

Are you sure you want me to follow this? A study of procedure management, user perceptions and compliance behaviour



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ARTICLE INFO

Keywords:

Safety
Procedure
User perceptions
Compliance
Violations
Maintenance
Mining

ABSTRACT

Adherence to procedures is critical to the safety and performance of maintenance tasks; however, few studies of procedure compliance among maintenance personnel have been reported. The present study evaluated a theoretical model in which management approaches to procedure compliance were linked to compliance outcomes through user perceptions of positive and negative procedure attributes. New scales were developed to assess these variables; hypotheses derived from the model were tested in survey data collected from maintainers in the mining industry ($N = 176$). A structural equation model showed acceptable fit statistics; findings were broadly consistent with the initial hypotheses.

As predicted, positive and negative dimensions of procedure attributes and compliance/non-compliance were perceived as distinct constructs, and were implicated in different pathways of the model. Also supporting the initial hypotheses, user involvement and managers' learning-oriented responses to non-compliance were linked to favourable compliance outcomes through perceived procedure attributes. Learning-oriented responses were also directly associated with greater compliance. In addition, and contrary to prediction, punitive management responses positively predicted compliance. As discussed in the paper, these findings contribute new insights, relevant in both research and industry contexts, to understanding procedure compliance among maintainers.

1. Introduction

The maintenance of physical plant and equipment is essential to the safety and smooth running of industrial operations, particularly in hazardous work environments. High standards of maintenance performance are necessary to ensure the safety of maintenance workers and the reliability of equipment returned to service. One specific aspect of maintenance performance with critical implications for safety is the extent to which maintainers comply with the formal rules and procedures that specify how particular tasks should be carried out. However, few empirical studies of factors associated with procedure compliance among maintenance personnel have been reported, even though evidence suggests that maintainers tend to be over-represented in the fatality statistics of heavy industries (Department-of-Mines-and-Petroleum, 2014), and procedure violations have been identified as contributory factors in several accident investigations (Miskell, 2013; Sterling, 2013; Thomas, 2007). The present study addresses the topic of compliance with maintenance procedures in the mining industry; this work environment exposes maintenance personnel to a wide range of complex tasks, and to hazardous physical work conditions (e.g. heavy

machinery, electrical power sources, and close proximity to moving vehicles). Thus, safety issues are particularly salient and the challenge of ensuring compliance with procedures is a fundamental concern for safety researchers and practitioners.

In the present paper, in line with Hale and Borys (2013a), the term 'procedure' is used to refer to any instruction specifying how a job has to be done. Maintenance procedures include both general rules and detailed task-specific instructions, both of which have safety implications; thus, if rules are disregarded, or if steps in the procedure are not correctly followed, an accident or hazardous situation may result. A widely-held view of procedures, noted by several authors (Hale and Borys, 2013a; Reason et al., 1998; Weichbrodt, 2015), is that procedures provide a means of standardizing and controlling behaviour, and thus reduce human error and accident risk. The view that procedure-following is the way to achieve safety corresponds to 'Model 1' of procedures, as noted by Dekker (2003) and later by Hale and Borys (2013a). However, many researchers consider that there are limits to the effectiveness of using procedures to prescribe and control behaviour (Amalberti et al., 2006; de Brito, 2002; Hale and Borys, 2013a; Hudson et al., 1998; Oltedal and Engen, 2011; Reason et al., 1998). Use of

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multiple procedures tends to limit the flexibility with which employees can achieve desired work goals under non-standard conditions, or in changing work environments, while frequent procedure amendments may create uncertainty about which actions are, or are not, still permitted.

In some instances, a procedure may not be relevant to the task concerned; if so, violation or modification may be the most appropriate action (Hudson et al., 1998; Reason et al., 1998). Dekker's 'Model 2' of procedures (Dekker, 2003), reflects this point of view, treating procedure use as a cognitive activity in which operators make skilled judgements about adapting procedures to circumstances. Consistent with this approach, a recent study of pilots showed that some flight situations they encountered were much more complicated than anticipated in the relevant procedure. To cope with these non-standard situations, pilots combined information from a range of available resources, interleaving fragments of checklists with other relevant data (Carim et al., 2016). Thus, procedures represented 'resources for action' rather than prescribed rules for discrete responses. These insights point to the effects of procedure characteristics on procedure following behaviours. Moreover, Hale and Borys (2013b) and Weichbrodt (2015) suggest that these behaviours can be influenced by how procedures are managed.

