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Risk, Reward, and Risk Taking: Construction Workers' Perspective

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Northwest Construction Consumers Council (NWCCC)

June, 2019

Construction Safety

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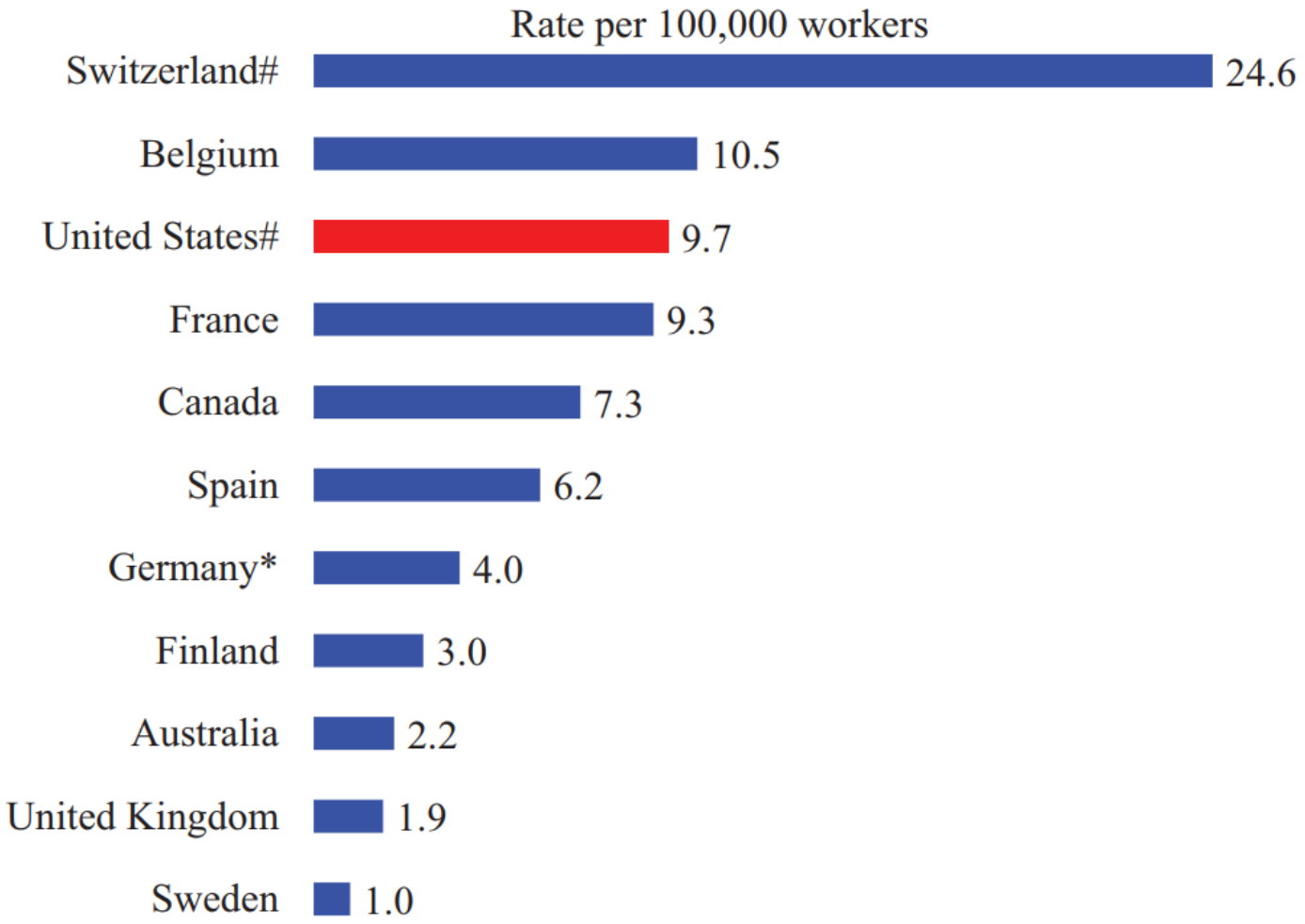
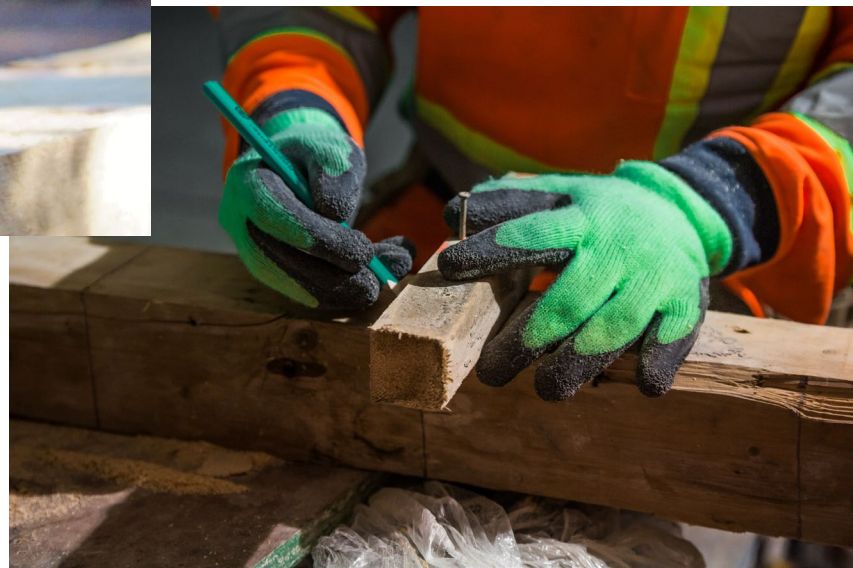


Rate of fatalities in construction, selected countries, 2013
Source: (CPWR, 2016)

Construction Saf



State of Construction Safety

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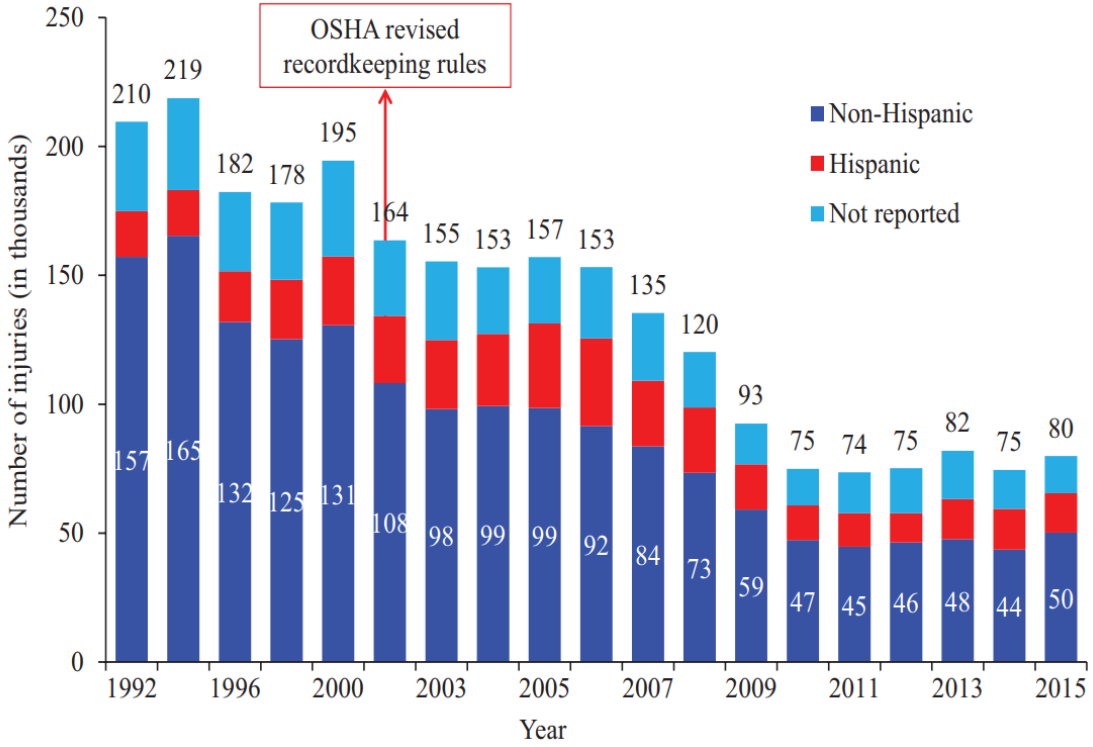
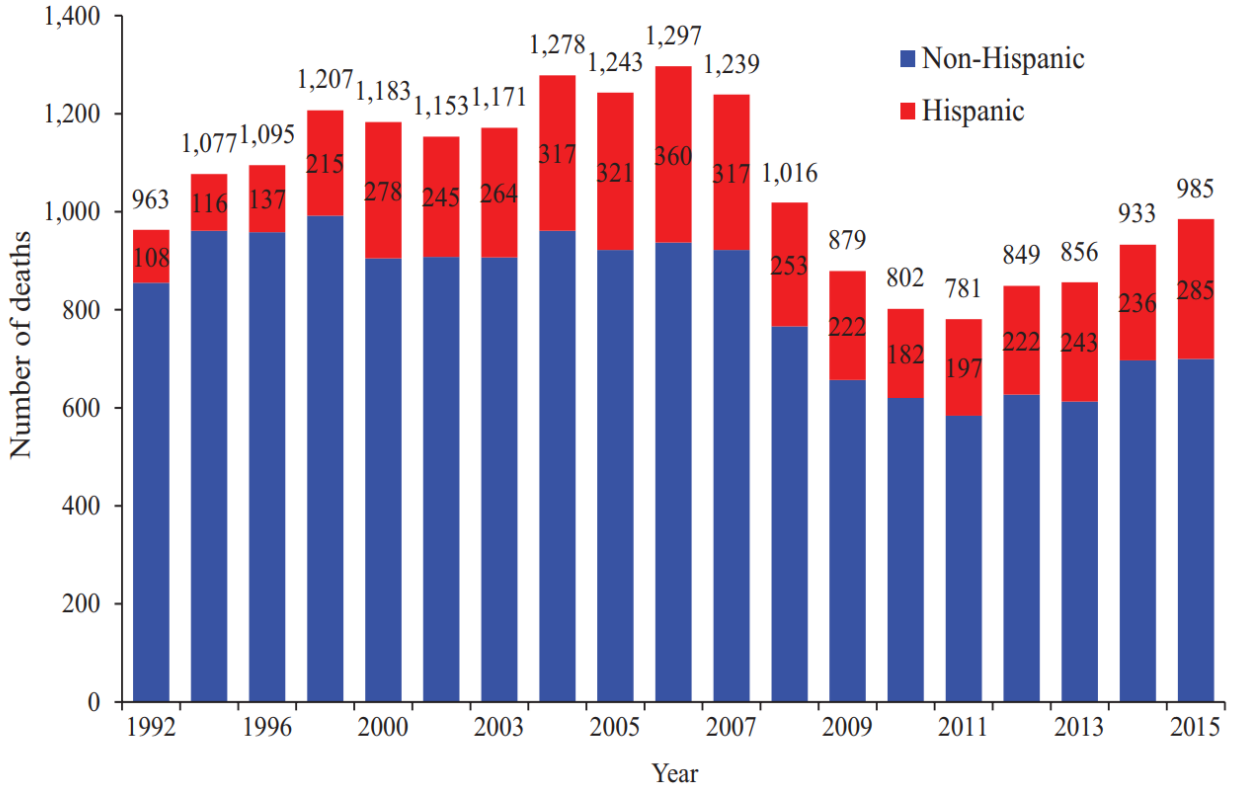


