosocial hazards at work
Code of Practice
JULY 2022
Government of Western Australia
Department of Mines, Industry Regulation and Safety
WorkSafe
Western Australia
CODE OF PRACTICE
Psychosocial hazards in the workplace
WHSC
Government of Western Australia
Department of Mines, Industry Regulation and Safety
CODE OF PRACTICE
Mentally healthy workplaces for fly-in fly-out (FIFO) workers in the resources and construction sectors
COSH
MIAC

An organisation must **eliminate psychosocial risks in the workplace**, or if that is not reasonably practicable, minimise these risks so far as is reasonably practicable.

- Safe Work Australia, July 2022

About us

Aglae and Fleur with the drilling jumbo at a mine site.

Team belongingness applied to mining

OUR LEARNINGS

- Survey fatigue
- Fast paced environment
- Psychosocial hazards regulations
- Wanting to do better
- Resources available
- Interested in benchmarking data

Our aim

Develop an online automated tool for mine sites to:

Identify psychosocial hazards on site.

Benchmark results against industry

Provide resources to mitigate/eliminate hazards.

Co-designed with industry

15 Interviews with stakeholders from the WA mining industry

What has industry asked for?

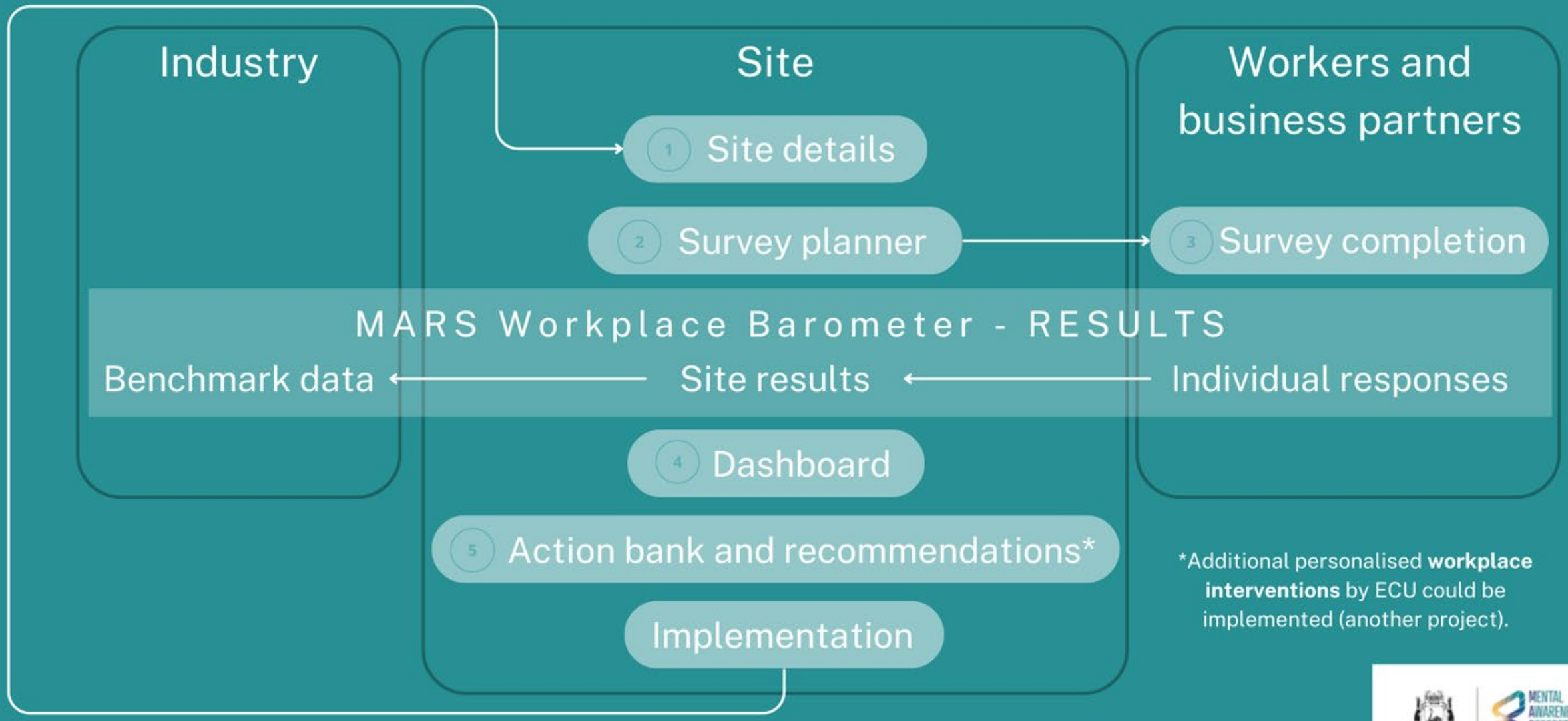
- Easy to set up
- Some level of personalisation
- Short surveys (less than 10 minutes)
- Easy to understand
- User-friendly

- Alignment with the Codes of Practice
- Managed at the site level
- Drill down to team level
- Benchmarking data
- Not just a barometer but also an action bank

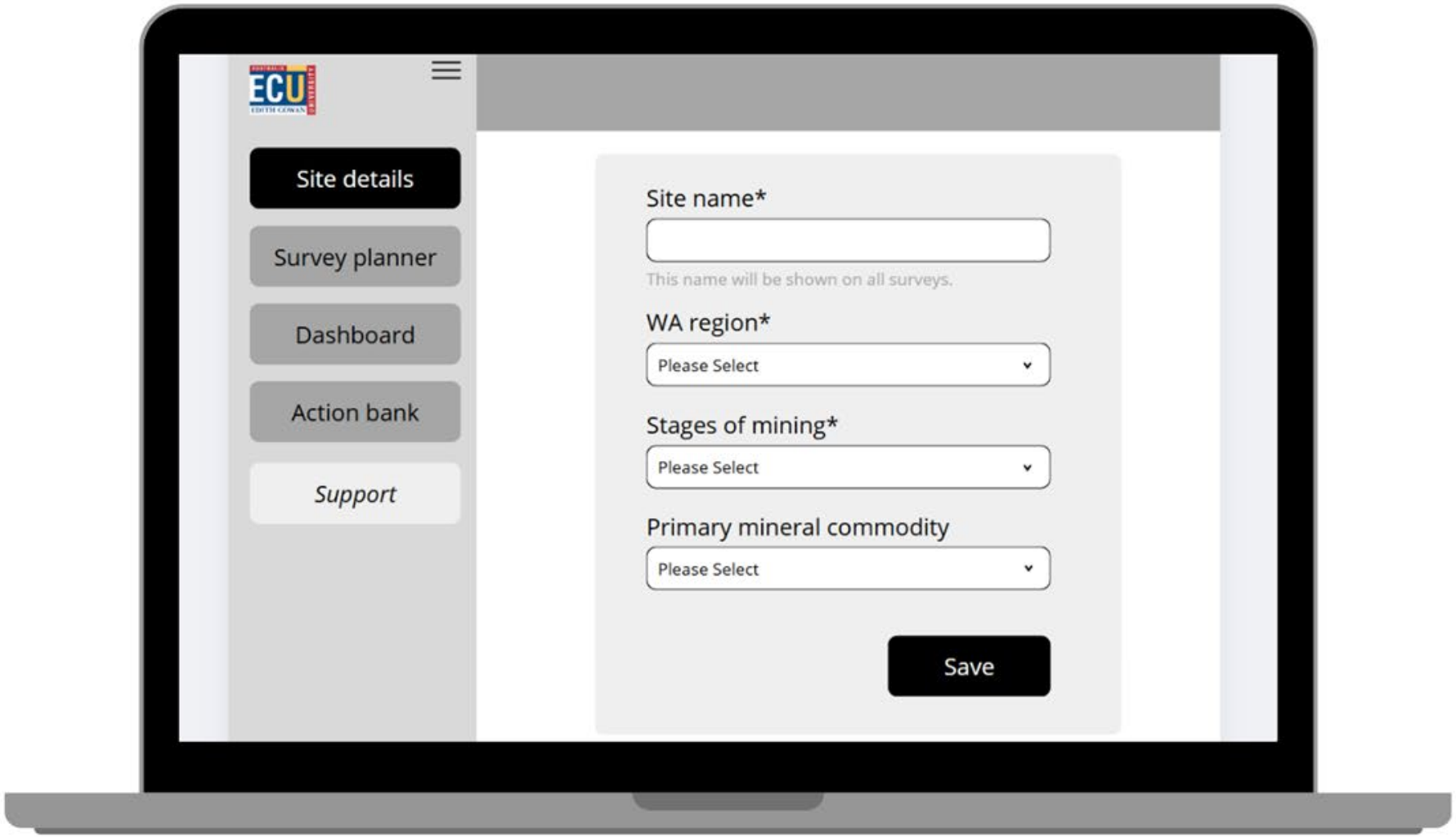
Big organisations have big budgets to conduct workforce surveys. Our organisation doesn't and this tool would be a perfect way [...] to help us keep our teams safe on site.

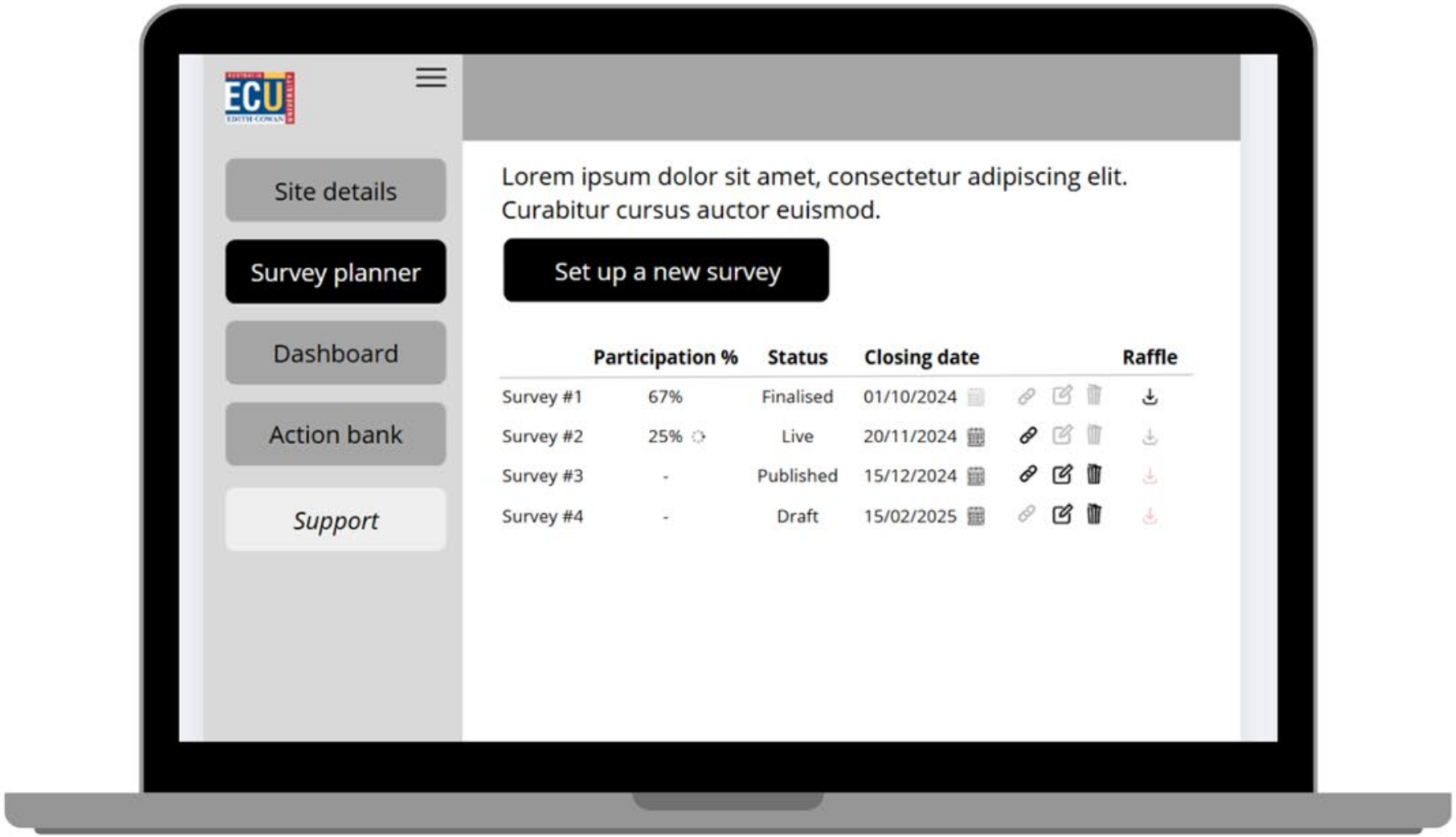
Designed for

The Better Together Platform



*Additional personalised **workplace interventions** by ECU could be implemented (another project).


