

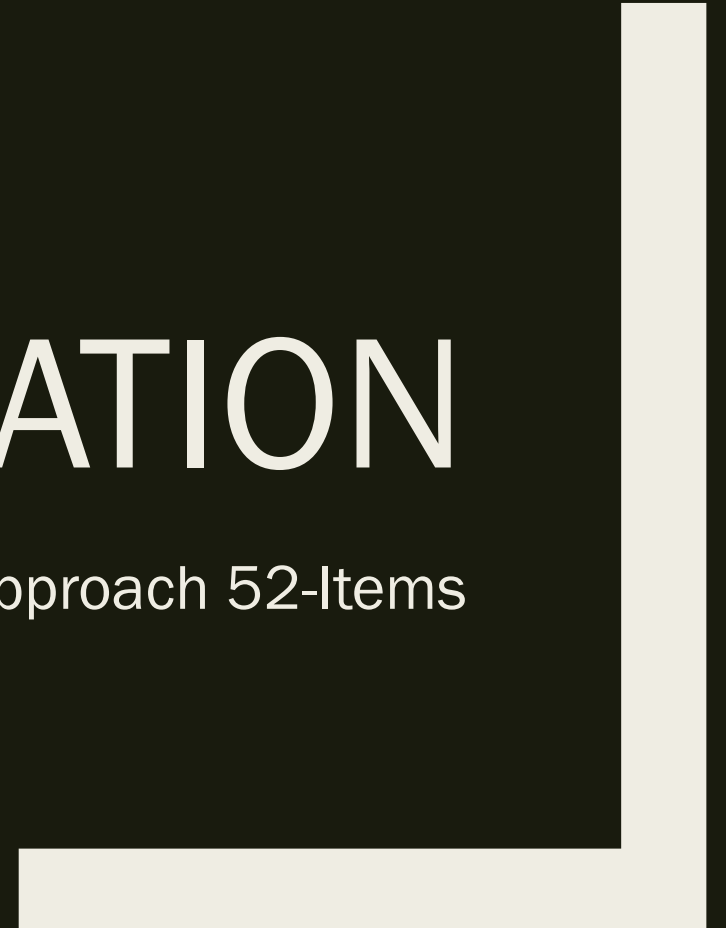


**CONSTRUCTION
SAFETY CULTURE
SCALE**



ITEM GENERATION

Deductive & Subject Matter Expert Approach 52-Items



52 Items Generated Based on Safety Culture Definition and Past Literature.

“Deeply held but often unspoken safety-related beliefs, attitudes, and values that interact with an organization’s systems, practices, people, and leadership to establish norms about how things are done in the organization. Safety culture is a subset of and clearly influenced by, organizational culture. Organizations often have multiple cultures or subcultures, and this may be particularly true in construction.” (NIOSH/CPWR, 2013, p.14)

5 Industry Subject Matter Experts were Consulted.

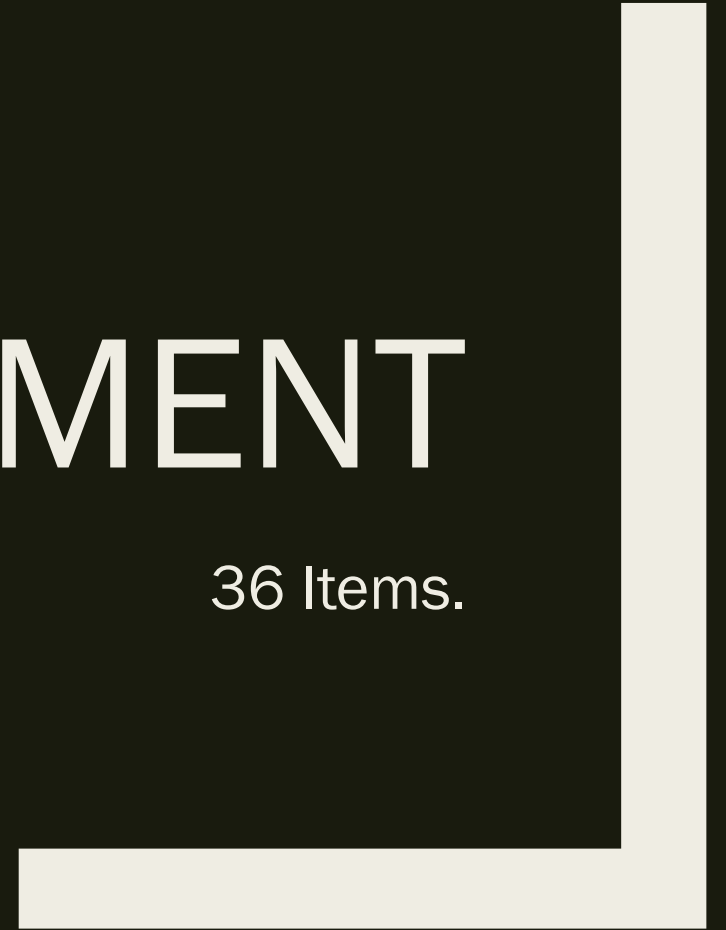
The SME's reviewed each question and rated the relevance to construction safety culture on a 5-point scale. They also were provided an opportunity to add items to the scale.