Number of nonfatal injuries resulting in days away from work in construction,1992 to 2015. Source: (CPWR, 2016)



Number of fatalities in construction, 1992 to 2015.

Source: (CPWR, 2016)

Accident Causation: Construction

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- **Root causes of construction accidents (Abdelhamid and Everett, 2000):**
  - Failure to identify hazards,
  - Proceeding with hazardous activity after diagnosing its riskiness,
  - Acting unsafely despite the worksite conditions.
- **Behavioral-related root causes of accidents (Gambatese et al, 2016):**
  - mistake/error,
  - absent-minded/forgetful,
  - uncaring/indifferent,
  - ignorance,
  - poor risk management, and
  - high risk tolerance

Accident Causation

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Construction workers are at the forefront of accidents, and often the last point of contact in a safety system failure.

Decision?

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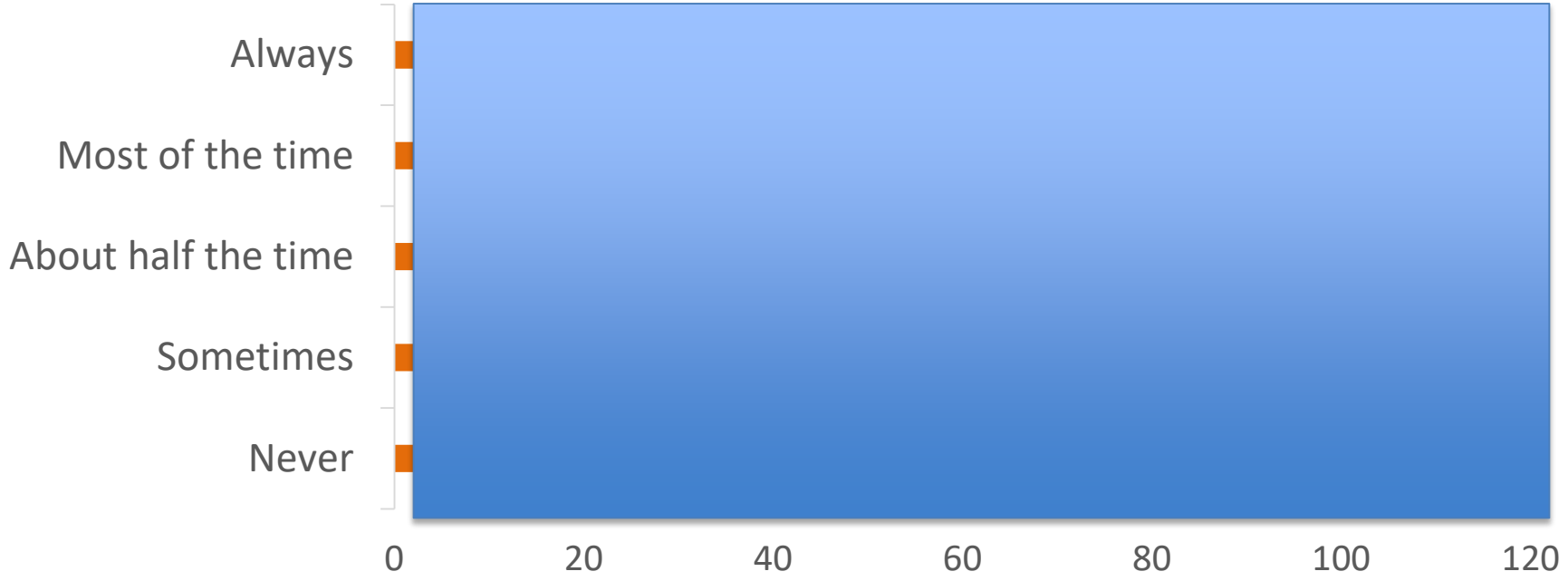
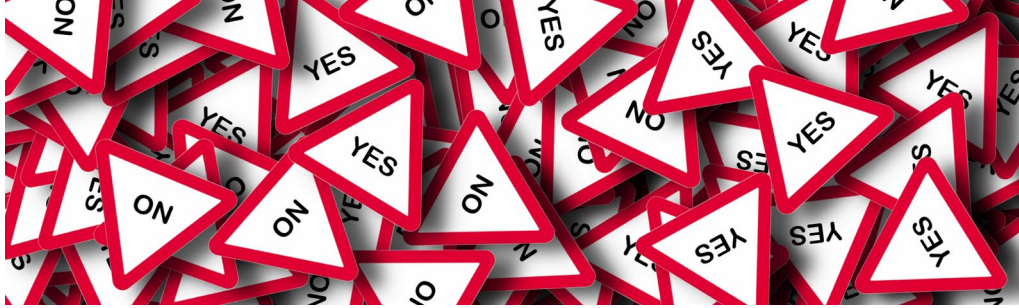
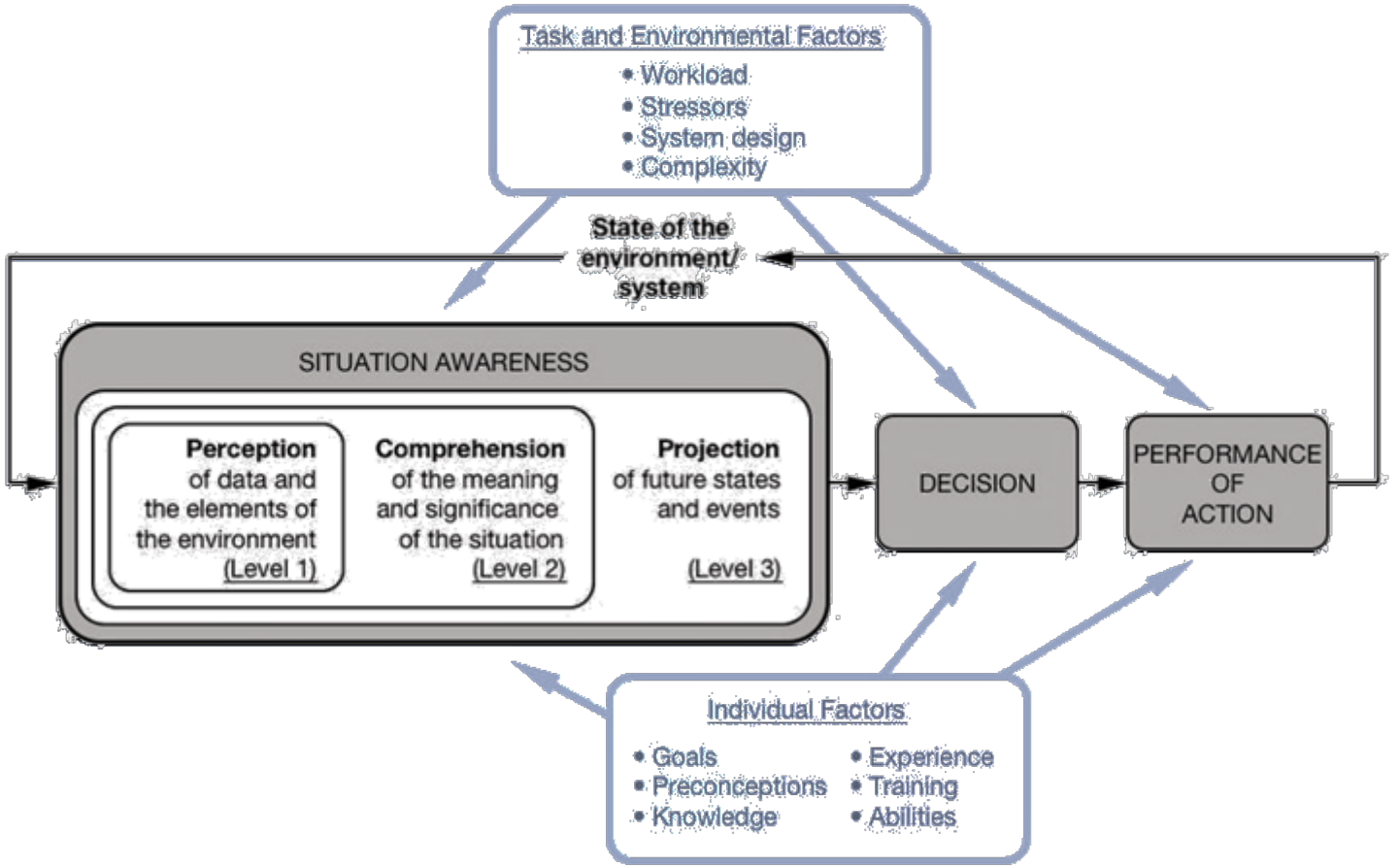
How often do you knowingly take a calculated risk even though it is against your training/work safety plan?