Site details
Survey planner
Dashboard
Action bank
Support
Site name*
This name will be shown on all surveys.
WA region*
Please Select
Stages of mining*
Please Select
Primary mineral commodity
Please Select
Save


Site details
Survey planner
Dashboard
Action bank
Support
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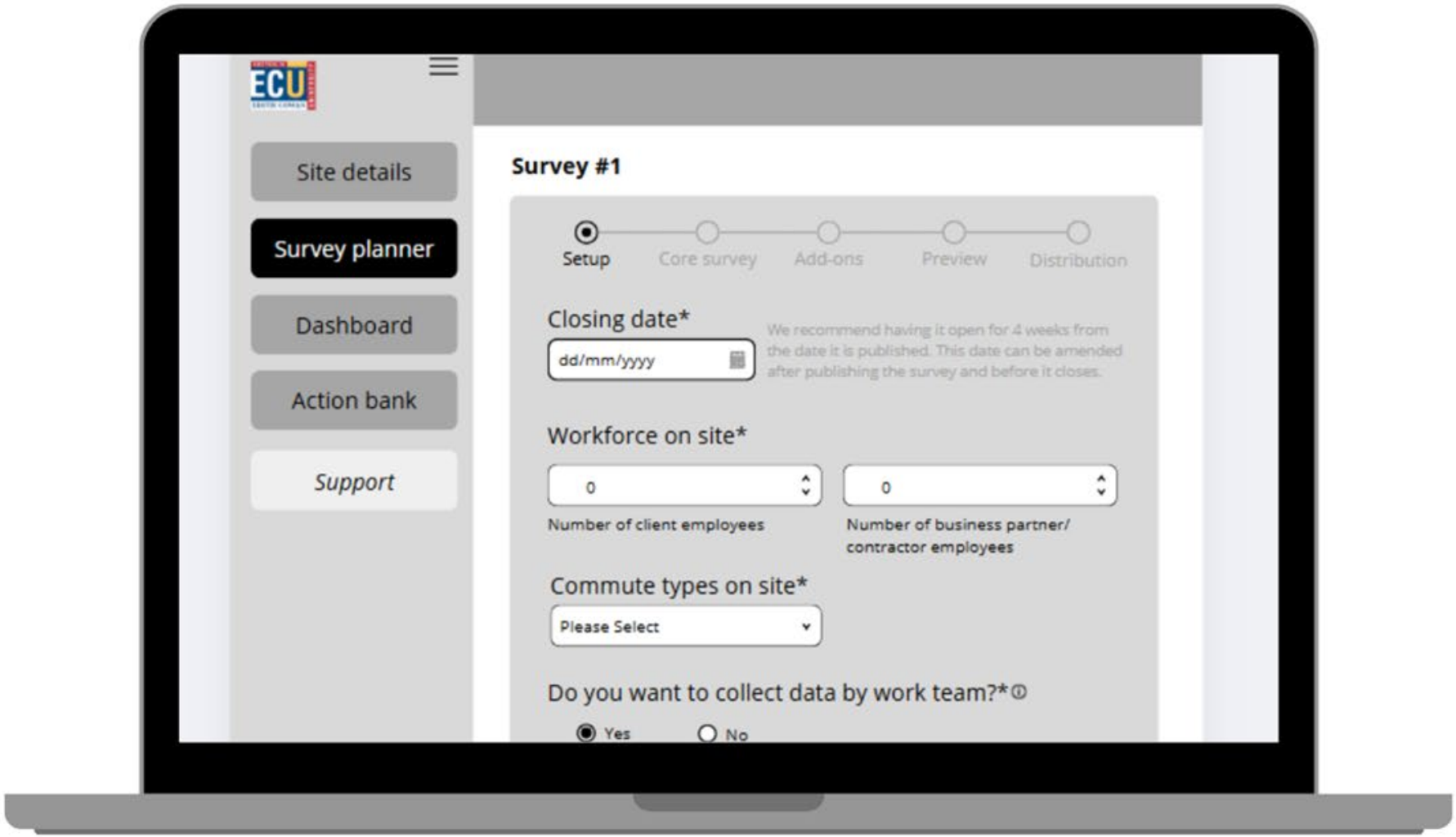
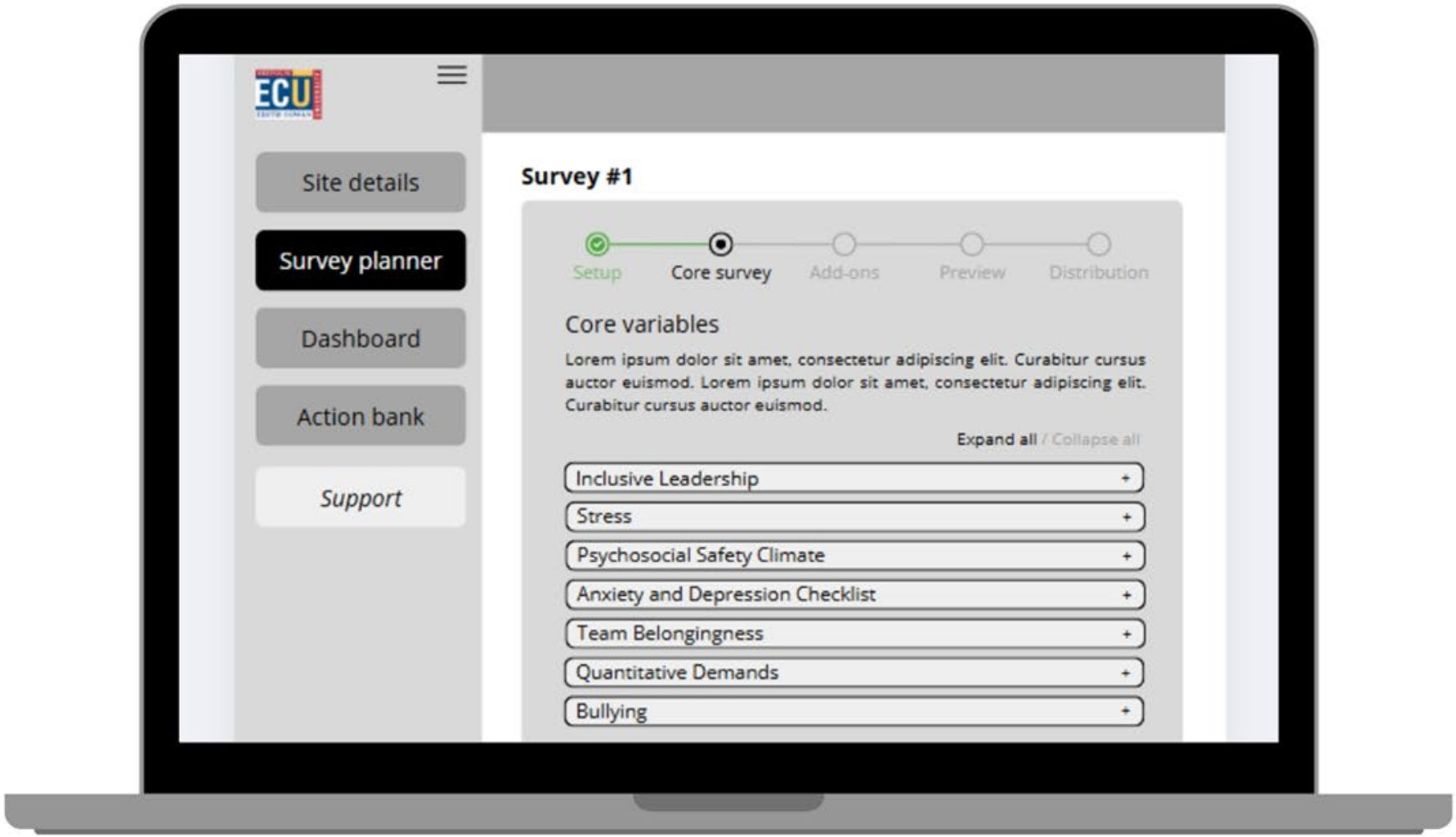
Set up a new survey
Participation %
Status
Closing date
Raffle
Survey #1 67% Finalised 01/10/2024
Survey #2 25% Live 20/11/2024
Survey #3 - Published 15/12/2024
Survey #4 - Draft 15/02/2025


Site details
Survey planner
Dashboard
Action bank
Support
Survey #1
Setup
Core survey
Add-ons
Preview
Distribution
Closing date*
dd/mm/yyyy
We recommend having it open for 4 weeks from the date it is published. This date can be amended after publishing the survey and before it closes.
Workforce on site*
0
0
Number of client employees
Number of business partner/ contractor employees
Commute types on site*
Please Select
Do you want to collect data by work team?*
Yes
No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Core survey
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Distribution
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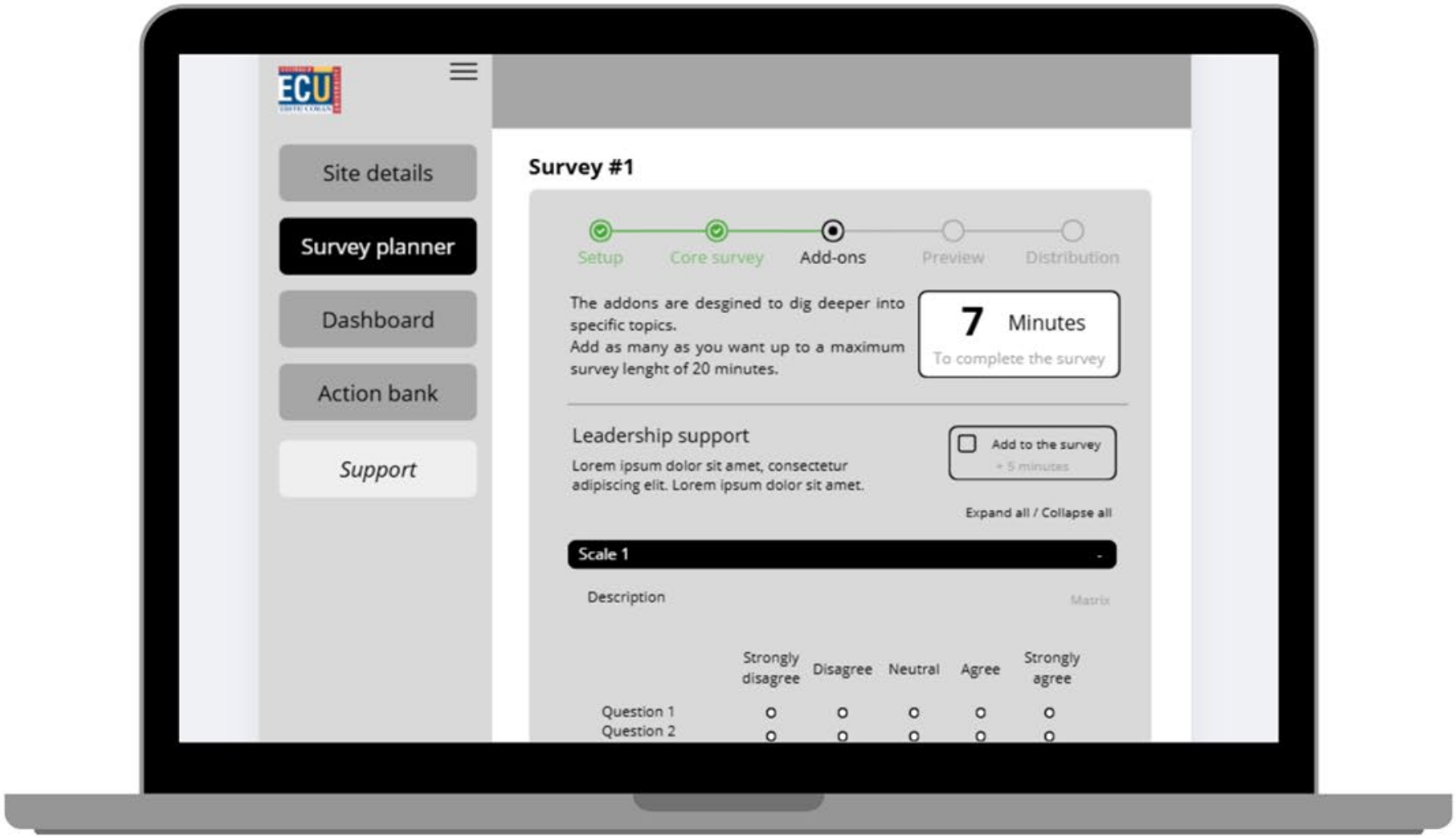
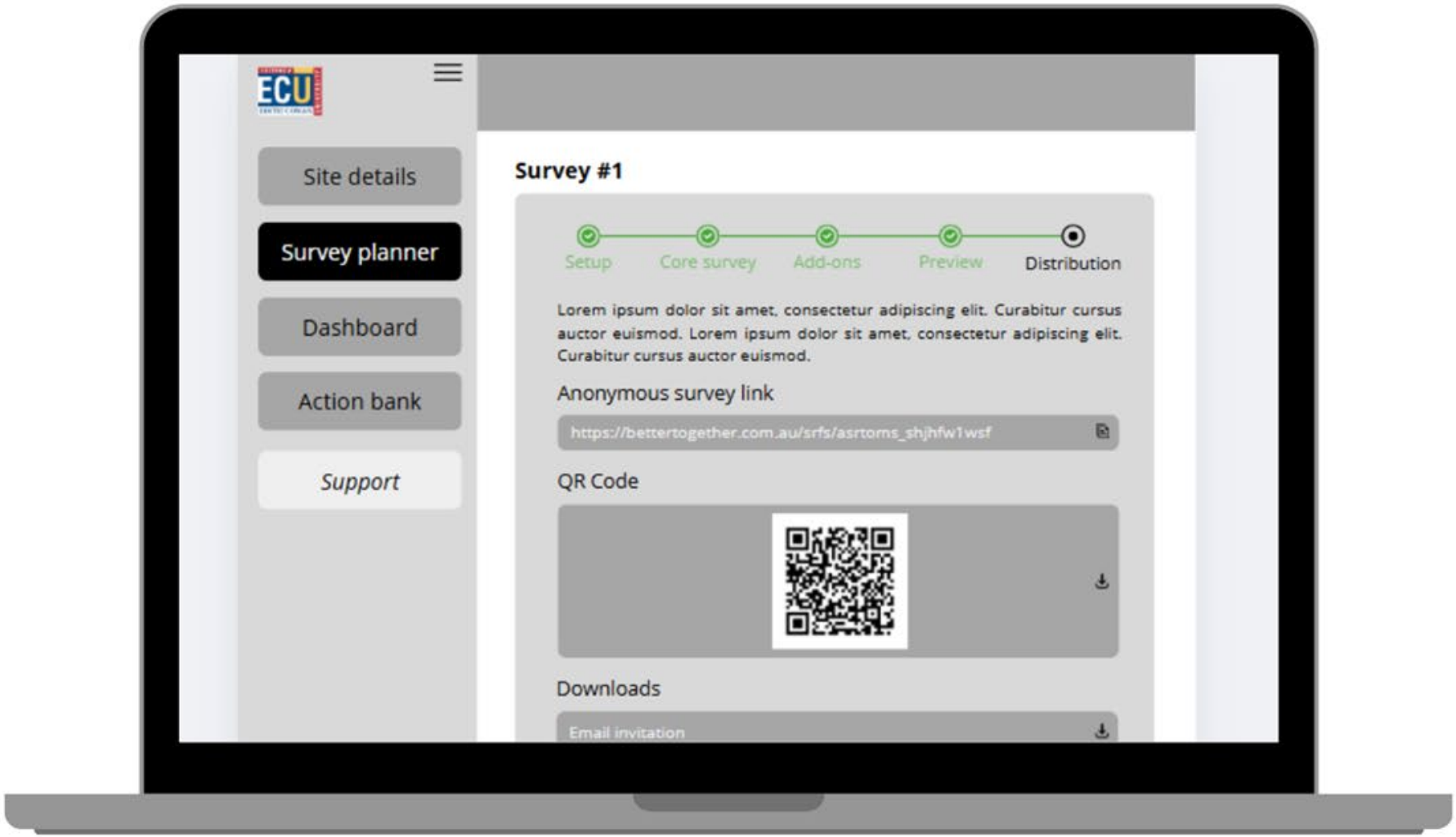
Expand all / Collapse all
Inclusive Leadership
Stress
Psychosocial Safety Climate
Anxiety and Depression Checklist
Team Belongingness
Quantitative Demands
Bullying