It is therefore important to consider the extent to which compliance with procedures is influenced by procedure attributes, and by the effects of different approaches to procedure management. In the following sections, we review literature addressing these issues. This review forms the basis of the hypotheses from which our two-stage research model is developed. The model represents pathways by which perceived procedure attributes and procedure management strategies impact on procedure-following behaviours.

2. Factors influencing procedure following

2.1. Literature review

Reflecting the increasing research interest in the topic of procedure following, studies that identify factors associated with compliance or non-compliance with procedures have been carried out in a wide range of industries, particularly aviation and transport. As a background to the present study, Table 1 summarises findings from relevant research. From this overview, it is clear that both procedure attributes and how procedures are implemented and managed by the organization play important roles in determining procedure-following behaviours.

2.1.1. Procedure attributes

Several of the studies summarised in Table 1 identify procedure attributes associated with poor compliance. Thus, procedures that are perceived to be difficult to access (Dahl, 2013), unclear (McDonald et al., 2000), vague (Dahl et al., 2013), poorly written (Olteidal and Engen, 2011), outdated (Lawton, 1998), providing too much or too little information (Laurence, 2005), inappropriate for the task, and/or unworkable (Lawton, 1998) are likely to lead to poor compliance, which in turn may jeopardise the quality of the work carried out (Hobbs and Williamson, 2002). For instance, Laurence (2005) found that the most frequently reported problems with procedures were lack of real-world understanding, too many to remember, too inflexible, not written in plain language, and poor or wrong in content. Similarly, Hale (1990) refers to a study of Dutch railway employees in which 85% of workers reported that it was difficult to find the procedure required, 70% perceived the procedures to be too complex, and 95% did not think the work could be finished on time if all procedures were followed.

As maintenance requirements vary widely and many tasks occur only infrequently, an extensive set of procedures may be necessary to provide sufficient information to allow users to carry out tasks correctly. The level of detail required depends on the competence of the staff, the complexity of the task, and how frequently the procedure is carried out (Mason et al., 2000). To ensure that procedures are followed

correctly, they should be up-to-date, presented clearly, workable, and relevant to the task in hand; if instructions are poorly presented, unduly complex, or difficult to access, staff will resist using them. These important aspects of effective procedure design and documentation are summed up in the concise advice of Besnard and Greathead (2003), "*design workable instead of exhaustive procedures*". Moreover, explaining the purpose of controls and checks included in the procedure increases operators' understanding of the task and its potential hazards, and thus reduces the likelihood of non-compliance (Mason et al., 2000). These points, and other issues of procedure presentation and usability, are set out in reviews concerned specifically with maintenance procedures (Mason et al., 2000; Reason and Hobbs, 2003) and with procedure use in general (Alper and Karsh, 2009; Hale and Borys, 2013a).

2.1.2. Management of procedures

Compliance with procedures is not solely determined by procedure attributes; how procedures are managed also has important implications for procedure-following behaviours. Three aspects of procedure management are particularly relevant to the present study: first, the extent to which users are involved in the development, implementation and updating of procedures, second, the extent to which managers use instances of non-compliance or poor compliance as opportunities for feedback, learning, and skill development and, third, the related issue of punishment-oriented approaches to the management of procedure compliance.

2.1.2.1. User involvement in the design and modification of procedures. The extent to which users have opportunities to contribute to the modification and improvement of procedures plays an important role in encouraging compliance; conversely, lack of involvement in procedure design tends to reduce compliance. Thus, Hale and Borys (2013a) found that non-participative management styles and poor co-operation between supervisor and workers, both of which tend to reduce opportunities for operators to be involved in procedure development, were related to non-compliance. Similarly, Simard and Marchand (1997) reported that a cooperative workgroup-supervisor relationship, which was associated with participatory supervisory management, was the most important predictor of compliance with safety rules.

More generally, Weichbrodt (2015) identifies the involvement of users in rule creation and adaptation as one of four strategies of good procedure management, whilst observing that participation is more likely to occur when adaptations are made to existing rules (including updating and modification) than in the design of entirely new rules. He cites studies in which the participation of employees in rules revision had favourable effects on safety culture, incident rates, and compliance; other benefits included a reduced number of safety rules, more workable rules, and increased 'psychological ownership' of the rules by the workforce.