208 Respondents

How Are Decisions Made?





Situational Awareness Model (Endsley, 2015)
Figure from: Lahtinen, 2016

Risk Perception

Intuitive feelings and experiences are still the predominant method by which human beings evaluate risk.

In simple terms, risk perception is defined as the personal evaluation of daily encountered hazards.

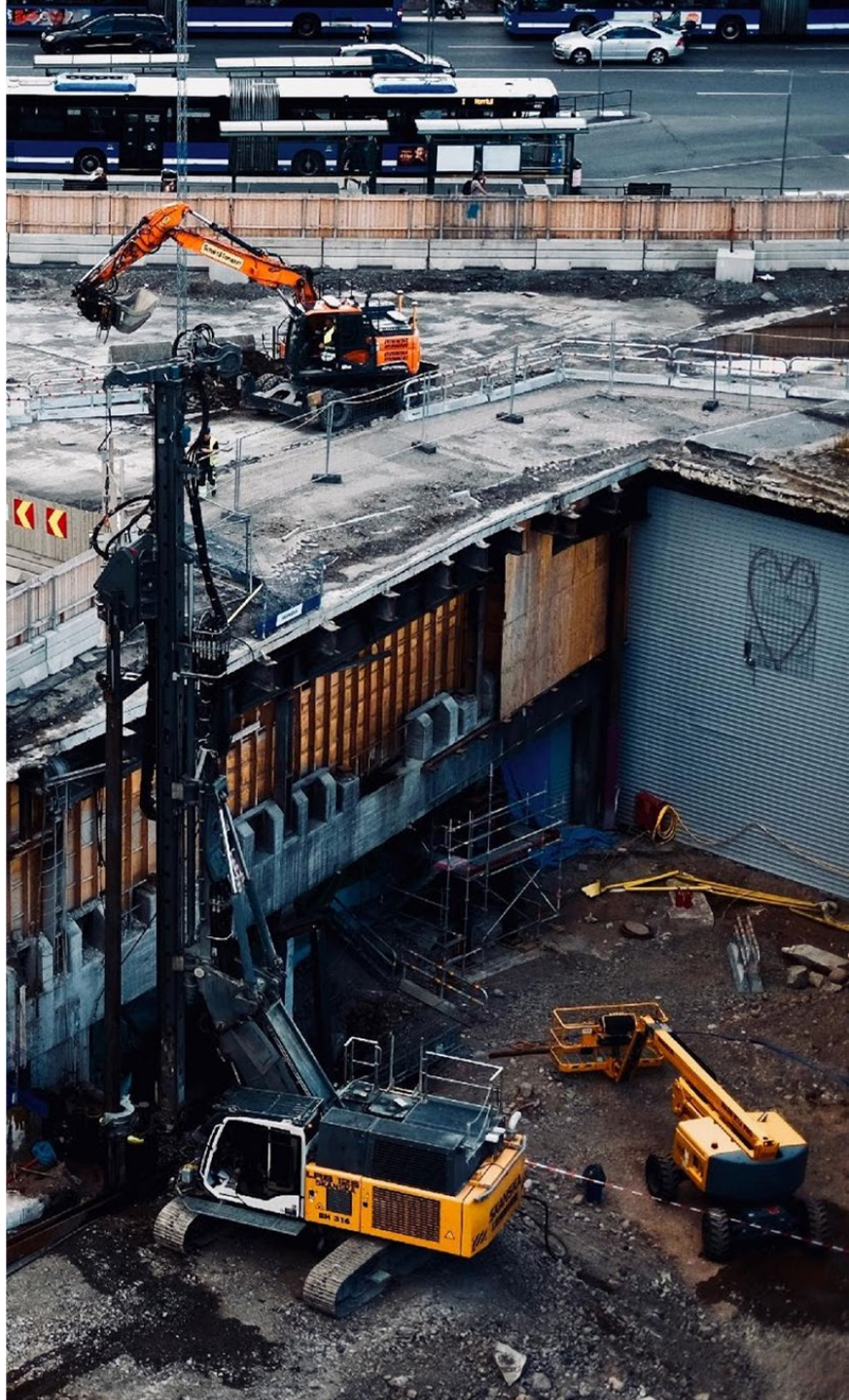
Figure from: Slovic et. al. (2004)

Risk Perception

Contractors plan, manage, and mitigate the residual safety risk passed down from the designer.

Construction is dynamic,
Sites have varying conditions, and
No task-specific quantifiable safety metric [1].

Therefore, construction relies on safety professionals' assessments, as well as workers' perceptions and their assessment of risk.



[1] Seo, JoonOh, et al. "Computer vision techniques for construction safety and health monitoring." Advanced Engineering Informatics 29.2 (2015): 239-251.

Risk Perception

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Why use worker risk perception?

Worker risk perception is influenced by the same factors that affect their perception in their day-to-day work [1].

Workers are able to adequately assess the risk in their own work [2].

How?

- Self assessment (Likert scale)
- Self assessment (frequency * exposure)
- Hazard identification (using a picture of a scenario; Job Hazard Analysis)

[1] Weyman, A. K. and D. D. Clarke (2003). "Investigating the influence of organizational role on perceptions of risk in deep coal mines." Journal of Applied Psychology 88(3): 404.

[2] Hallowell, Matthew Ryan. "A formal model of construction safety and health risk management." (2008).

Hazards present:

- *Fall hazard*
- *Electrical hazard*
- *Struck by hazard*
-

Bad safety practices:

- *Incorrect ladder use*
- *No safety glasses*
-

Good safety practices:

- *Proper tool handling (using the tool bag)*

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Job Hazard Analysis

Job:

Department or location:

(Company name and address)

Task or Step	Hazards	Controls	Personal Protective Equipment (PPE)

lni.wa.gov

JHA by:

Date:

But wait!

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- Construction workers do not act in an unsafe manner intentionally (Tixier et al., 2014).
- Research shows that preconceptions in risk perception cause risk misjudgments which in turn might cause unsafe conduct (Arezes and Miguel, 2008).
- The problem lies in a common misconception that the higher an individual's level of competency in risk perception, the more likely they will work in a safe manner.
- However, research indicates that being aware of the risk associated with one's work does not necessarily mean that he/she will adopt safe practices in their work (Mullen, 2004).
- Mullen (2004) noted that employees often weigh the negative aspects of their jobs against the positive aspects.

Rewards

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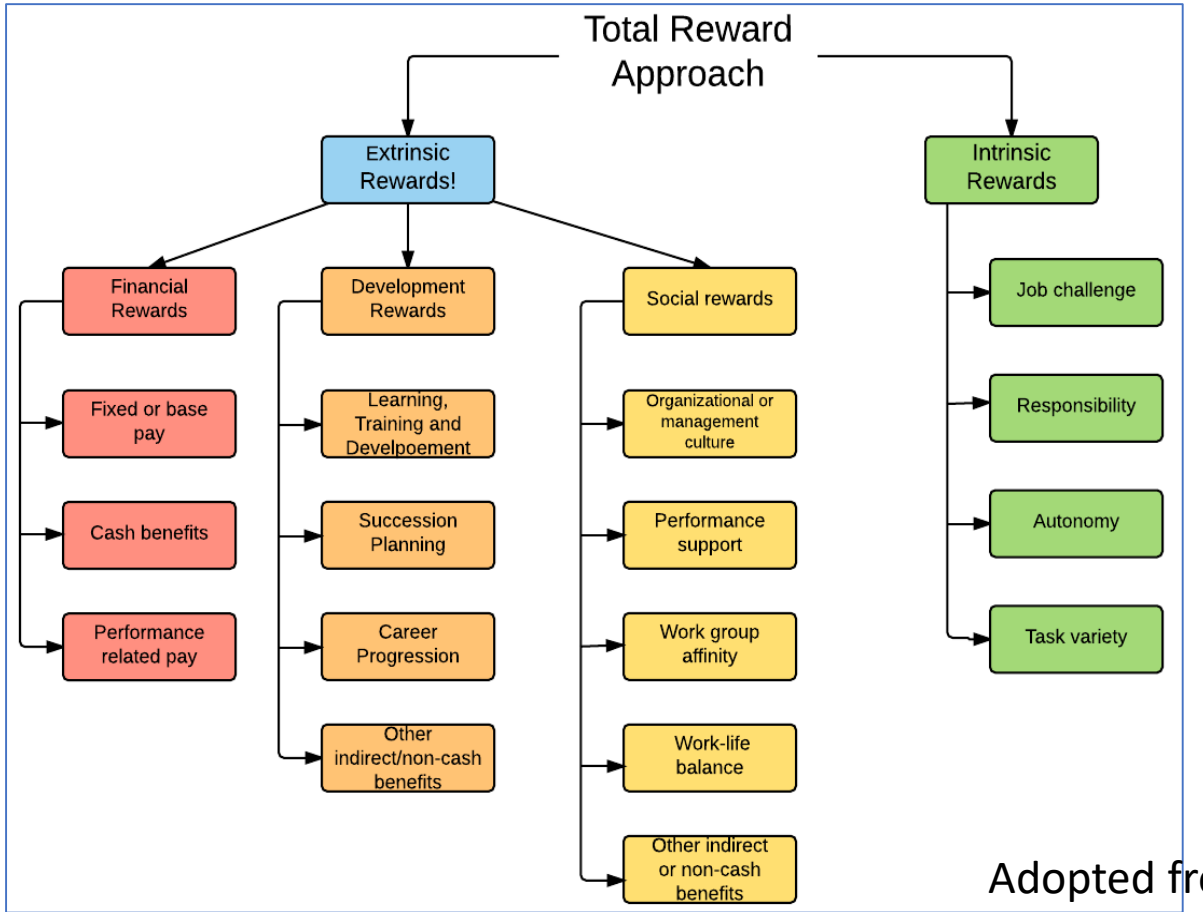
An occupational reward can be anything of value (tangible or intangible) that an employer or an organization delivers to its employees whether **intentionally or unintentionally** in contemplation of the employee's work contributions and to which employees as individuals attach a positive value as a satisfier of certain self-defined needs" (Shields et al., 2016).