Site details
Survey planner
Dashboard
Action bank
Support
Survey #1
Setup
Core survey
Add-ons
Preview
Distribution
The addons are desgined to dig deeper into specific topics.
Add as many as you want up to a maximum survey lenght of 20 minutes.
7 Minutes
To complete the survey
Leadership support
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Lorem ipsum dolor sit amet.
Add to the survey
+ 5 minutes
Expand all / Collapse all
Scale 1
Description
Matrix
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
Question 1
Question 2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Core survey
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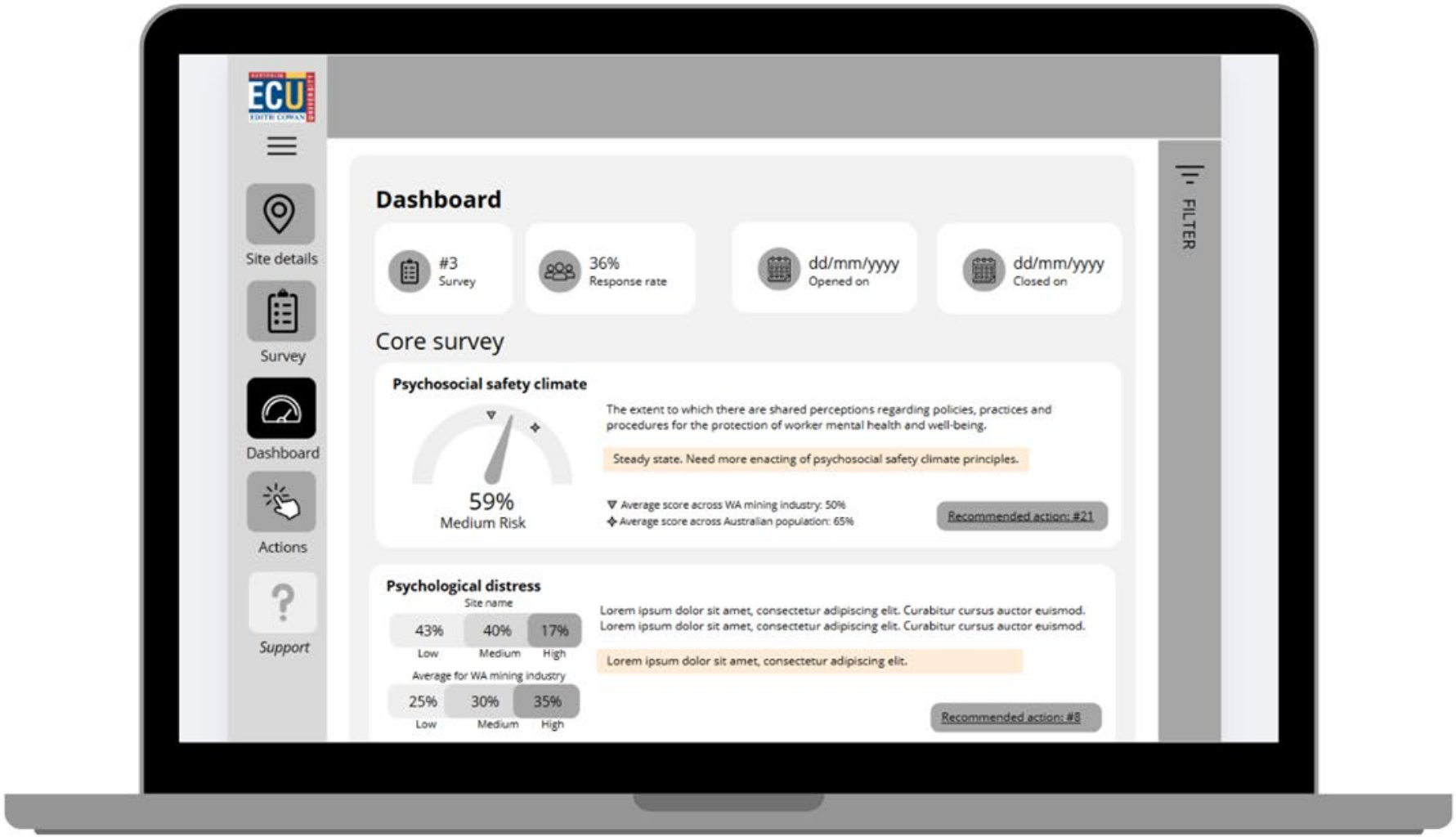
Anonymous survey link
https://bettertogether.com.au/srfs/asrtorms_shjhfw1wsf
QR Code
Downloads
Email invitation


Site details
Survey
Dashboard
Actions
Support
Dashboard
#3
Survey
36%
Response rate
dd/mm/yyyy
Opened on
dd/mm/yyyy
Closed on
FILTER
Core survey
Psychosocial safety climate
59%
Medium Risk
The extent to which there are shared perceptions regarding policies, practices and procedures for the protection of worker mental health and well-being.
Steady state. Need more enacting of psychosocial safety climate principles.
Average score across WA mining industry: 50%
Average score across Australian population: 65%
Recommended action: #21
Psychological distress
Site name
43%
40%
17%
Low
Medium
High
Average for WA mining industry
25%
30%
35%
Low
Medium
High
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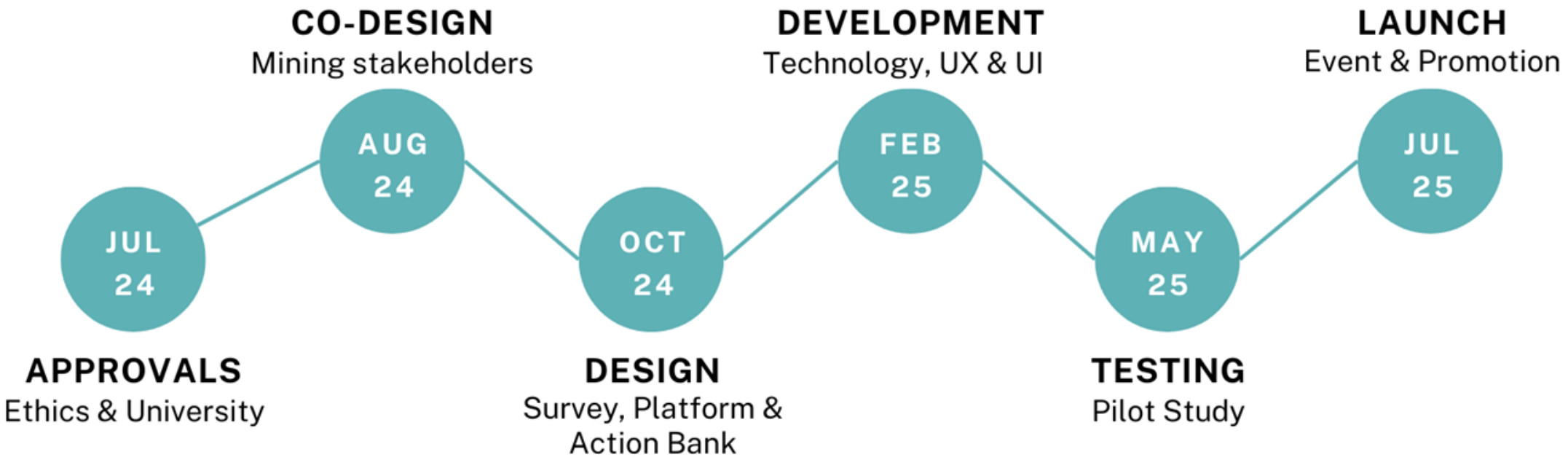
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Curabitur cursus auctor euismod.
Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Recommended action: #8

Timeline


JUL 24
APPROVALS
Ethics & University
AUG 24
CO-DESIGN
Mining stakeholders
OCT 24
DESIGN
Survey, Platform & Action Bank
FEB 25
DEVELOPMENT
Technology, UX & UI
MAY 25
TESTING
Pilot Study
JUL 25
LAUNCH
Event & Promotion

> *The best thing about this platform is the F word*

“The best thing about this platform is the F word - Free.”

Contact us

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Understanding psychosocial risks for mining workforce with digital advancements: A bibliometric literature review

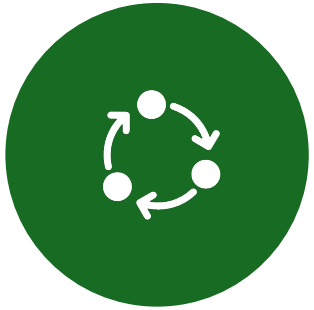
Dr Eden Li

Imagine having a shiny, helpful robot into your mining operation...

The paradoxical effects of emerging mining technologies on worker health, safety, and psychosocial risk:

A bibliometric literature review

BACKGROUND AND RESEARCH QUESTIONS



METHOD

RESULTS

DISCUSSION AND CONTRIBUTIONS

Background

- The International Labour Organisation (ILO) identifies mining as one of the world's most hazardous industries, with high rates of injuries and disasters[1] .
- Advanced digital technologies offer significant potential to mitigate risks, enhancing worker health and safety across mining operations.
- At the same time, these digital advancements could also exacerbate existing risks or causing new ones.
- Consequently, the overall impact of emerging technologies on health, safety, and psychosocial risks in mining remains unclear.

1. International Labour Organization (ILO) 2015, Mining: a hazardous work. https://www.ilo.org/resource/mining-hazardous-work

Research Questions

The overarching research aim is to unpack the impacts of emerging mining technologies on health, safety, and psychosocial benefits and risks at work, as well as the underlying mechanisms.

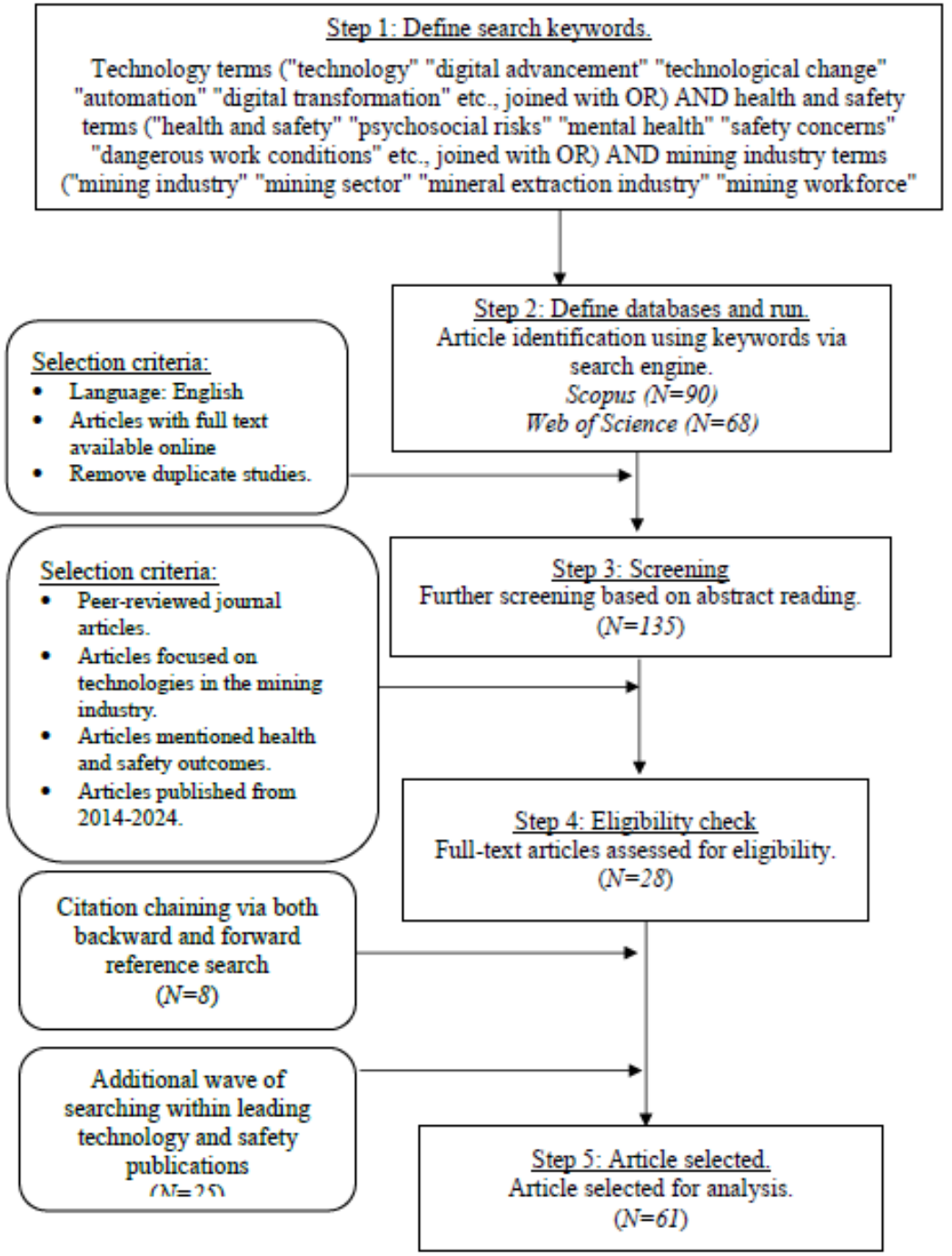
- RQ1: What are the mainstream emerging technologies in the mining industry?
- RQ2: What are the health, safety, and psychosocial benefits and risks?
- RQ3: How do these technologies change work?
- RQ4: What are the implications for future of work in mining?

Methods

A systematic literature review was performed to synthesise the existing research.

Analysis approach

✓ Descriptive analysis
✓ Thematic analysis



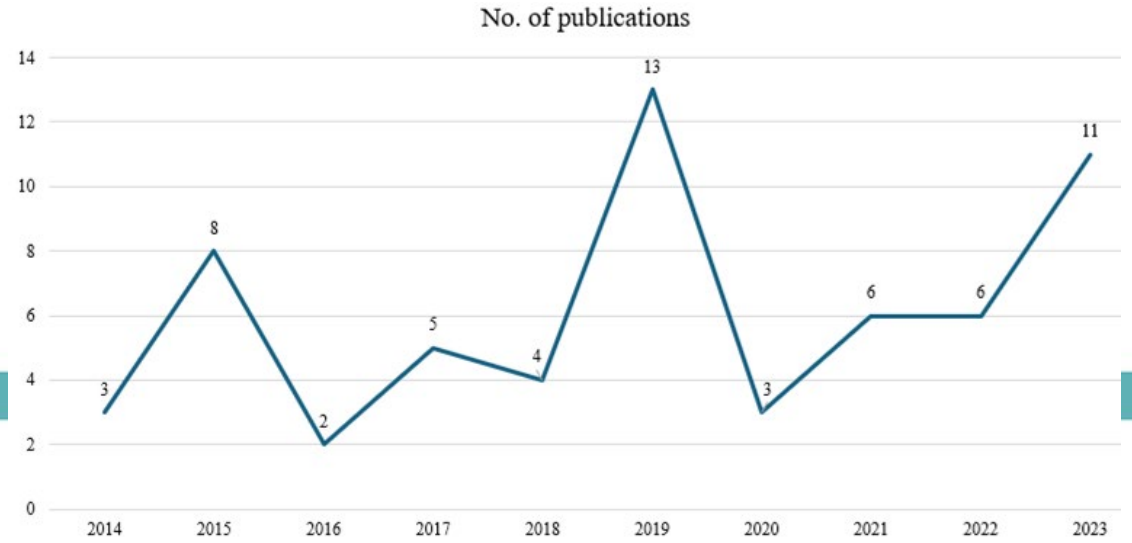
Findings

Distribution of publication across journals

Source title	No. of publications
International Journal of Mining Science and Technology	14
Safety Science	9
Resources Policy	8
Mining Metallurgy & Exploration	4
International Journal of Environmental Research and Public Health	3
Mineral Economics	2

Note: Only journals have no less than 2 publications are noted.