Based on SME agreement and construct fidelity, we removed 16-items, leaving 36-items for the next scale development phase.

Orig order	Timestamp	1.00	2.00	3.00	4.00	Average		%
						5.00Item		
	22How many times could you have reported a near-miss but did not?	1	3	4	3	1	2.4	48
	36I sometimes do not wear all my PPE because it gets in the way of my work.	1	3	4	5	1	2.8	56
	37I feel there is pressure to get the job done as quick and cheap as possible.	1	4	4	5	1	3	60
	50What is one thing you would do to make your work day safer for you and your coworkers?	1	4	4	3	3	3	60
	10On average, how often are you disciplined when you act unsafely or break a rule?	1	3	4	4	4	3.2	64
	11On average, how often are your coworkers disciplined when they act unsafely or break a rule?	1	3	4	4	4	3.2	64
	15Depending on who I am working with on the shift, I have to be more cautious for my safety.	5	2	4	4	1	3.2	64
	18__ out of __ of my coworkers often do not follow safety rules and regulations.	5	3	4		4	3.2	64
	21How many times have you reported a near-miss?	1	2	5	3	5	3.2	64
	29In the past 6-months: How many times have you stopped your job task because you felt it was unsafe?	1	5	4	5	1	3.2	64
	12I tend to take more risks when I am working alone compared to when I am working with coworkers.	3	4	5	3	2	3.4	68
	30In the past 6-months: How many times have your coworkers stopped work because it was unsafe?	2	5	4	5	1	3.4	68
	33I would feel pressure from my coworkers if I were to delay the job due to a safety concern.	1	5	5	5	1	3.4	68
	34I would feel pressure from my supervisor if I were to delay the job due to a safety concern.	1	5	5	5	1	3.4	68
	47If I raise a safety concern, I worry that our business might not get another contract with the same contractor.	1	5	3	5	3	3.4	68
	48I feel less safe when I work for certain contractors.	1	4	3	5	4	3.4	68
	2On average, how often do your coworkers receive positive feedback when acting safely.	4	2	4	4	4	3.6	72
	17I believe that __ out of __ my coworkers care about their own personal safety.	4	3	3	4	4	3.6	72
	31(Why/Why not) In the past 6-months: How many times SHOULD you have stopped work because you felt it was unsafe?	2	5	5	5	1	3.6	72
	51What, if anything, stops you from reporting safety accidents and injuries?	1	4	5	5	3	3.6	72
	1On average, how often do you receive positive feedback for acting safely.	4	3	4	4	4	3.8	76
	16I believe that __ out of __ my coworkers care about my safety when we are working together.	5	3	3	3	5	3.8	76
	19__ out of __ of my coworkers always follow safety rules and regulations.	5	3	4	4	3	3.8	76
	52If the government legalized marijuana, would it make your workplace more dangerous? Why or why not?	1	5	3	5	5	3.8	76
	26If I saw something dangerous or unsafe coworker, I would tell to other coworkers about it.	5	4	4	2	5	4	80
	6On average, how involved are your coworkers in the decisions regarding their health and safety at work?	4	3	5	5	4	4.2	84
	13Compared to when I am alone, I behave more safe when I am around coworkers.	5	4	5	5	2	4.2	84
	14Compared to when I am alone, I behave more safe when I am around my supervisor	5	4	5	5	2	4.2	84
	24If I saw something dangerous or unsafe condition, I would talk to my coworkers about it.	5	4	4	3	5	4.2	84
	44My direct supervisor is quick to resolve safety issues on the job site.	5	4	4	4	4	4.2	84
	My direct supervisor provides the appropriate amount of discipline when a safety rule or procedure has been 45broken.	5	4	4	4	4	4.2	84
	My direct supervisor provides the appropriate amount of discipline when a safety rule or procedure has been 46broken.	5	4	4	4	4	4.2	84
	30On an average work week, how often do you prioritize productivity over safety?	5	5	5	4	3	4.4	88
	40On an average work week, how often do your coworkers prioritize productivity over safety?	5	5	5	4	3	4.4	88
	50On average, how involved are you in the decisions regarding your health and safety at work?	4	4	5	5	4	4.4	88
	9On average, how often do your coworkers follow safety rules and procedures?	5	3	5	5	4	4.4	88
	23If I saw a dangerous or unsafe condition, I would talk to my supervisor about it.	5	3	4	5	5	4.4	88
	25If I saw a dangerous or unsafe coworker, I would talk to my supervisor about it.	5	4	3	5	5	4.4	88
	41My direct supervisor focuses on working safety, even if work will fall behind schedule.	5	4	4	4	5	4.4	88
	49Certain contractors do not prioritize safety.	5	4	3	5	5	4.4	88
	7On average, how often are the appropriate tools and equipment available for you to work safely?	5	4	4	5	5	4.6	92
	8On average, how often do you follow safety rules and procedures?	5	3	5	5	5	4.6	92
	Our organization has a process to capture near-miss incidents (incidents that did not result in damage or harm, 20but easily could have) If Yes, then	5	3	5	5	5	4.6	92
	28My supervisor is open to new ideas and ways of completing the job in a safer way.	5	5	4	5	4	4.6	92
	35I always wear the appropriate PPE, even if it will take additional time to complete the job.	5	4	4	5	5	4.6	92
	38My direct supervisor prioritizes safety over everything else.	5	5	4	4	5	4.6	92
	39My direct supervisor supports me in receiving safety training	5	5	4	4	5	4.6	92
	40My direct supervisor cares when I am not working safely.	5	4	5	4	5	4.6	92
	27I let my coworkers know when they are not working safely	5	5	5	4	5	4.8	96
	42My direct supervisor leads by example when it comes to safety.	5	5	5	4	5	4.8	96
	43My direct supervisor listens to my safety concerns and suggestions.	5	5	5	4	5	4.8	96
	32I feel comfortable reporting safety concerns, even if it means the job will be delayed.	5	5	5	5	5	5	100