Adopted from (Shields et al., 2016)

Rewards

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- Not all rewards are created equal!

antranik.org

Rewards

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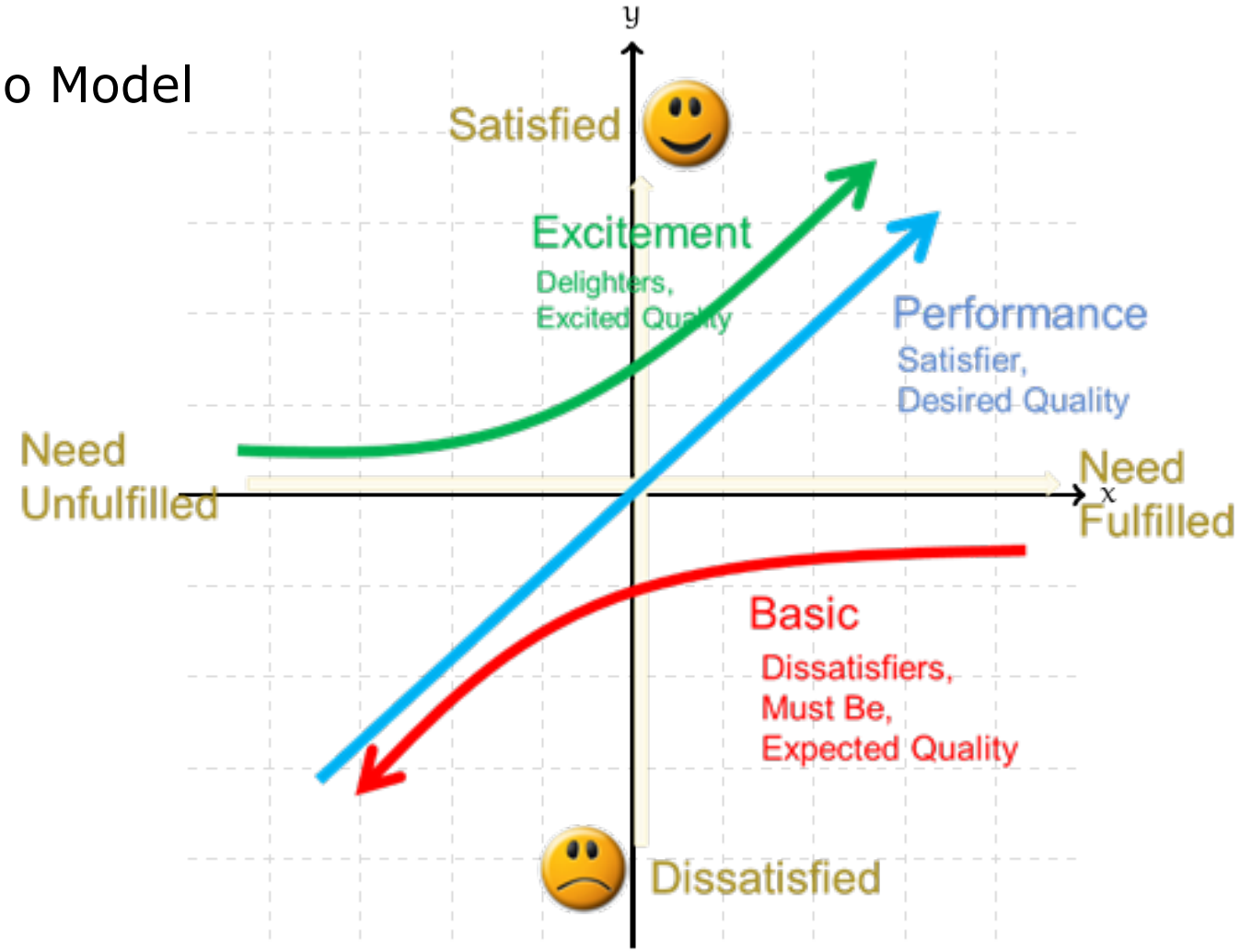
Relationship of Total Reward Approach to Maslow and Herzberg Models

Total Reward Approach	Maslow's Motivation Theory	Herzberg's Two-Factor Model	Expected Outcome with respect to Employees
Base pay	Physiological Need	Hygiene Factor	Attract
Cash benefits	Safety Need	Hygiene Factor	Attract
Performance-related pay	Esteem Need	Motivator Factor	Attract, Retain
Learning and Development	Cognitive Need	Motivator Factor	Motivate
Succession planning	Safety Need	Motivator Factor	Retain and Motivate
Career progression	Self-Actualization	Motivator Factor	Attract, Retain, and Motivate
Management culture	Belonging Need	Hygiene Factor	Attract, Retain
Performance support	Belonging Need	Hygiene Factor	Retain
Work group affinity	Belonging Need	Hygiene Factor	Retain, and Motivate
Work-life balance	Belonging Need	Hygiene Factor	Retain
Job challenge	Aesthetic Needs	Motivator Factor	Attract
Responsibility	Esteem Need	Motivator Factor	Attract
Autonomy	Aesthetic Need	Motivator Factor	Attract
Task verity	Aesthetic Need	Motivator Factor	Attract

(Hewitt, 2012; Kwon and Hein, 2013)

Rewards

- Kano Model



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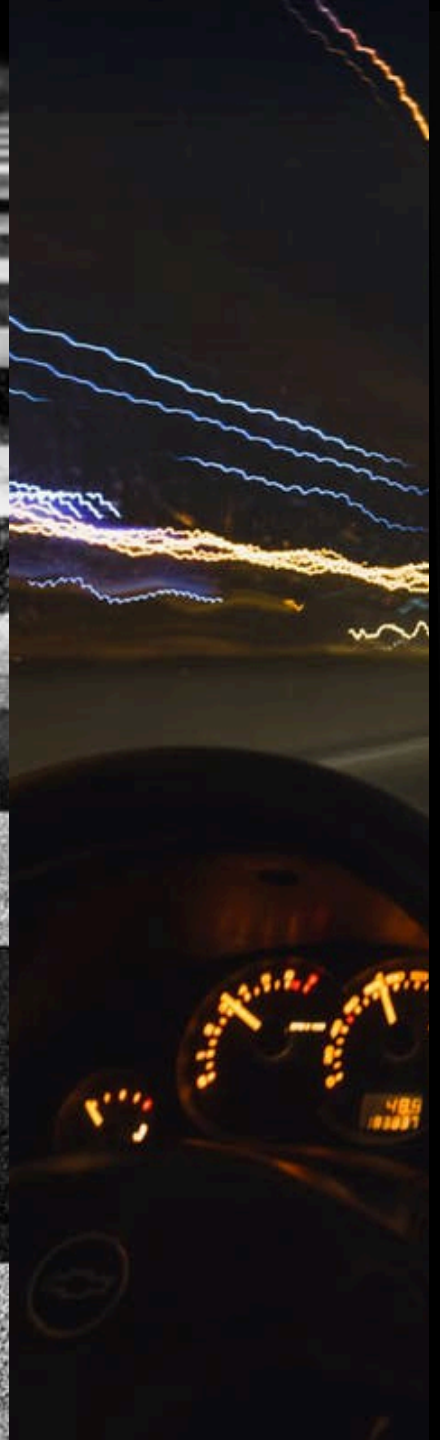