Publication year



Countries or regions of data source

Country	No. of publications
China	9
United States	6
Australia	6
Brazil	2
European Union (EU)	2
Poland	2
India	2
Sweden	2
Turkey	2
South Africa	2

Methodology

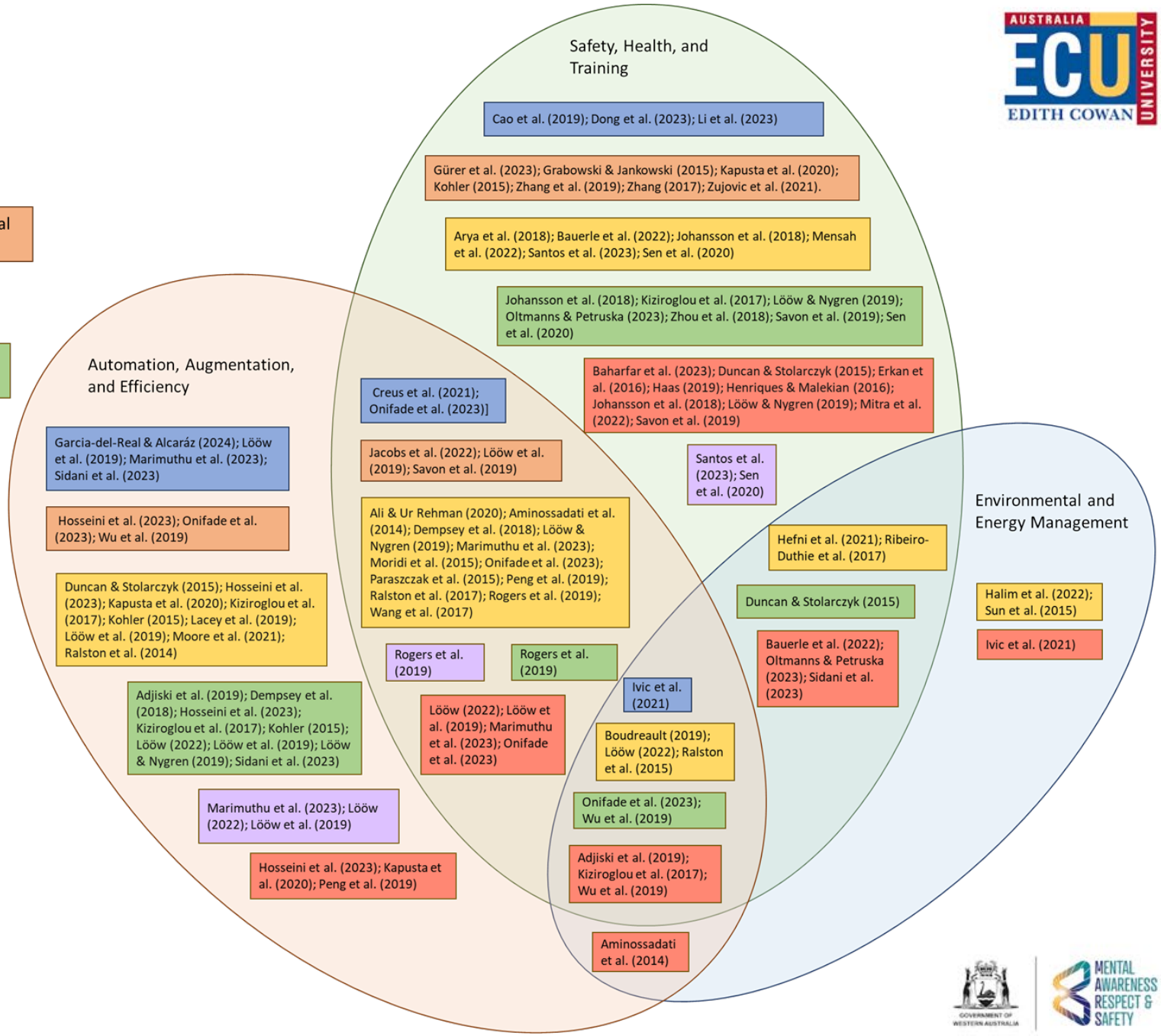
Methodology	No. of publications
Conceptual	12
Literature review	13
Experiment	6
Case study	15
Interviews	3
Secondary data analysis	4
Survey	10

Findings

- Analytics AI/ML
- Augmented and Virtual Reality, Digital Twins
- Autonomous Equipment
- Integrated Remote Operation Centres
- Robotics
- Smart Sensors

★ *6 Categories of emerging technologies in the mining industry*

★ *3 Technological functions*
- *Automation, augmentation and efficiency*
- *Safety, health and training*
- *Environmental and energy management*



Findings

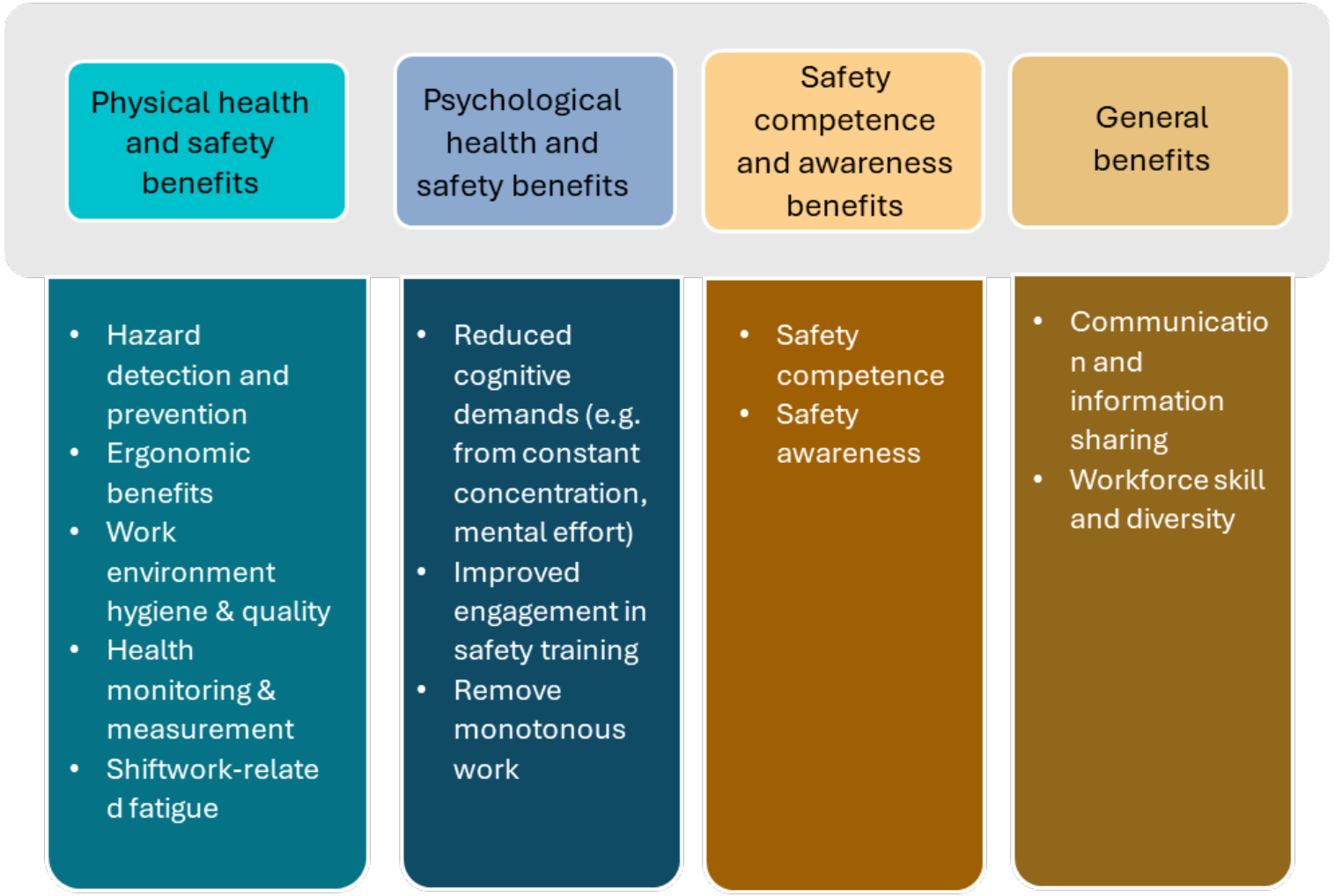


Figure 1. Health, safety and psychosocial benefits

Findings

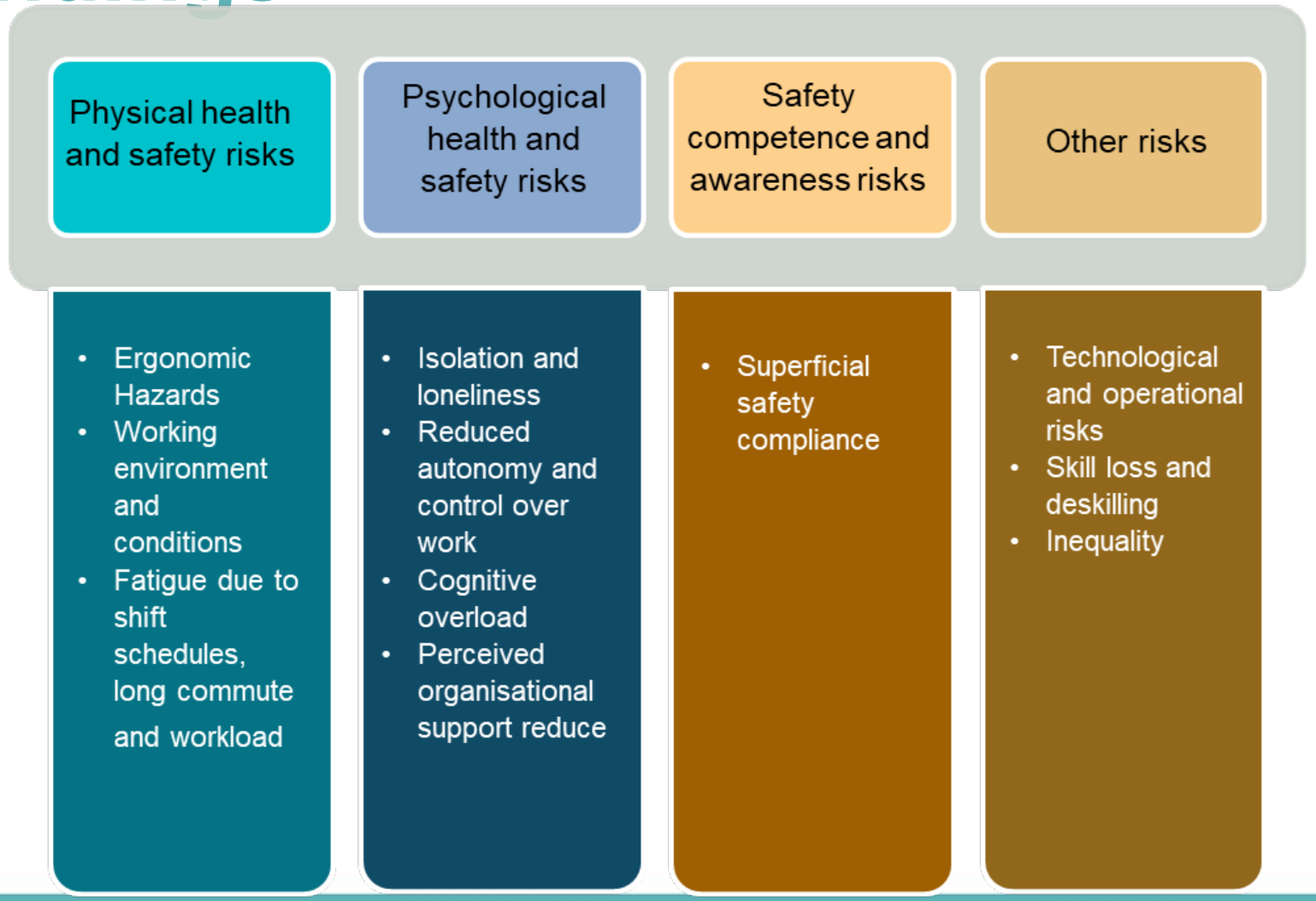


Figure 2. Health, safety and psychosocial risks

Discussion and Contributions

Mechanisms of change in work

Five categories of change at the mining workplace: *change in how, what, when and where work is done and by whom.*

These fundamental shifts at work serve as key mechanisms explaining the paradoxical outcomes.

The true value of technological advancements hinges on effectively managing and implementing workplace changes.

Implications for the future of mining

The value of technological advancements ultimately hinges on how workplace changes are managed and integrated.

Strategic planning should include comprehensive training and reskilling initiatives to bridge skills gaps and support workforce adaptability, enabling smooth transitions to new roles.

Integration efforts must follow human-centred principles, ensuring that technologies are designed with workers' experience and safety in mind by involving them in design and feedback processes, thereby fostering ownership and acceptance of new tools.

Continuous evaluation and feedback mechanisms are essential to ensure technology aligns with human factors over time.

Managing technology-induced changes aligns with the United Nations' Sustainable Development Goals (2024) that support decent work for all.

A paradox of efficiency and worker experience?

Adopt Human-Centered Design:

E.g. Involving workers in the design and feedback process, ensure that technology feels like a tool of empowerment rather than a mechanism of control.

Commit to Continuous Training and Reskilling:

E.g. Help workers adapt to new roles that technology may bring, positioning the robot as a supportive colleague rather than a watchdog.

Implement Clear Feedback Mechanisms:

E.g. Regularly gather feedback on the technology's impact on job satisfaction and stress.

Align with Ethical and Sustainable Goals:

E.g. Incorporating broader goals, reinforces that the technology serves not just productivity but also the well-being and dignity of the workforce.

The Safety BMI – developing an integrated approach to monitoring incident and injury risks

Associate Professor Marcus Cattani
Dr Bobbie Selleck
Anton Fouche
David Eddy

Thank you to the companies who have donated their data.