SCALE DEVELOPMENT

36 Items.



2 Scale Types + Short Answer

Frequency (0-100%)

“Indicate, on average, how often each statement occurs from 0% (never) to 100% (Always) in your workplace

Agreement (5-point scale)

When imagining your current job and employer, please indicate the extent to which you agree or disagree with each of the follow statements.

Validated with **223** Construction Employees

223 construction employees (supervisors and labour) from a variety of sub-industries while attending a training session at Nova Scotia Construction Safety.

Sub-Industries:

- Commercial Construction
- Concrete & Cement Products
- Concrete Services
- Construction Infrastructure
- Electrical Services
- Framing
- Heavy Construction
- Interior Finishing Services
- Masonry Insulation and Siding
- Misc Maintenance & Install
- Plumbing & Air Conditioning
- Residential Construction
- Roofing
- Site Work
- Wrecking & Demolition

SCALE CONSTRUCTS

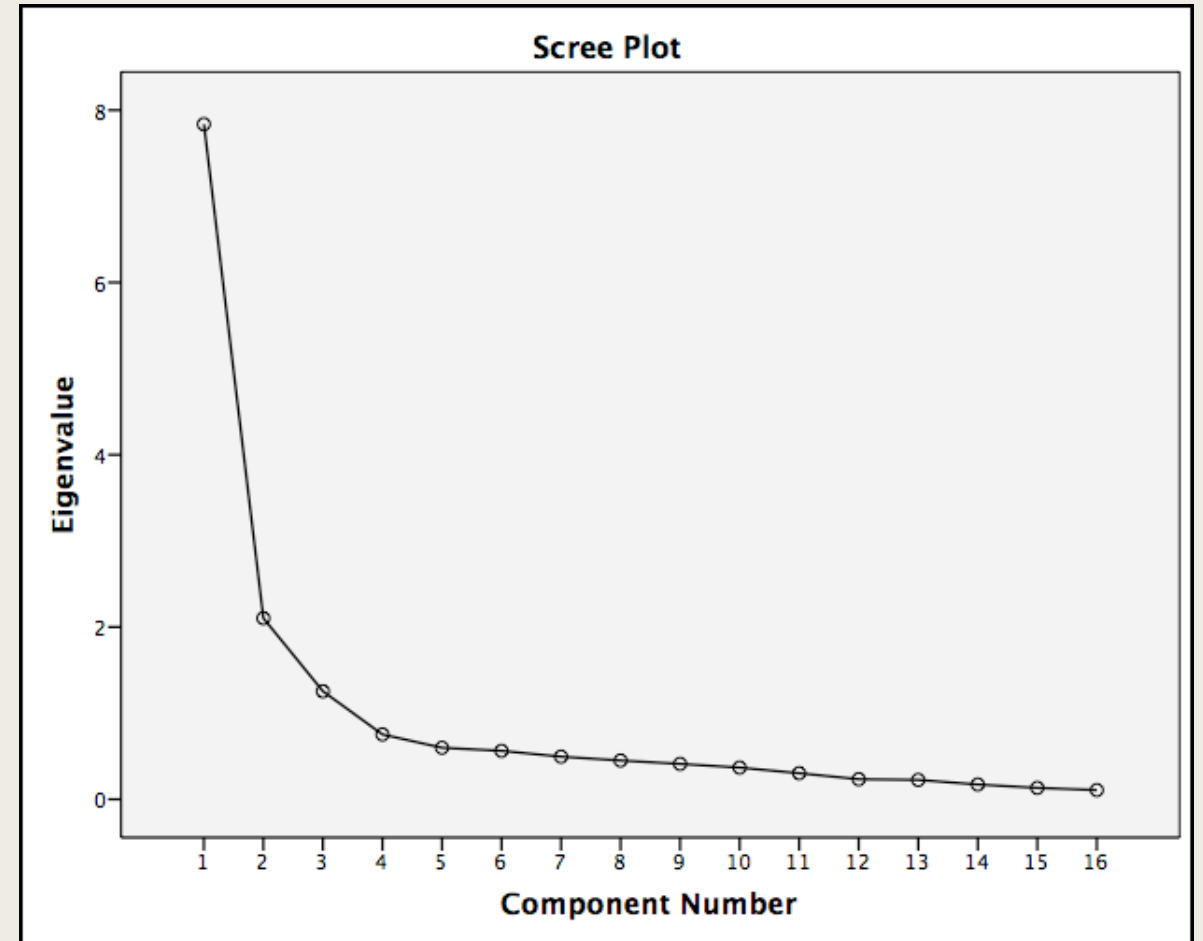
3-Factor Solution



Principle Components Analysis: 3 - Factor Solution: 16 - Items

The Scree Plot is used to identify how many factors exist in the scale.

It is clear that there is a 3-factor solution from the scree plot and Eigenvalues (greater than 1).



Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.837	48.983	48.983	7.837	48.983	48.983
2	2.102	13.138	62.121	2.102	13.138	62.121
3	1.254	7.837	69.958	1.254	7.837	69.958
4	.753	4.704	74.662			

	Factor		
	Supervisor Culture	Coworker Culture	Communication Culture
1My direct supervisor is quick to resolve safety issues on the job site.	.934		
1My direct supervisor leads by example when it comes to safety.	.883		
1My direct supervisor focuses on working safety. even if work will fall behind schedule.	.874		
1My direct supervisor listens to my safety concerns and suggestions.	.832		
1My direct supervisor provides the appropriate amount of discipline when a safety rule or procedure has been broken.	.788		
1My direct supervisor prioritizes safety over everything else.	.727		
1My supervisor is open to new ideas and ways of completing the job in a safer way.	.568		
2My coworkers always follow safety rules and regulations.		.848	
2My coworkers care about my safety when we are working together.		.838	
2How involved are your coworkers in the decisions regarding their health and safety at work?		.794	
2How often do your coworkers follow safety rules and procedures?		.772	
2How often do your coworkers receive positive feedback when acting safely.		.536	
3If I saw something dangerous or unsafe condition. I would talk to my coworkers about it.			.844
3If I saw a dangerous or unsafe condition. I would talk to my supervisor about it.			.842
3I let my coworkers know when they are not working safely.			.758
3I feel comfortable reporting safety concerns. even if it means the job will be delayed.			.517