GREEN BULL
reddit.com/r/OSHA

Risk-Reward Trade-off: Background

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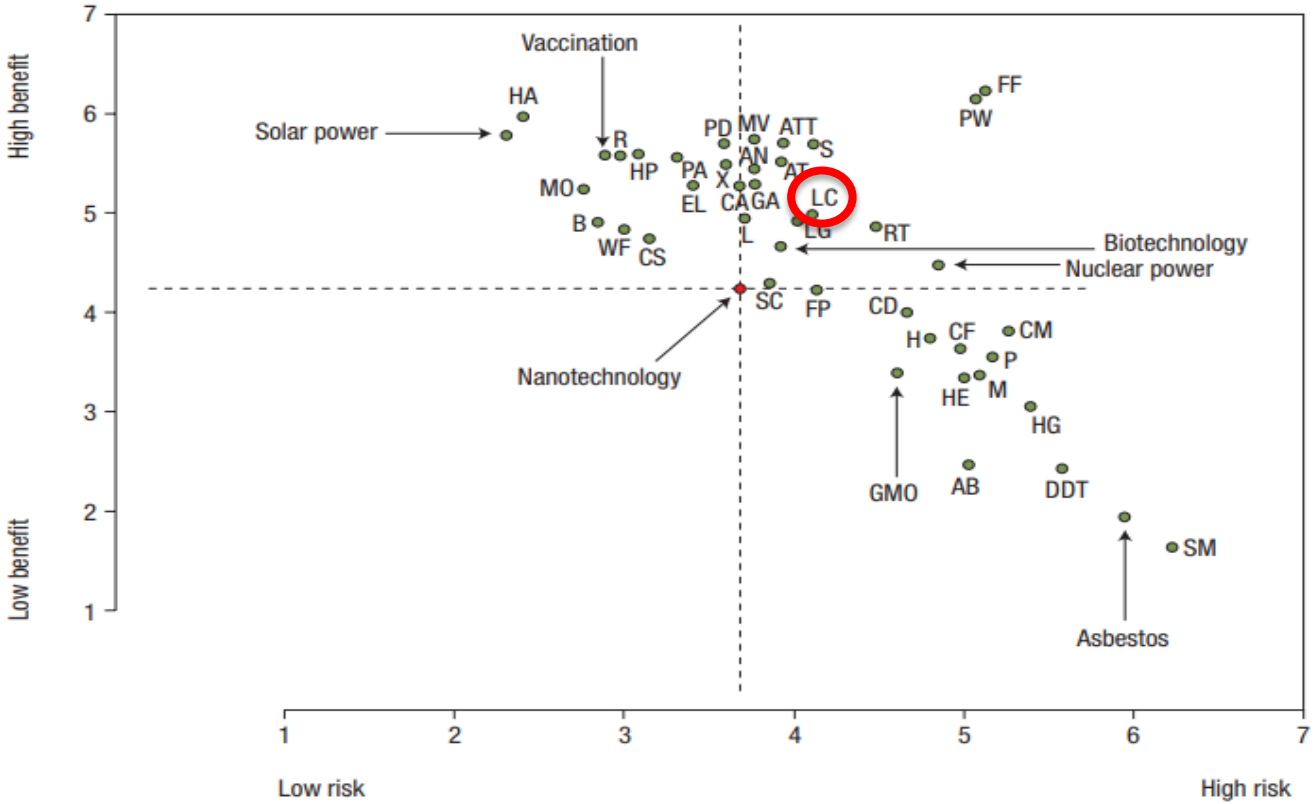
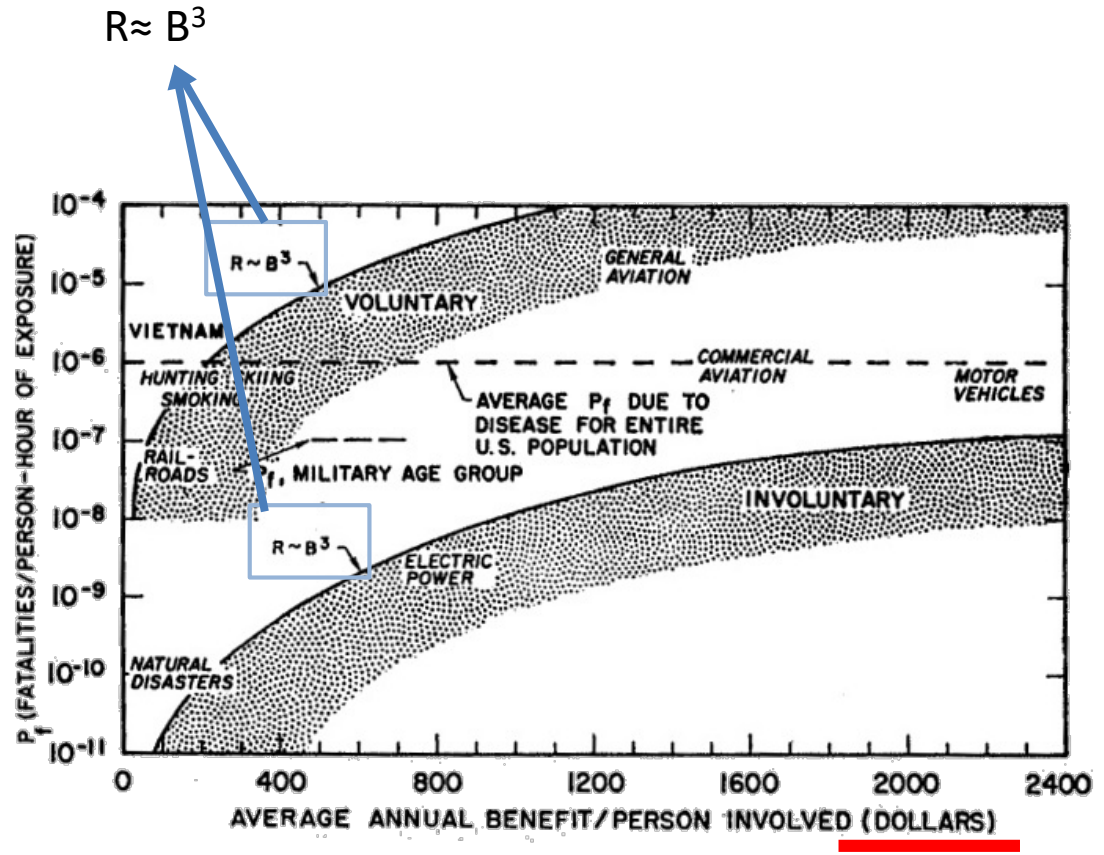


In people's minds, risk and rewards are **negatively** correlated.

Currall et al. (2006)



In the real world, risk and reward are often **positively** correlated.

Starr (1969)

Risk-Reward Trade-off: Background (Cont'd)

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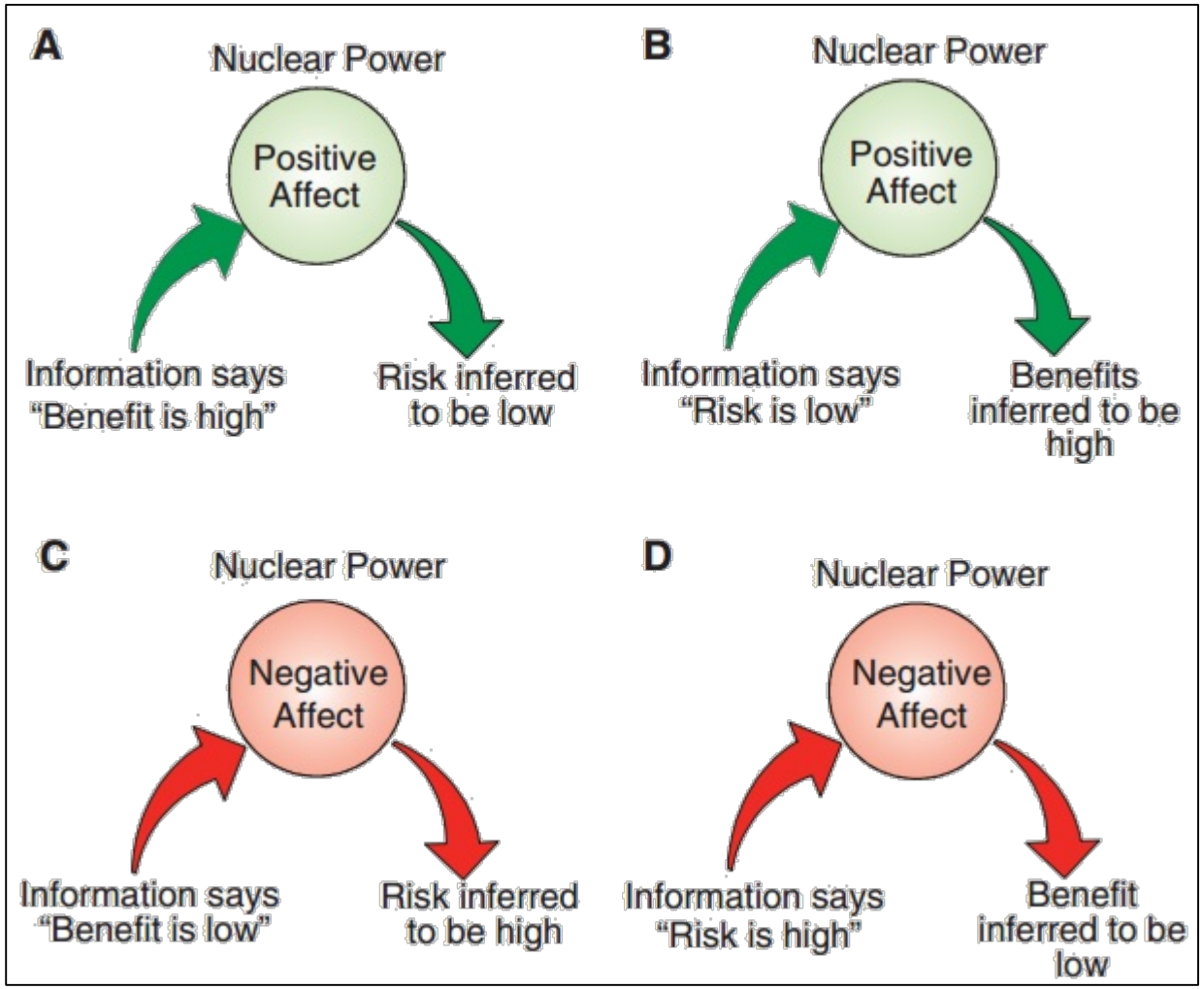
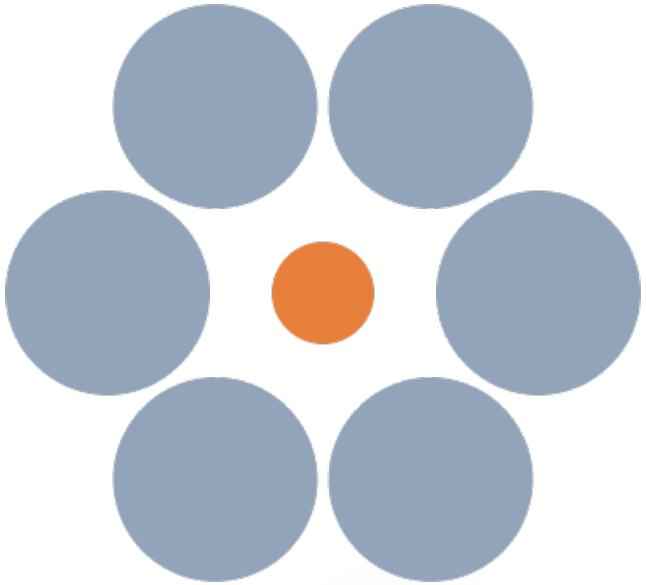
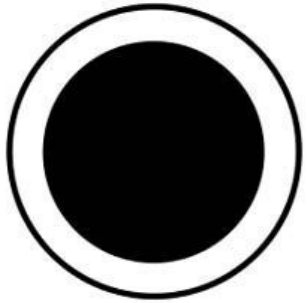
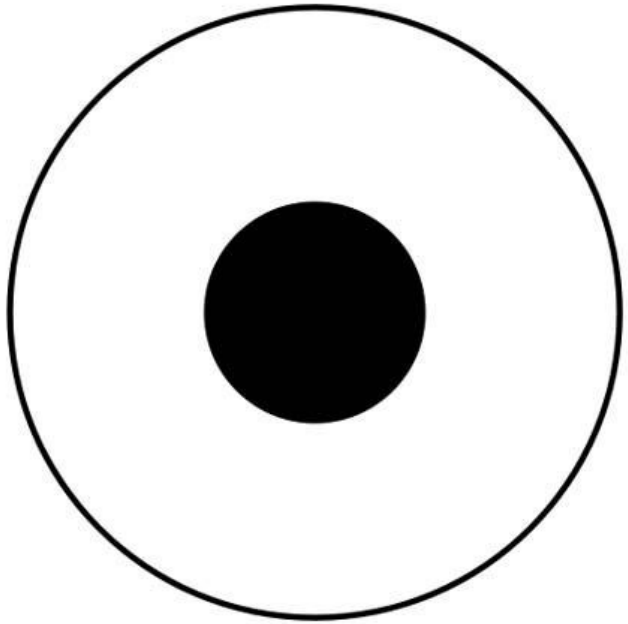
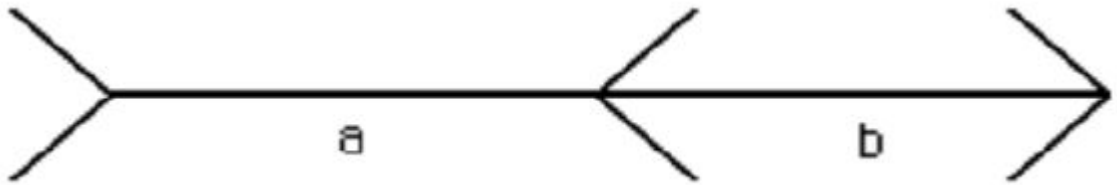