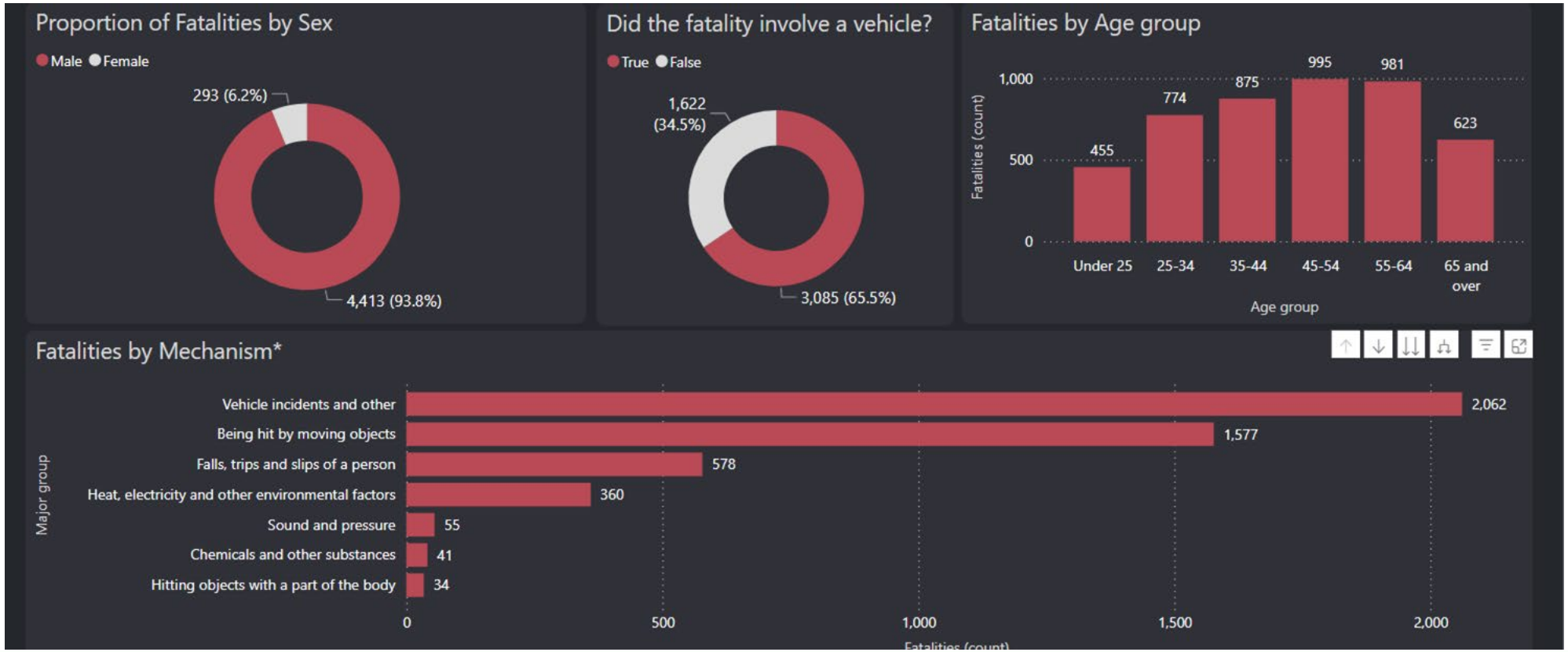
Introduction

- Serious injuries are rare
  - Does the organisation tolerate th
- ‘Safety’ data is being collec
  - What does data tell ‘you’ about ri
- We are expert in risk management
  - Why haven’t we managed injury risk better?
- What could the data tell us about risk and its management
  - Maybe we need to monitor something else?

In 2022-2023:
Number of workers: 13 million

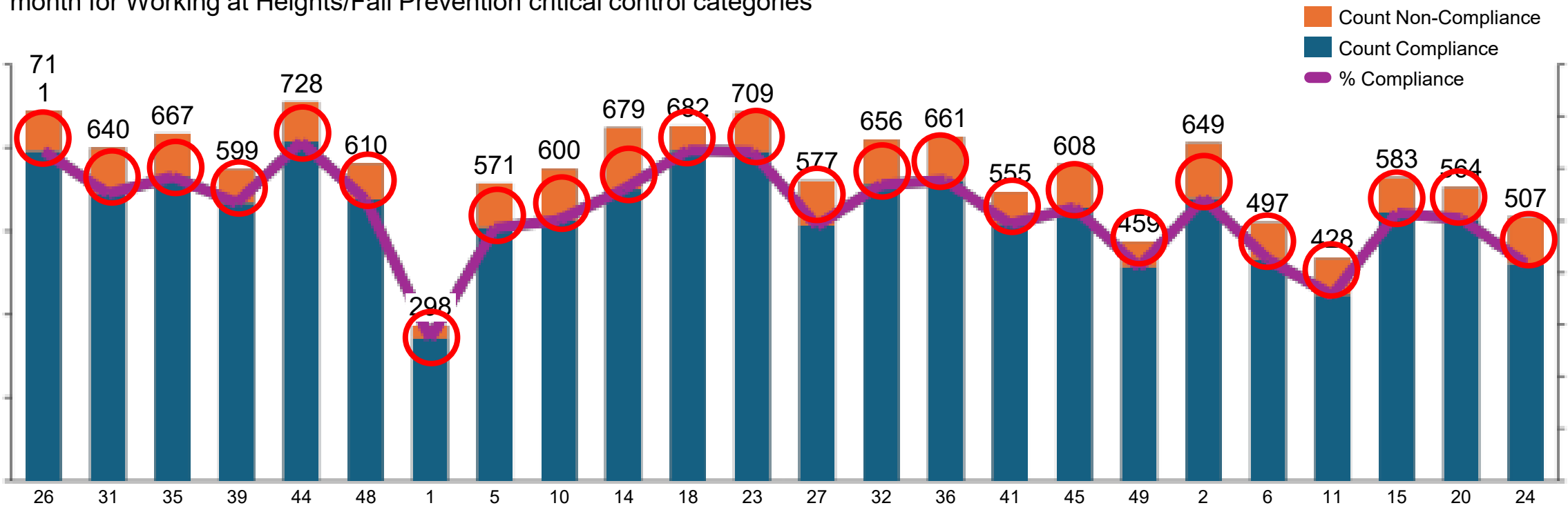
Toleration:
The level of risk at which an organisation changes its behaviour

Western Australia – fatalities (SWA, 2024)

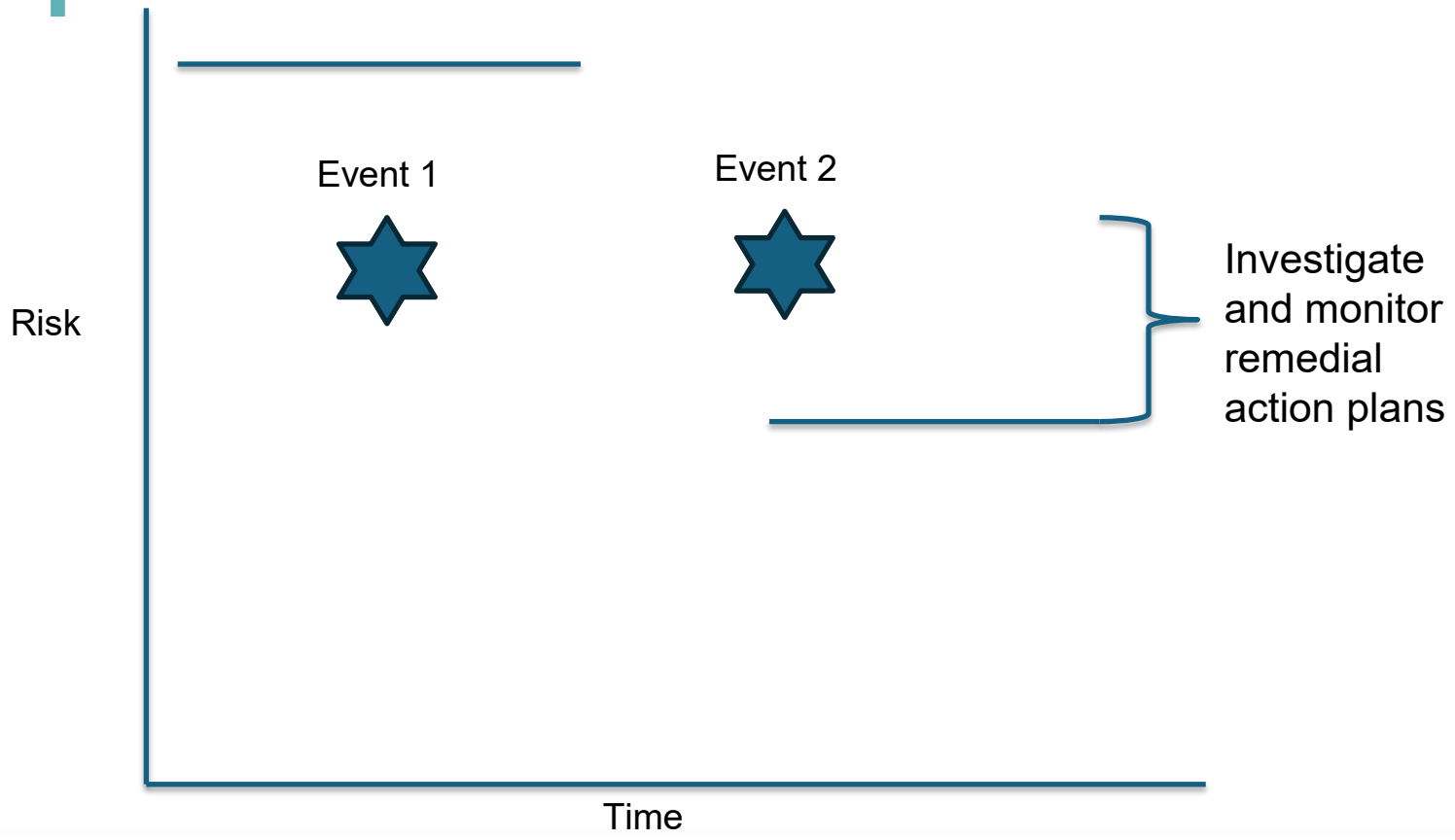


Toleration risk criteria define acceptability

Count of compliant and non-compliant leadership verification activities per month for Working at Heights/Fall Prevention critical control categories



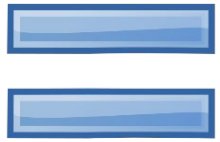
Leadership define toleration



Definition of risk – ISO31000

"effect of uncertainty on objectives"

X + Y



Variables

Toleration (T)	The level of risk which initiates change. Nothing happens unless the risk is not tolerated.
Consequence (C)	The potential of harm, within scope
Effectiveness (E)	The capability to prevent harm, within scope

Safety BMI - Conceptual model

$$\text{Injury Risk} = \frac{T\ f(C) * T\ f(E)}{T}$$

Explanation:

T f(C) - The leadership attitude towards consequence determines the organisational approach. If an organisation does not tolerate a level of risk, then action will be taken to reduce risk. The organisation needs to address higher consequences first.

T f(E) - The effectiveness of the organisation to control injury risk to below the toleration.

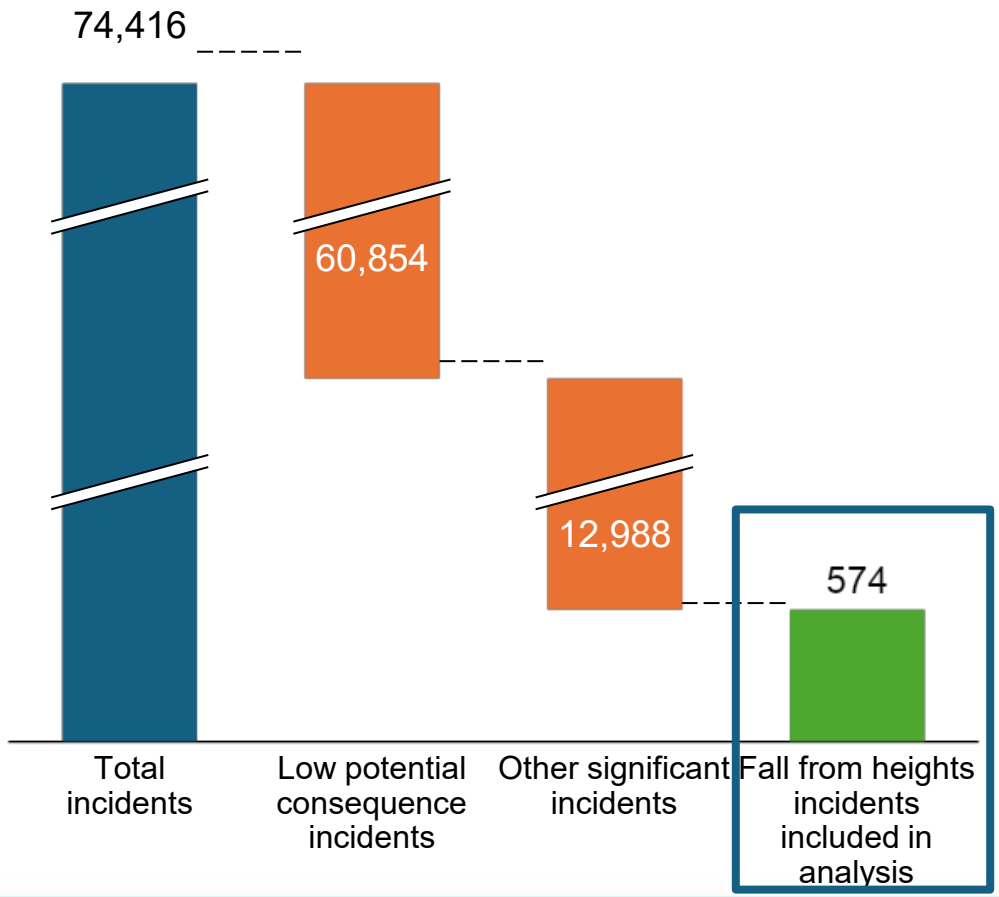
Data: good quantity; poor quality

Our aim is to convert the donated data into a format suitable for a Safety BMI formula.