3 Factors + Short Answer

Supervisor Culture: A supervisor's support towards safety has consistently been identified as one of the key drivers to a strong and positive safety culture. **The selection of items represent a strong safety leader.** Someone that leads by example, is receptive to individual safety concerns, and prioritizes safety.

Coworker Culture: How you perceive your coworkers can have **an important role in identifying underlying aspects of safety culture** and can reduce socially desirable responding.

Communication Culture: The items assess a **clear and uninhibited communication**, which is core to a strong and positive safety culture.

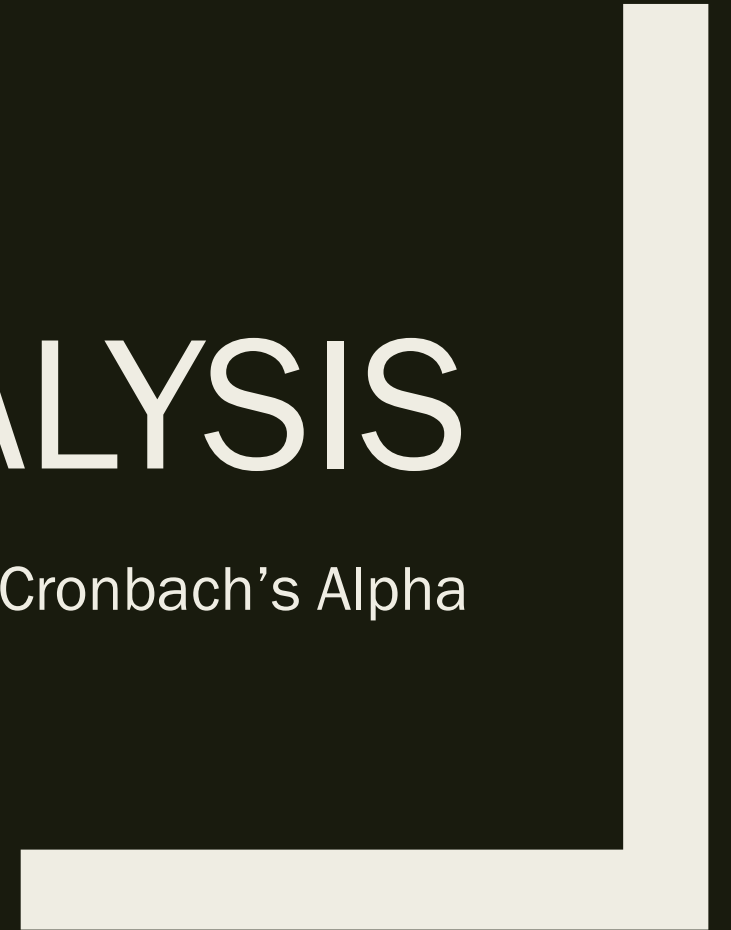
- 1 My direct supervisor is quick to resolve safety issues on the job site.
- 2 My direct supervisor leads by example when it comes to safety.
- 3 My direct supervisor focuses on working safety even if work will fall behind schedule.
- 4 My direct supervisor listens to my safety concerns and suggestions.
- 5 My direct supervisor provides the appropriate amount of discipline when a safety rule or procedure has been broken.
- 6 My direct supervisor prioritizes safety over everything else.
- 7 My supervisor is open to new ideas and ways of completing the job in a safer way.

- 8 My coworkers always follow safety rules and regulations.
- 9 My coworkers care about my safety when we are working together.
- 10 How involved are your coworkers in the decisions regarding their health and safety at work?
- 11 How often do your coworkers follow safety rules and procedures?
- 12 How often do your coworkers receive positive feedback when acting safely.

- 13 If I saw something dangerous or unsafe condition. I would talk to my coworkers about it.
- 14 If I saw a dangerous or unsafe condition. I would talk to my supervisor about it.
- 15 I let my coworkers know when they are not working safely.
- 16 I feel comfortable reporting safety concerns. even if it means the job will be delayed.