(Slovic, 2004)









Wilde (2014)

Construction Safety Risk and Occupational Reward Trade-off

Data Collection

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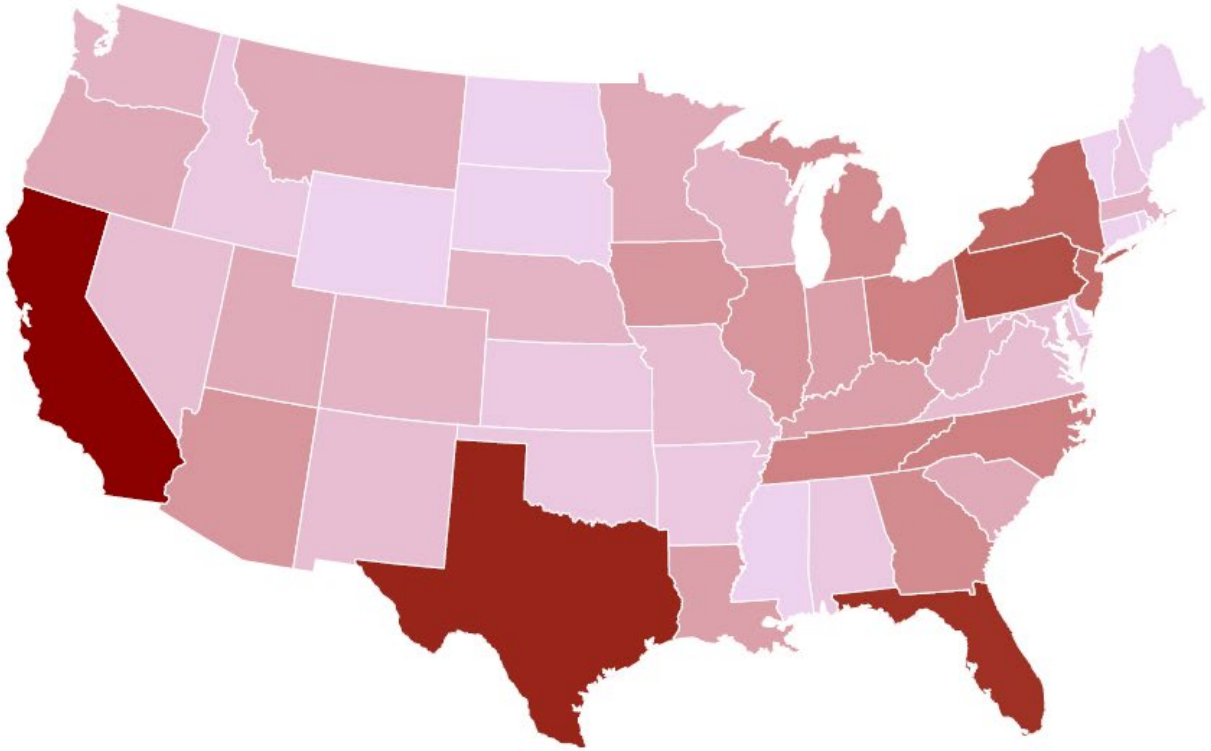
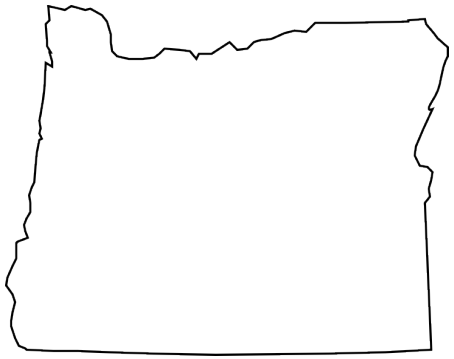
- Survey of over 200 construction workers, nationwide



Survey participation rate by state

- 37 interviews, 6 construction sites, 5 companies



Risk

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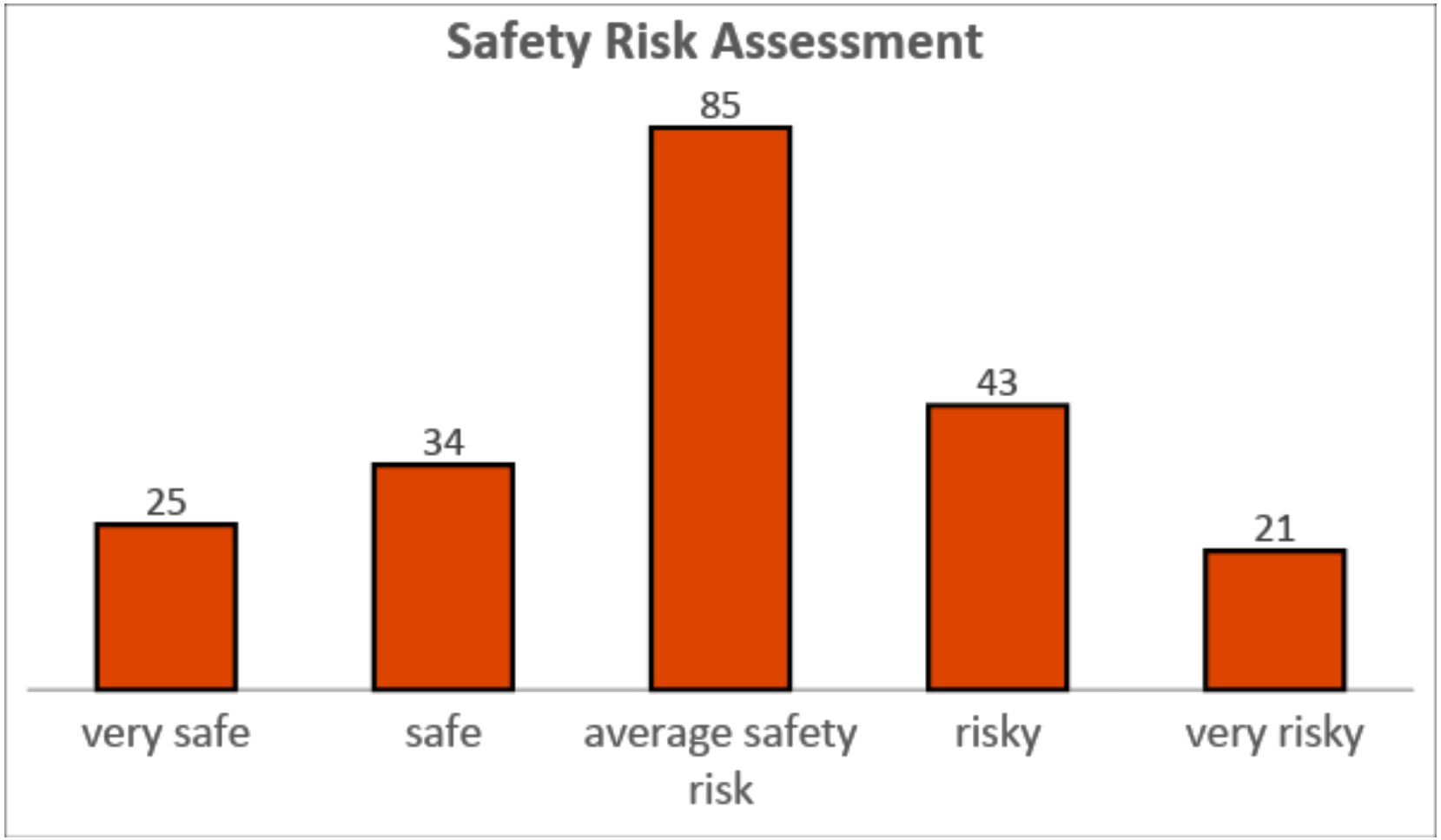