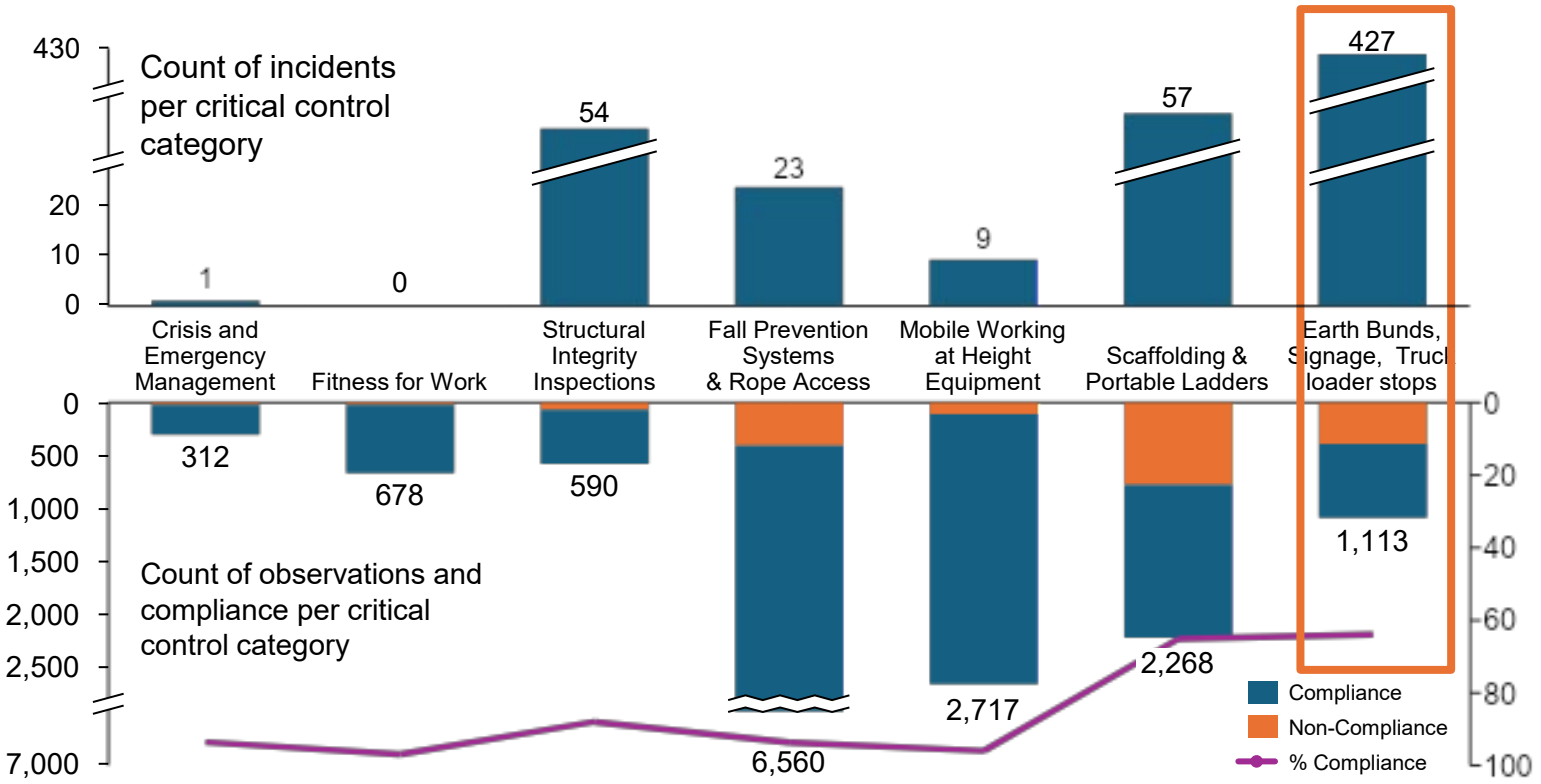
The dataset contains errors, inconsistencies and missing data. This means we need to improve the data collection and quality

From the risk assessment program, the organisation identified seven critical risk control categories for working at heights/fall prevention risk:

- Fall Prevention Systems and Rope Access
- Earth Bunds, Signage, and Truck loader stops
- Structural Integrity Inspections
- Fitness for Work
- Scaffolding and Portable Ladders
- Mobile Working at Heights Equipment
- Crisis and Emergency Management



Incident and leader verification



Observations:

- For the same period, a low number of leadership verification activities with a low level of compliance, and high number of high-potential incidents were reported.
- 17% of the incidents were repeat incidents.
- The Critical Control Category Performance Score (E) is higher than expected at 85%

Conclusion

1. The conceptual model provides a leadership focused approach
2. Data quantity is good but quality needs to improve (i.e. more focused on risk rather than a count)
3. A formula applying the model to the data is well underway
    - Each variable is being developed to include various sources
4. Application to evaluate injury risk may offer a process to gain insight into the effectiveness of what data to collects, controls, and leadership perception
5. Call to action: more data needed

Effectiveness of Using a Capability Maturity Model to Advance D&I in the Mining Sector

Dr Judy Lundy
Dr Uma Jogulu
Amy Chapple

Session overview

- The D&I maturity business case
- How a CMM can help advance D&I maturity
- Overview of the D&I CMM and assessment process
- Project methodology
- Evaluation
- Key findings
- Implications for industry

Why build D & I Maturity?

Developing D&I capability assists:

- Influencing respectful and healthy behaviours and workplace relationships;
- Mitigating against psychosocial hazards;
- Fostering a culture that is safe, respectful and inclusive and values diversity and gender equality (Standard 2 – Guide for Complying with the Positive Duty under the *Sex Discrimination Act 1984)*

Having a truly diverse and inclusive workforce offers organisations:

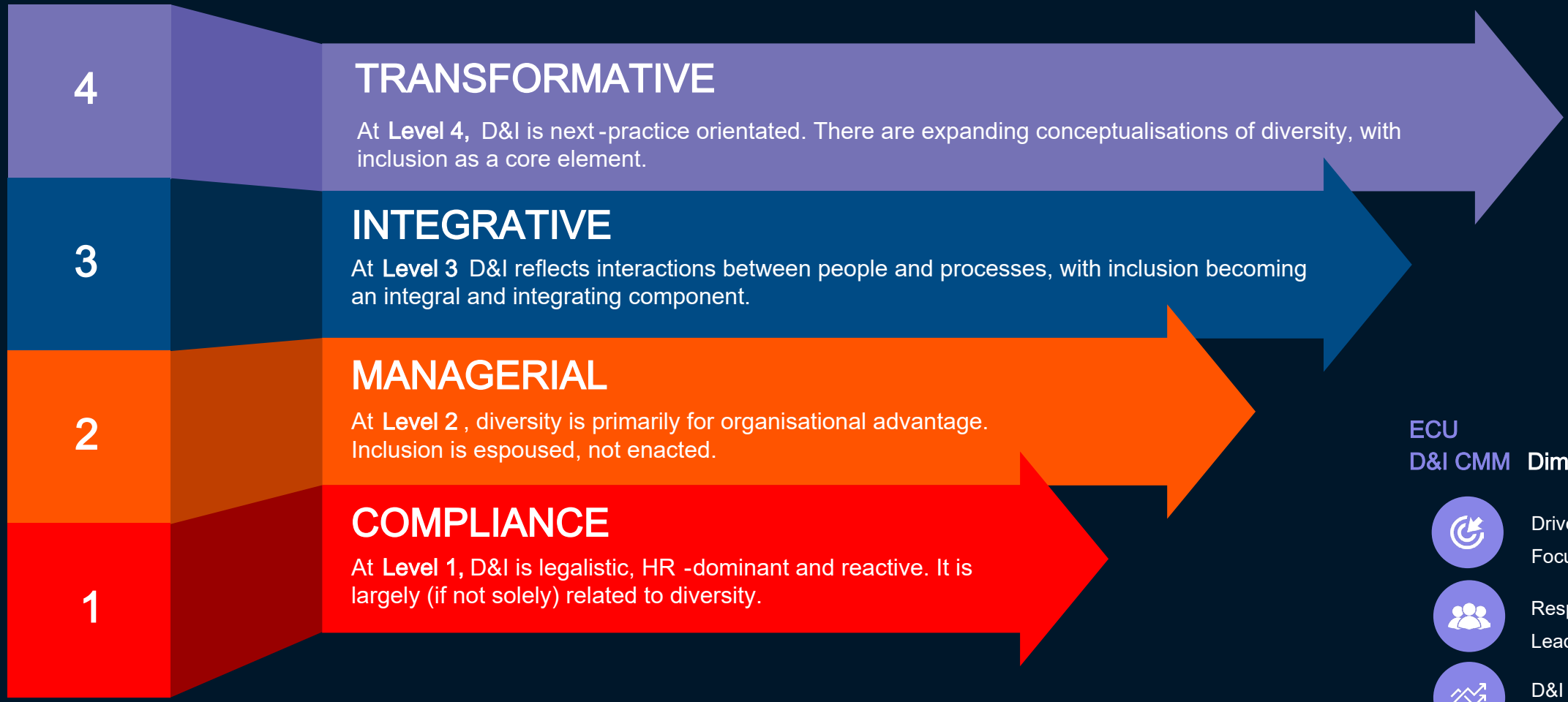
- Alternative perspectives
- Greater creativity
- Improved problem-solving
- Robust decision-making processes
- Increased productivity and performance
- Meeting workforce and societal expectations

Why use a CMM to advance D&I?

- Sustainably progressing D&I requires a holistic approach that integrates D&I into an organisation's culture and core processes. (Ravazzani, et al., 2021)
- Progress is unlikely to be successful without an understanding of root causes, a meaningful definition of success, leadership accountability, context specific solutions and rigorous tracking of progress. (McKinsey & Company, 2023)
- CMMs are well suited to address these challenges as they offer organisations a structured analytical process to assess their current operations against predetermined levels of maturity to identify and prioritise improvement initiatives. (Parker, et al., 2017)

ECU D&I Maturity Levels

Overview of the D&I CMM



ECU D&I CMM **Dimensions**

- Drivers & Focus
- Responsibility & Leadership
- D&I Measurement
- Mechanisms & Defining Features

Assessment process: working through the evidence guides to determine levels of maturity against each of the 4 dimensions

ECU D&I CMM: Drivers & Focus Evidence

Using the tool

Consider the evidence questions and how they relate to your organisation/business unit. Use the **dropdown menu** in the 'Finding' column to indicate whether you have evidence of this indicator (Yes, No, Unsure). Please note, this list is indicative only. You may identify other sources of evidence in your organisation. You can add them to the list by using the extra rows or by adding more rows as needed.

MATURITY LEVEL 1: COMPLIANCE			
D&I CMM Indicators	**Ask these questions to consider what evidence exists of this indicator**	**Finding**	**Justification**
Diversity as required	Are we simply hiring based on who is available?	Unsure	[add notes justifying your finding]
Legal framework guides policies and procedures	Do HR policies and procedures just focus on what is legally required, regarding diversity?	Unsure	[add notes justifying your finding]
Compliance with legislation	Do we have checks in place to ensure all HR decisions (e.g. selection, promotion, termination etc.) are compliant with relevant employment legislation?	Unsure	[add notes justifying your finding]
Compliance with mandated requirements	Do HR policies and procedures just focus on what is legally required, regarding diversity?	Unsure	[add notes justifying your finding]
	Do we have checks in place to ensure all employee-related decisions (e.g. selection, promotion, termination etc.) are legislatively compliant?	Unsure	[add notes justifying your finding]
Compliance with anti-discrimination requirements	Do HR policies and procedures just focus on what is legally required, regarding diversity?	Unsure	[add notes justifying your finding]
	Do we have checks in place to ensure all employee-related decisions (e.g. selection, promotion, termination etc.) are legislatively compliant?	Unsure	[add notes justifying your finding]
[Indicator]	[add your own evidence examples]	Unsure	[add notes justifying your finding]
[Indicator]	[add your own evidence examples]	Unsure	[add notes justifying your finding]
[Indicator]	[add your own evidence examples]	Unsure	[add notes justifying your finding]

Are you at the COMPLIANCE Level?

If you answered '**Yes**' or '**Unsure**' to the Level 1 D&I CMM evidence questions, you may be sitting at the **compliance level**. Don't stop here. Keep going through the evidence questions of the next three levels to see if you meet any of those. This will help you determine your overall rating.

If you answered 'No' or 'Unsure' to any of the compliance indicators, you may need to act immediately to make sure you are meeting your legislative requirements.

MATURITY LEVEL 2: MANAGERIAL			
D&I CMM Indicators	**Ask these questions to consider what evidence exists of this indicator**	**Finding**	**Justification**
Diversity for gain	Do we target our recruitment of under-represented diversity groups where	Unsure	[add notes justifying your finding]

Are you at the MANAGERIAL Level?

If you mainly answered '**Yes**' to the Level 2

Project methodology - phase 1

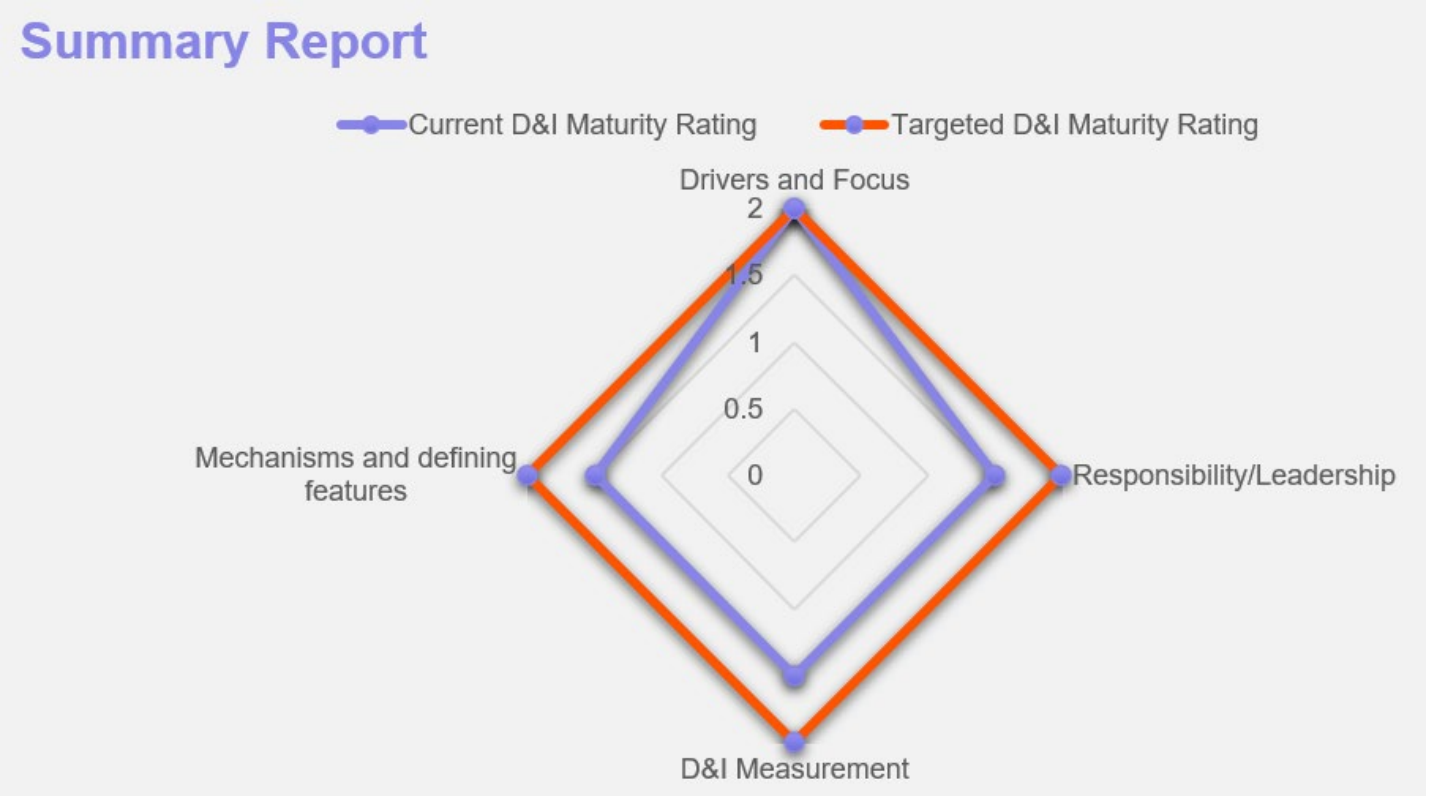
Contextualising the CMM tool for the mining sector

- Online individual interviews and focus groups with participants from non - managerial to senior manager levels and with collective mining sector experience of over 140 years.
- Made the tool more reflective of mining sector practices and language with over 70 changes made so the wording would be context specific for a diverse mining sector workforce.