RELIABILITY ANALYSIS

Cronbach's Alpha



Factor Reliability

Cronbach's Alpha is a reliability indicator of internal consistency.

An acceptable Cronbach's Alpha values range between .70 and 1.0

Supervisor

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.934	.937	7

Coworker

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.816	.845	5

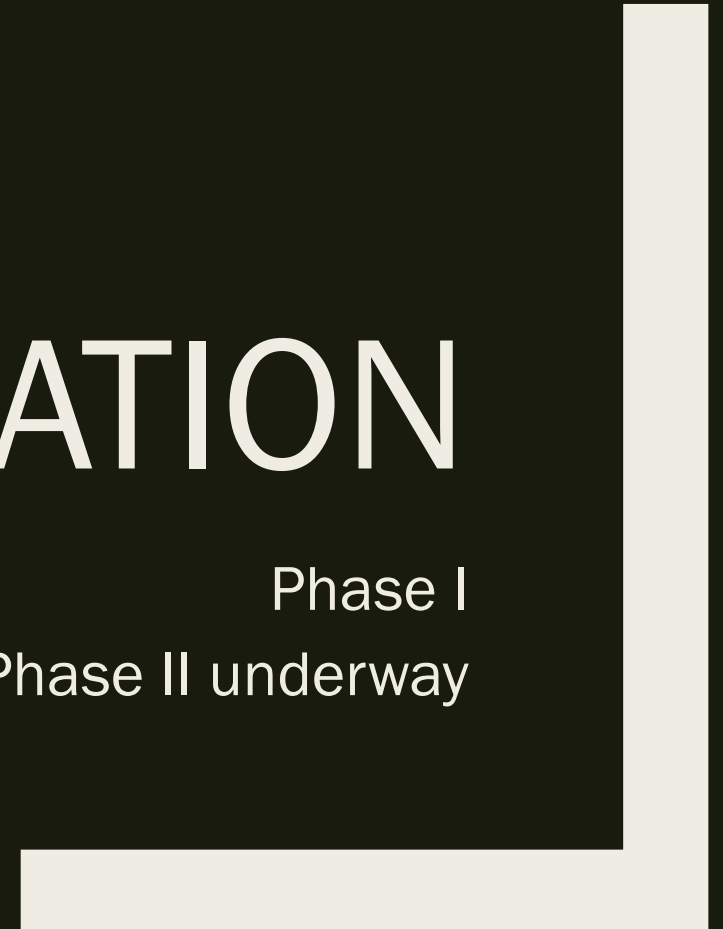
Communication

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.812	.827	4

SCALE EVALUATION

Phase I

Phase II underway



Safety Culture Scale Relationships

Our Construction Safety Culture Scale was correlated with several safety performance scales, climate scale, and self-reported safety injury and events.

Safety Performance was measured by 4-constructs. Safety Knowledge, Safety Motivation, Safety Compliance, and Safety Participation. Self-report injuries and safety events

Safety Climate

Safety knowledge, which refers to the amount of knowledge an employee has regarding safe work practices.

Safety motivation, which refers to an employees attitude towards the importance of safety.

Safety Participation, refers to an employees effort in contributing to the safety in the workplace.

Safety compliance, which refers to an employees ability to follow rules related to safety.

Neal, A., & Griffin, M., A. (2006)

Safety climate

1. Management places a strong emphasis on workplace health and safety
2. Safety is given a high priority by management
3. Management considers safety to be important

Safety compliance

1. I use all the necessary safety equipment to do my job
2. I use the correct safety procedures for carrying out my job
3. I ensure the highest levels of safety when I carry out my job

Safety participation

1. I promote the safety program within the organization
2. I put in extra effort to improve the safety of the workplace
3. I voluntarily carry out tasks or activities that help to improve workplace safety

Safety motivation

1. I feel that it is worthwhile to put in effort to maintain or improve my personal safety
2. I feel that it is important to maintain safety at all times
3. I believe that it is important to reduce the risk of accidents and incidents in the workplace

Safety knowledge (Neal, Griffin, & Hart, 2000; Griffin & Neal, 2000)

1. I know how to perform my job in a safe manner
2. I know how to maintain or improve workplace health and safety
3. I understand the health and safety regulations relating to my work