Respondent assessment of their work safety risk

Rewards

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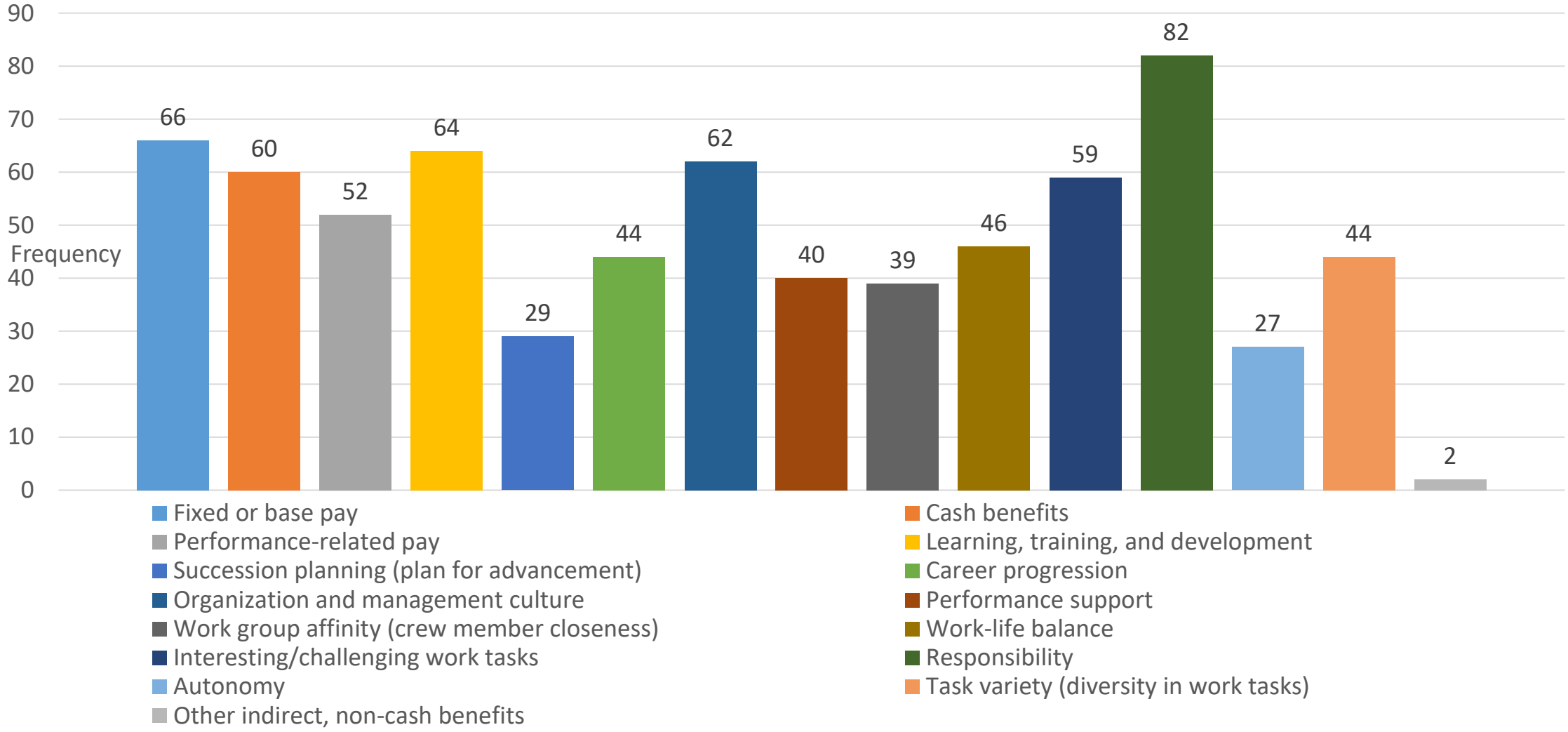

Reward representation by category as indicated by respondents

Rewards

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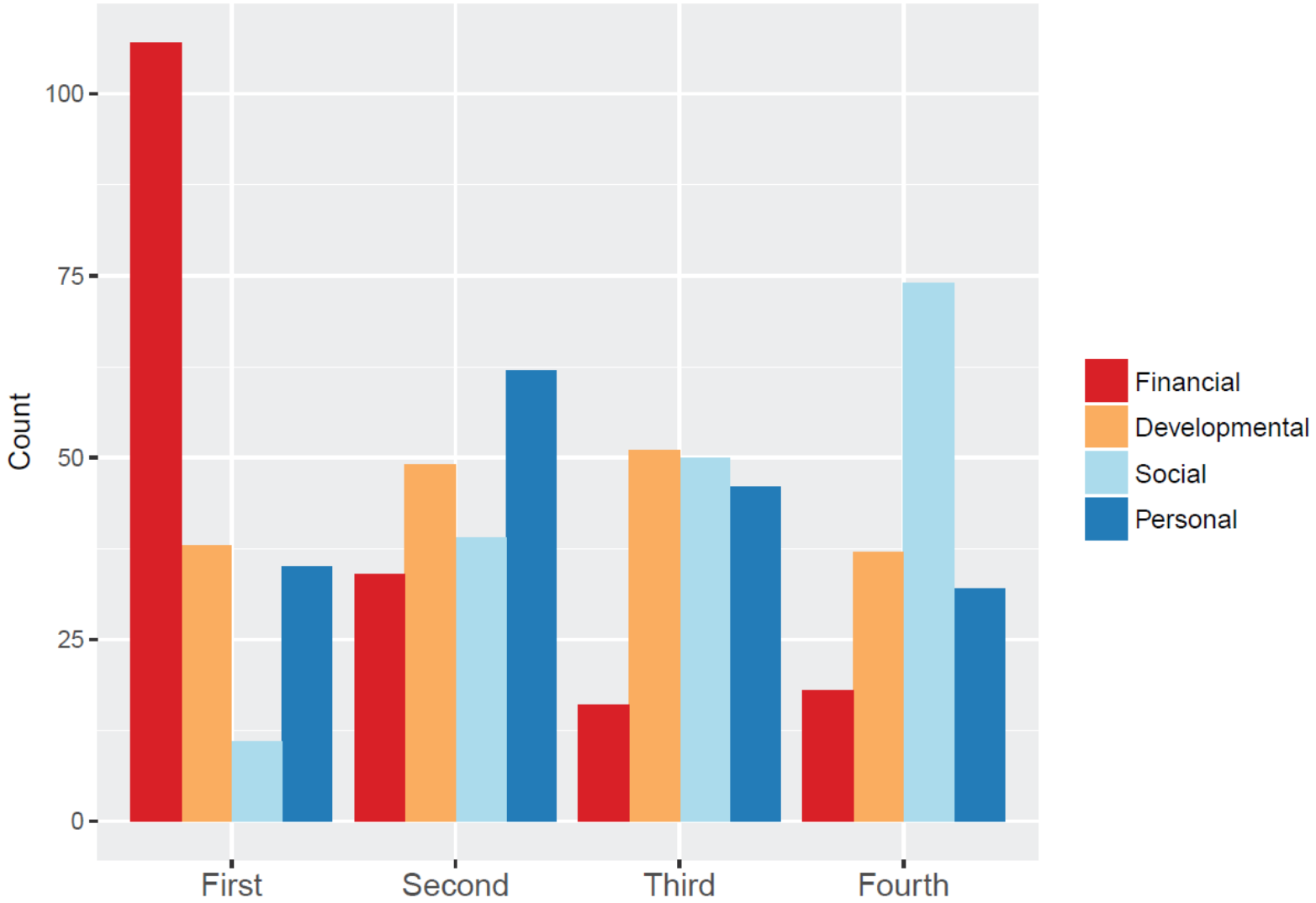

Reward importance as indicated by respondents

Risk-Reward Relationship

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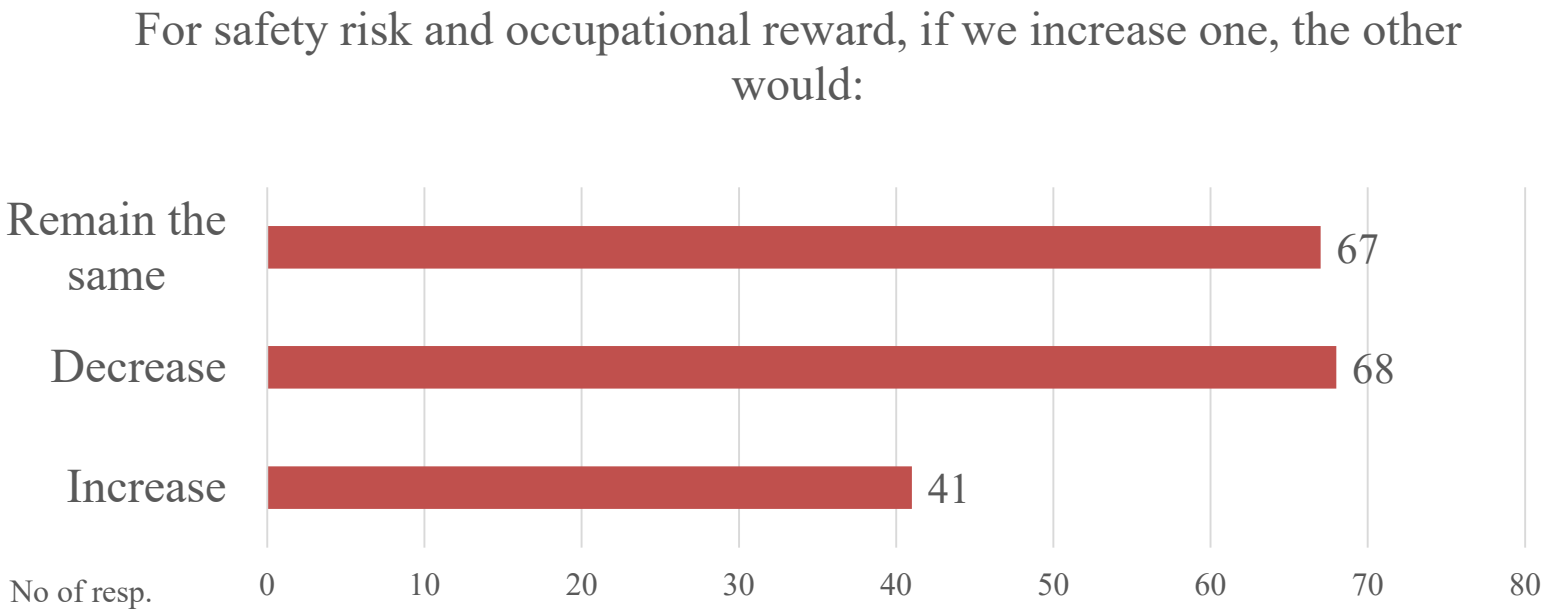
Stated Relationship



Perceived relationship between risk and reward

Risk-Reward Relationship

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Revealed Relationship

Risk and Reward Perception Variable	Mean	Scale	
A1: Worker's knowledge of safety	2.06	1 = very high level of knowledge, 7 = very low level of knowledge	0.279
A2: Company's knowledge of safety	2.00	1 = very high level of knowledge, 7 = very low level of knowledge	0.261
A3: Fear of accident	2.93	1 = very little fear, 7 = extreme fear	
A4: Personal vulnerability	3.32	1 = extremely unlikely, 7 = extremely likely.	
A5: Potential consequences	4.45	1 = low impact potential, 7 = very high impact	
A6: Preventability of risk causing the accident	2.71	1 = extremely preventable, 7 = extremely unpreventable	0.286
A7: Possibility of worker intervention	2.93	1 = very high possibility, 7 = very low possibility	0.345
A8: Potential to impact a large number of workers	2.98	1 = very low level of impact, 7 = very high level of impact	
A9: Long-term potential of risk	1.84	1, immediate impact, 7 after a very long time	
Reward Perception	1.85	1 = very satisfied with reward, 7 = very dissatisfied with rewards	
Job satisfaction	1.95	1 = very satisfied with my job, 7 = very dissatisfied with my job	