Project methodology - phase 2

Maturity assessment workshops

- Maturity assessment workshops conducted in each partner organisation with participants from non-managerial to middle manager levels to assess the perceived level of maturity of the organisation for each of the four dimensions on the CMM based on the available evidence.
- Collated assessment results and key themes presented back to each organisation.
- Desired maturity levels and potential priority focus areas to address gaps between current and desired states discussed.



Evaluation

Following the completion of phases 1 & 2, evaluation meetings were conducted with both organisations to determine how effective the D&I CMM tool and the assessment process were to help shape thinking about future D&I strategies and practices.

Key finding: the assessment process raises awareness of D&I

The structured discussions were extremely useful in generating meaningful conversations about the concepts of D&I which aren't usually discussed within the wider workforce. One participant said:

"Discussing it at length through this process has been really valuable, not only to understand the importance of D&I and the D&I concepts, but also, where we are as a business."

Another indicated:

"It made us think about different facets of D&I, not just the usual policy perspective"

Key finding: using the D&I CMM assists with identifying actions and assigning accountability

The outcomes of the assessment were valuable in presenting an overview of the current situation and establishing measures of where they would like to be in 12-months' time. In the case of one organisation this was incorporated into the KPIs for the responsible member of the executive team. One participant said:

"The biggest thing for us is identifying those gaps so we know where to focus our efforts. So, I think we've taken an approach of listing some initiatives out around what we want to take forward as a result of the study."

Another indicated the tool and assessment process:

"Provided a line of sight of where to go next. In building capability maturity"

Implications for industry

- The ECU D&I CMM can be useful to assist mining sector organisations to identify and address the “success factors” that contribute to sustainable D&I impact. Using the tool can assist in adopting a more holistic approach that integrates D&I into culture and core processes.
- The process of assessment, particularly when conducted in a workshop setting, can be educative and of assistance with awareness raising and culture change.
- The CMM tool provides an opportunity for mining organisations to track their progress by setting up an assessment rhythm so that progress can be monitored, and accountabilities assigned. This can assist in advancing D&I maturity, thereby positively influencing respectful and healthy behaviours and workplace relationships.

How could a WA mining sector organisation use this tool?

Mining sector organisations could conduct their own maturity assessments through assessment workshops which can assist with awareness raising and culture change.

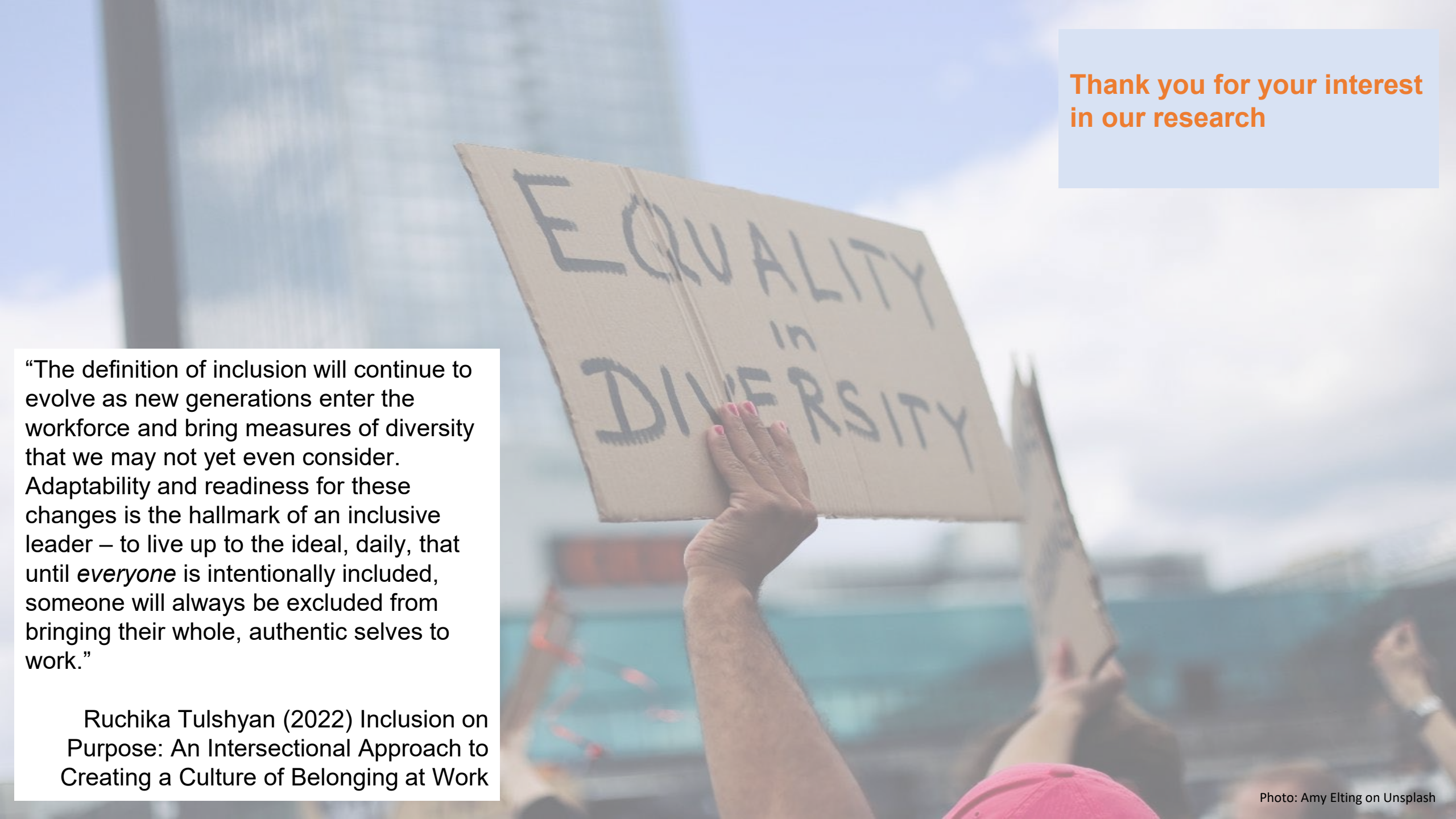
Key considerations for maximising the value of the assessment process include:

- ensuring input from a wide range of representative stakeholders at different levels and from different sites and departments across the organisation.
- creating a psychologically safe environment for participants in the assessment process to ensure they feel safe in sharing their observations and experiences.
- dedicating time and resources to understanding the assessment results in the context of the specific mining organisation so tailored solutions can be designed and implemented.

What value would using the tool add for a WA mining sector organisation?

The D&I CMM tool provides an opportunity for mining organisations to track their D&I maturity progress over time by:

- setting up an assessment rhythm (e.g. annually)
- monitoring progress by comparing results from previous assessment/s
- assigning accountabilities to responsible stakeholders.



Thank you for your interest in our research

"The definition of inclusion will continue to evolve as new generations enter the workforce and bring measures of diversity that we may not yet even consider. Adaptability and readiness for these changes is the hallmark of an inclusive leader – to live up to the ideal, daily, that until *everyone* is intentionally included, someone will always be excluded from bringing their whole, authentic selves to work."

Ruchika Tulshyan (2022) Inclusion on Purpose: An Intersectional Approach to Creating a Culture of Belonging at Work

Photo: Amy Elting on Unsplash

Developing research questions for the future; Health & exposure metrics as an indicator of workplace health in Western Australia.

Professor Jacques Oosthuizen

Welding fume a complex mixture

- IARC classified welding fume as a human carcinogen (2017).
- Increased risk for tracheal, bronchial and lung cancer.
- Australian Workplace Exposure Standard (WES) reduced from **5 to 1 mg/m^3** in Jan 2024.
- Welding fume comprises of multiple contaminants (metals), and each of those also has a WES that needs to be complied with.

Hypotheses

It was hypothesised that:

1. Most samples previously classified as compliant (before the 2024 change) will exceed the newly established WES.

1. Compliance with new general welding fume WES will assure compliance with the respective WES's of individual contaminants contained within welding fume.

Methods

- DEMIRS extracted de-identified welding fume data from the Safety Regulatory System (SRS) database.
- More than 600 000 entries since the mid 1980's.
    - high degree of validity
    - formalised sampling methodologies
    - registered samplers
    - standardised job and location codes
    - automated quality control checks
- Ethics approval from ECU
- Data stratified for descriptive statistics
- Temporal trends analysed with a gamma generalized linear hurdle model (GLM)

Results

Table 1 Welding fume samples by commodity and location

Commodity	Surface	Underground	Total
Iron	3,737	0	3 737
Other	3,103	18	3 121
Gold	2,236	60	2 296
Nickel	703	11	714
Copper, lead and zinc	211	6	217
Mineral sands	214	0	214
Chem. and agriculture	197	0	197
Total	10 401	95	10 496

The most commonly occurring contaminants analysed with general welding fume samples were iron oxide (n=5 504), nickel (n=4 922), chromium metal (n=4 855), zinc (n=4 173), manganese (n=4 109), and copper (n=4 043).

Welding fume trends against previous and current WES

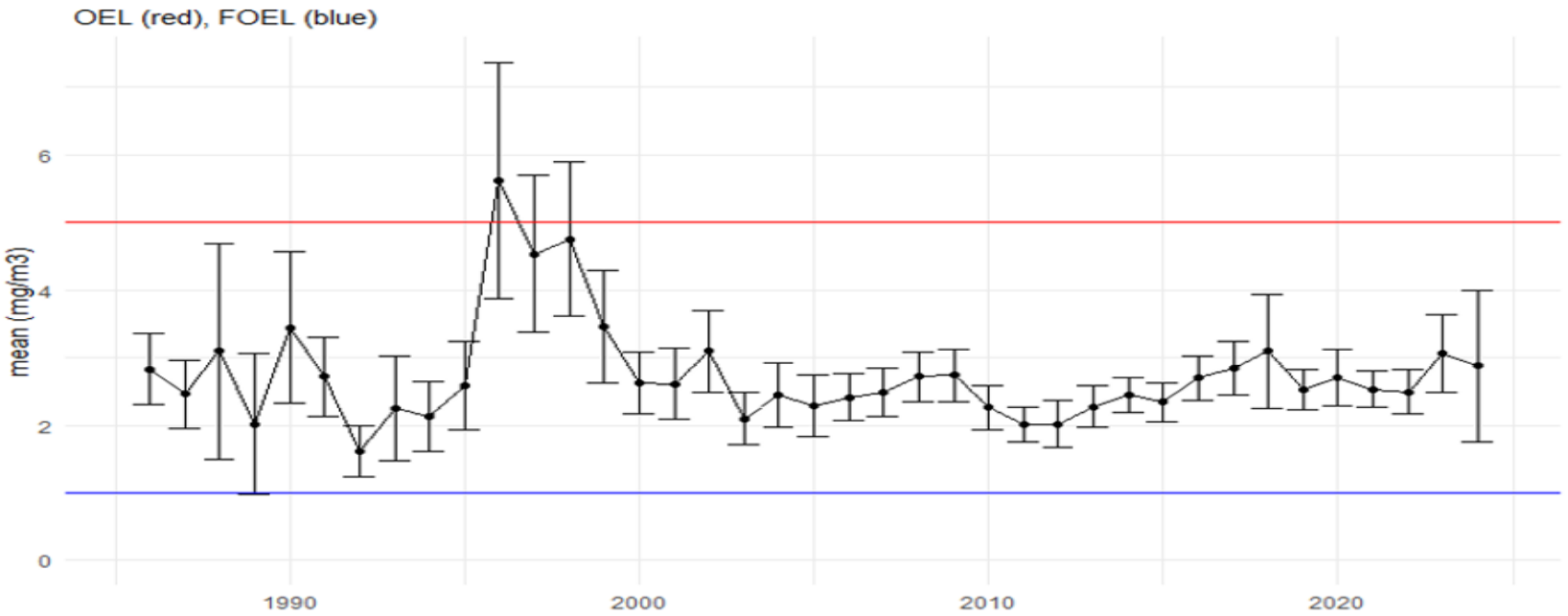


Figure 1. Welding fume results (mean) with lower confidence limit (LCL) and higher confidence limit (HCL) by year, 1986 to 2024, the red line indicates the previous WES, and the blue line indicates the new WES.

No significant change over time.

Moved from 100% compliant to 100% non-compliant in 2024.

Hypothesis 2: Assumed compliance of other contaminants

- Data stratified to identify all samples compliant with the new WES also analysed for additional contaminants (n = 2432).
- 9, (0.37%) exceeded an individual contaminant WES.
- Exceedances were recorded for;
  - vanadium (n=2), lead (n=2), manganese (n=1), iron oxide (n=2), chromium VI (n=2)
- Only four exceedances in the past 25 years;
  - two in 2017 and two 2019,
  - the contaminants being 2 x FEO and 2 x PB

Implications for industry

- In January 2024 the WA mining sector went from 100% compliant to 100% non-compliant.
- The new welding fume WES presents significant challenges, as levels have remained constant over time.
- Existing controls are not sufficient to meet the new WES and further reductions may not be easily achievable.
- The most effective control is powered air-purifying respirators (PAPR) integrated with welding helmets, up to 99.96% efficiency, (Knott et al. 2023).
- PAPR should become (already is) the industry standard given welding fume is carcinogenic (Loomis et al. 2022).
- Sampling outside of the helmet or PAPR does not accurately reflect worker exposures.
- On the collar sampling should be conducted on workers in the vicinity of welders (similar to sidestream smoke).
- Compliance with a general welding fume WES of 1 mg/m^3 implies (greater than 90%) compliance with individual contaminants contained in fume. This finding could be of significant benefit to industry and could streamline future monitoring and reduce costs.

Diesel particulate matter (DPM) (n = 23 596)

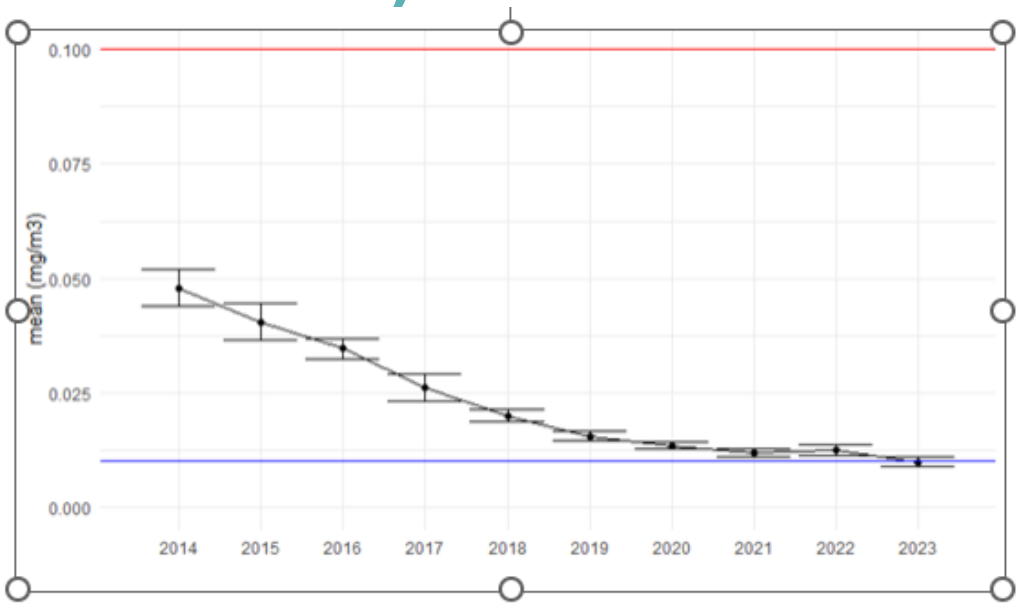


Figure 2 DPM sampling results (mean and 95% CI), including LCL and UCL, from 2015 to 2023

DPM current WES 0.1 mg/m^3 proposed WES 0.015 mg/m^3.

Mean and 95% CI have decreased from 2015 - 2023, with all below the previous WES and above the proposed WES, except for 2023.

The GLM model for the period 2015 - 2023 indicates that the expected mean decreases with 85.9 % year on year ($p<0.0001$).

Implications for industry DPM

- The WA mining sector is dealing well with DPM exposure management.
- There has been a significant decline in exposures over the last decade, modelling shows that compliance is achievable.
- Compliance will be difficult in an underground environment, unless there is a move away from diesel powered plant.
- The sector most impacted is gold mining, with many underground operations.
- The SEG's that require exposure reduction are;
    - ground & roof support,
    - loading & transport,
    - long hole drill & blast and
    - production & services.

Strategies need to be developed by the regulators and industry to account for the protection provided by respiratory protective equipment (RPE) which is the industry norm for people exposed to DPM.

Respirable crystalline silica (RCS) (n = 138 689)

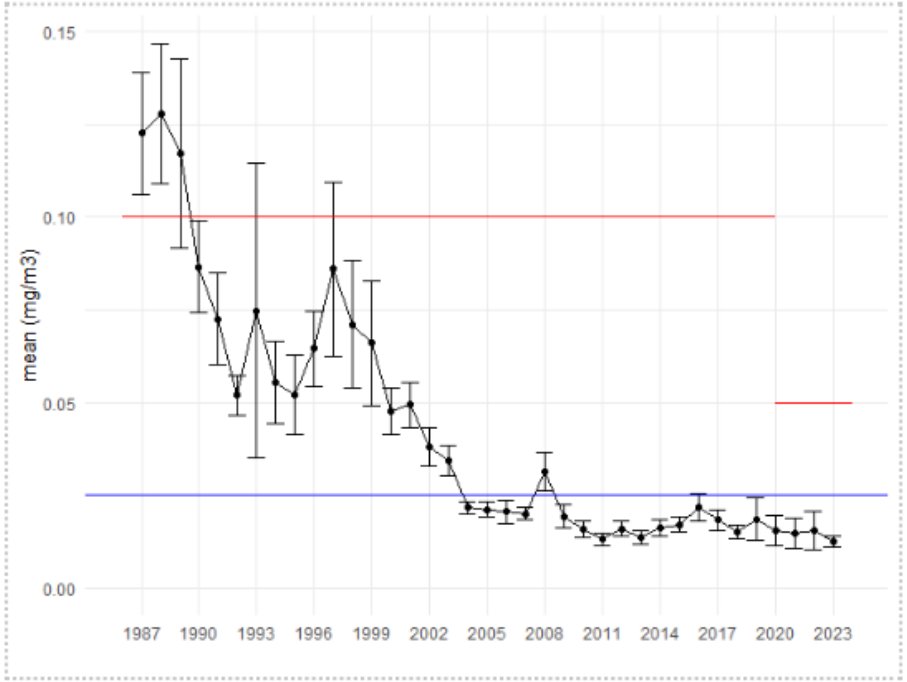


Figure 5 Mean RCS results with LCL and UCL by year, 1987 to 2023

RCS exposure levels decreased (1986 - 2023) with mean and 95% CL remaining consistently below both the 0.1 mg/m^3 (pre-2009) and 0.05 mg/m^3 (post-2009) but above the proposed WES of 0.025mg/m^3.

Sample means have remained consistent from 2009 onwards.

GLM modelling indicate that there has been a small increase in the expected mean between 2015 and 2024 (p=0.016) however, the mean is expected to decrease each year by approximately 5%.

Copper, lead zinc and other commodities had a higher expected mean compared to iron (p<0.0001 and p=0.011, respectively).

Implications for industry (RCS)

- The WA mining sector is deemed to be compliant with the RCS WES of 0.05 mg/m^3 and on track to a lower WES compliance.
- The following occupational groups (SEGS) had the highest exposures:
  - charging & blast,
  - exploration drilling,
  - laboratory technician,
  - quarry labourer, and
  - sample preparation
- All mean values for 2023 were below the WES.
- Exploration drilling did have exceedances and this finding is not unexpected.

Implications for industry (RPE)

WA mines have well developed RPE management programs with respirator fit testing and clean-shaven policies.

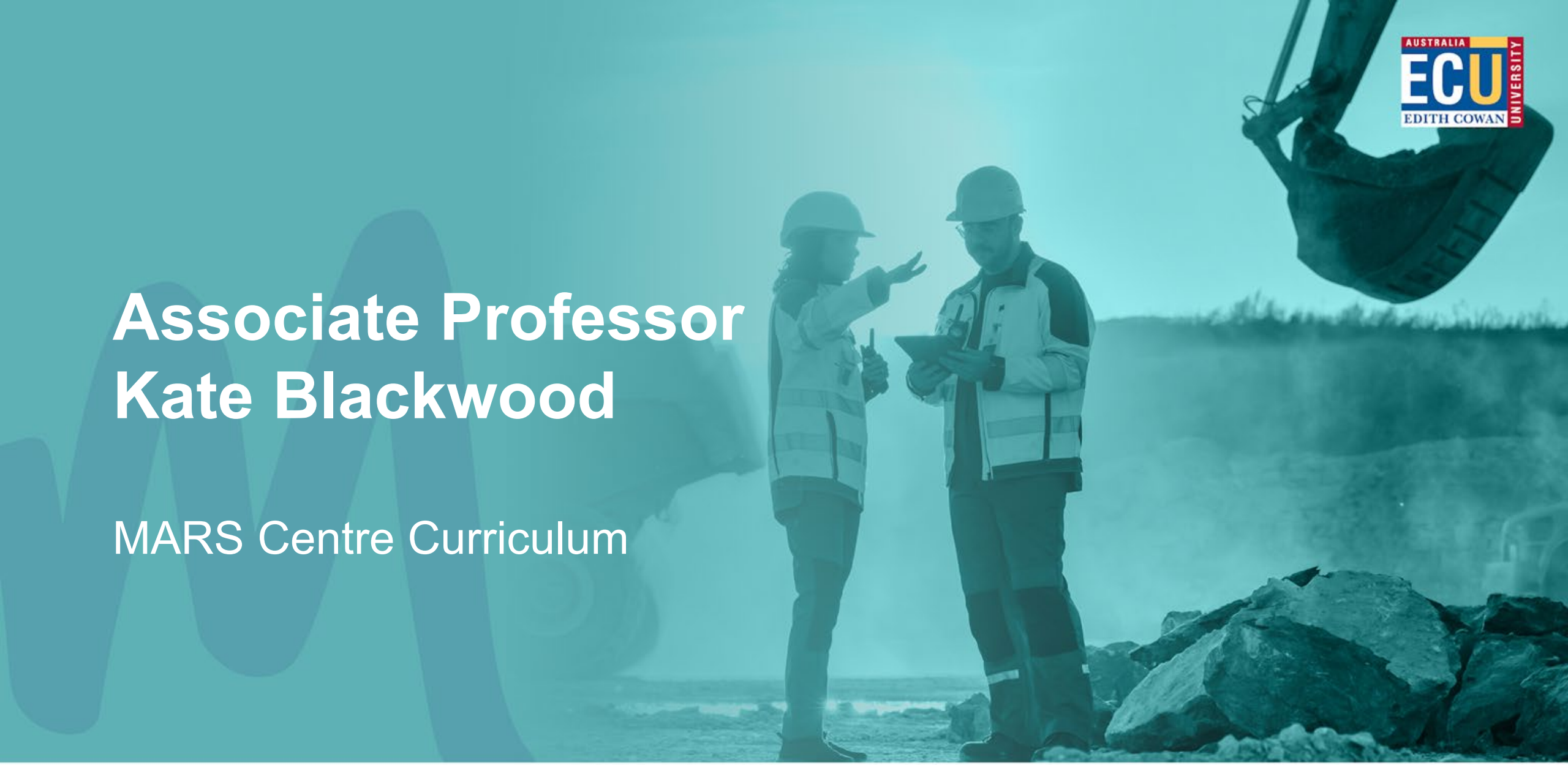
- Current sampling and reporting needs to factor in the protection provided by RPE.
- Regulators need to develop ways for organisations to report workers' exposures considering RPE protection factors.
- Unprotected workers in the vicinity of people wearing RPE need to be assessed (sidestream smoke)
- More research is needed, key issues to consider include;
  - Development of methods where the sampler is placed inside the respirator.
  - How RPE programs will be approved and regulated.
  - Development of methods to apply standardised correction factors to samples collected in the breathing zone external to the RPE.
  - Adjustments for the uncertainty associated with inadequate fit

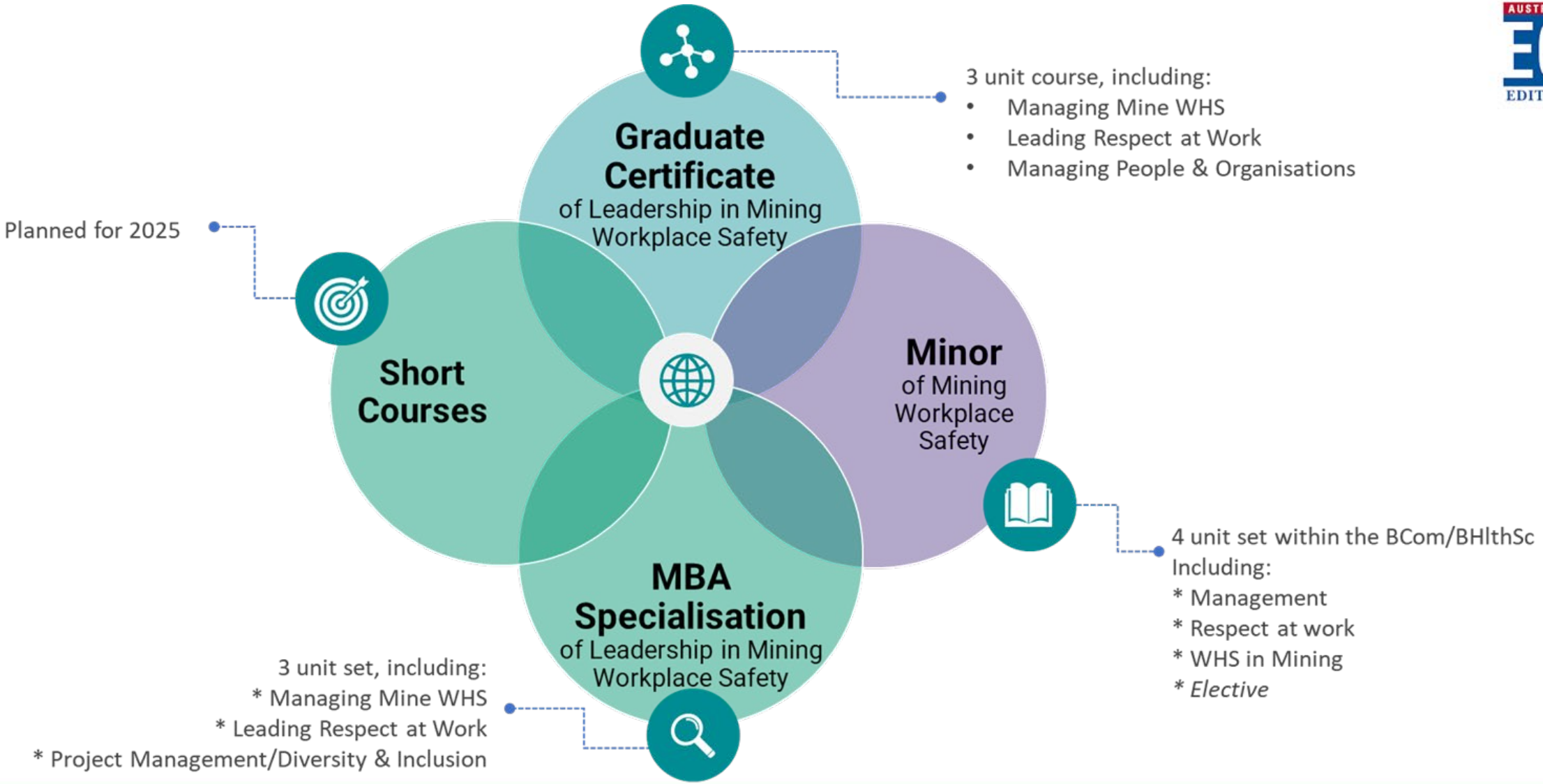
Acknowledgement

The authors wish to thank Mr Paul Foley and Mr Scott Reynolds from the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) for the retrieval and supply of de-identified worker exposure data held in the SRS database.

Associate Professor Kate Blackwood

MARS Centre Curriculum

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3 unit course, including:
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• Leading Respect at Work
• Managing People & Organisations
Planned for 2025
Short Courses
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4 unit set within the BCom/BHlthSc
Including:
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* Respect at work
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Transform the industry. It starts with you.

Advance your leadership skills in mining safety and respect at work with ECU's Graduate Certificate of Leadership in Mining Workplace Safety.

Course Overview

Are you an aspiring or current manager in Western Australia's mining industry?

Located in the School of Business and Law, ECU's Graduate Certificate of Leadership in Mining will enhance your leadership capability for advancing a culture of respect and safety, preventing psychosocial risks, supporting diversity, equity and inclusion, and reducing workplace fatalities and injuries. It is designed to prepare the mining workforce for the future of work safety, particularly in the areas of mental awareness and respect.

This course is offered in partnership with the Western Australian Government's Mental Awareness, Respect and Safety (MARS) program, administered by the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS).

Delivery

This course is offered in part-time or full-time delivery mode. You can study flexibly online with the option to attend a two-day intensive in the Perth CBD. There are three units, and each unit will run over a period of 6-8 weeks. This means that you can gain this tertiary qualification in as little as 6 months.

Scholarships

If you work in the WA mining industry, you may be eligible for a State Government scholarship covering 50% of your fees. Visit our website below to find out more.

See more course information — **ecu.edu.au/courses/S11**

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Managing Mine Work Health and Safety	Leading Respect at Work	Managing People and Organisations

Summary of the day

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CONCLUSION

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