Risk-Taking

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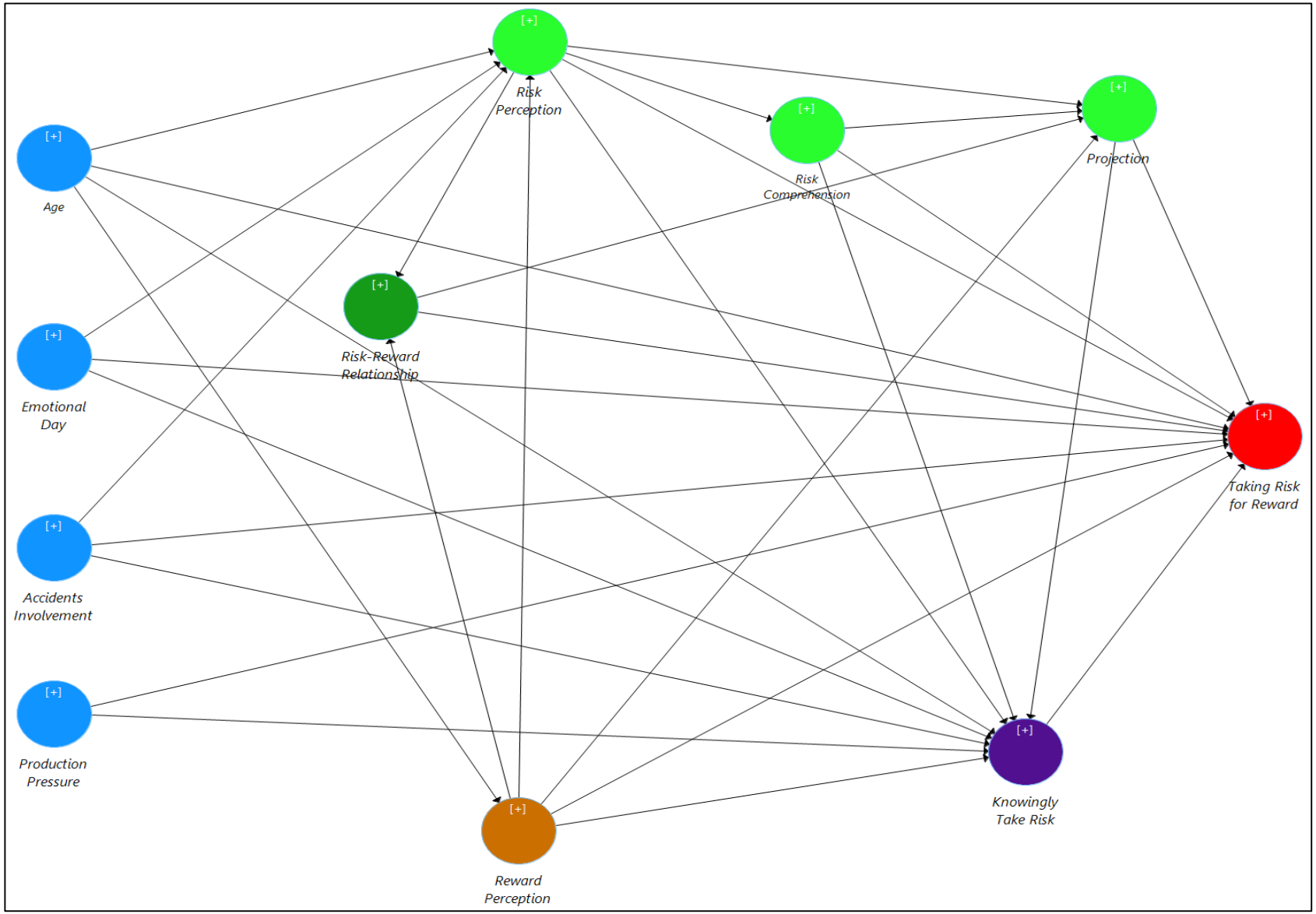

Risk-Taking

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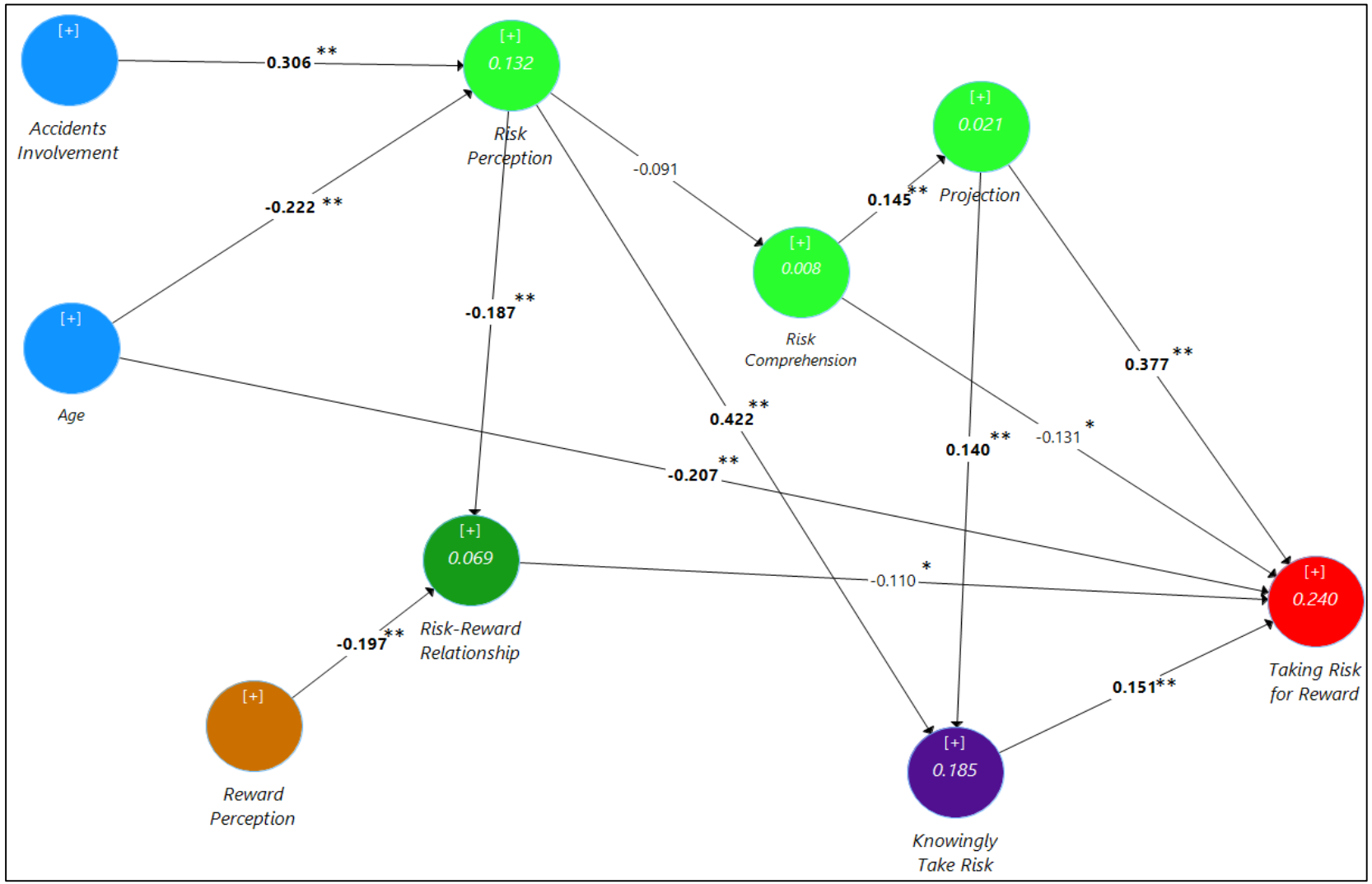

Decision Making

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Will you work on a safe site if your benefits are low (not that high)?

Will you work on a hazardous site if your benefits are high (higher than what you normally work with)?

Do you have a preference regarding site conditions, and job benefits?

Theme/Group (% of all 37 participants)	Theme Description
A (16.2%)	Safety is prioritized over reward
B (35.1%)	Working on a safe site with low benefits is not acceptable
C (24.3%)	High risk for high reward
D (10.8%)	Yes to all jobs, as long as I am paid
E (13.5%)	Safety is good, but a bit more risk is acceptable too

Decision Making

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Reasons for Taking Risk	Freq. (%)
Cut corners to get the job done	19/37 (51.5)
Every job have some risk, even if I don't take risk myself	10/37 (27%)
I don't risk safety	5/37 (13.5%)
Other reasons	3/37 (8%)

Reasons for not Taking Risk	Freq. (%)
high consequences: possible injury/outside of my comfort zone	10/37 (27%)
I value my life/getting back to my family/no reason to take risk	17/37 (46%)
Other workers safety, I can get fired, company policy, I find ways to do it safely	10/37 (27%)

Conclusions

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- Construction workers do take risks in their jobs
- Risk perception is still widely used in construction safety assessment
- Risk perception is not secluded from rewards perception
- Workers have no understanding of the risk-reward relationship in their jobs
  - However, worker decisions are influenced by the risk-reward relationship
- Risk taking is not always related to personal tendencies
  - Normalization of deviance
  - Psychological contract
  - Risk-taking for other's benefit (employer/client)

Path Forward

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- Assessments of risk-taking, and risk-reward perception, are required
- Training for risk-reward implication, and risk homeostasis.
  - For example: Signing bonus, danger money, productivity bonus.
- Crew re-assignment (based on collective risk-taking balance)
- Is it risk-taking or decision-making under uncertainty?

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