2.1.2.2. Management of non-compliance: learning-oriented responses. Managers have important responsibilities for encouraging good practices in relation to procedure following, and for correcting violations and poor compliance. Treating instances of non-compliance as opportunities for feedback and learning represents a positive approach to managing procedure violations. Thus, supervisory responses to non-compliance may include identification of the operator's reasons for not following the required procedures (e.g. lack of clarity, unduly complex, or out-dated), provision of information about the correct procedure, ensuring that the operator understands the need for the specific requirements (Mason et al., 2000) and, if appropriate, arranging further training (Weichbrodt, 2015). Procedure modifications and improvements in procedure quality may also be considered (Hudson et al., 1998). Communication and feedback about non-compliance facilitates individual learning, and potentially leads to favourable perceptions of procedures, and to increased

Table 1
Research studies of factors associated with procedure-following behaviour.

Reference	Participants	Method	Factors influencing procedure following
Antonovsky (2010)	Petroleum industry personnel	Survey and interviews	Motivation, commitment, and job satisfaction were viewed in turn as influencing compliance with work procedures, and as having a direct impact on the performance of work tasks
Bourrier (1996)	Operations/maintenance personnel at two U.S. nuclear power plants	'Strategic analysis' was used to identify organizational strategies used in response to planned outages.	Four major problems in responding to planned outages were identified: (i) need for efficient coordination between operators and maintenance personnel (ii) need to work with very detailed and specific procedures; (iii) need to cope with unplanned situations; and (iv) need to ensure proper work execution and quality. Organizational responses of the two plants differed significantly along each of these dimensions
Dahl and Olsen (2013)	Offshore platform workers (N = 10003)	Survey administered at 6 different moments	Safety compliance was influenced positively and directly by leadership involvement, as well as indirectly via increased worker's competence, engagement, role clarity, and follow up of contractors
Dahl (2013)	Contract workers in the Norwegian petroleum industry (N = 24)	Semi-structured interviews	Access, user friendliness, training, work characteristics (e.g. routinisation), perceived risk level, subcontracting, and the influence of leaders and co-workers, were associated with workers' knowledge of rules and procedures, which was used to explain unintentional violations
Dahl et al. (2013)	Offshore service vessel crews (N = 1108)	Survey	Safety climate and age were positively related to safety compliance. Job experience and perceived procedure vagueness were negatively related to safety compliance. Authors suggest stakeholders should consider a broad multi-factorial approach to increase safety compliance
de Brito (2002)	Pilots in commercial aviation (N = 207, 35, 30 for consecutive studies)	Task analysis, questionnaire, observations, group sessions	The study found that pilots not only determine whether a procedure is necessary for a particular situation, but also assess how relevant it is for that situation and plan their actions accordingly. Work design, personal attributes, and task/social/organizational factors influenced how pilots responded to each stage of a procedure
Espin et al. (2006)	Operating room staff, surgeons and nurses (N = 28)	Interviews based on problem scenarios	Violations were associated with time pressure, work overload, and conflicting demands. Staff felt they had to work around the safety regulations to get the work done in the time available
Fogarty and Shaw (2010)	Aircraft maintainers in Australia (N = 307)	Survey	Management attitudes influenced individual attitudes, group norms, and work pressures, which in turn influenced violations directly or indirectly through the intention to violate. Authors note that the Theory of Planned Behaviour is useful for understanding procedural violations
Hudson et al. (1998)	Offshore oil and gas operators and supervisors in the North Sea (N = 182)	Survey	In a test of the 'Behavioural Cause Model', 64% of the variation in violations was explained by <i>expectations</i> of having to bend the rules to get the work done, feeling of <i>powerfulness</i> (sufficient ability/experience), seeing <i>opportunities</i> for shortcuts, and inadequate <i>work planning</i>
Laurence (2005)	Mine workers across 33 mine sites in Australia and globally (N = 500)	Survey	15% of respondents agreed it was necessary to break the rules to get the job done. Reasons for rule deviations were problems with the rule, lower risk when not following rules, saving time/energy, and lack of management commitment. Problems with rules included too many procedures to remember, too inflexible, complex, or unclear, and/or inadequate content, lack of real-world relevance
Lawton (1998)	Railway shunters in the UK (N = 36)	Survey	Main reasons to violate procedures were quicker ways of working, inexperience, time pressure, high work load, procedures out-dated, rules impossible to work to, and management turning a blind eye. Four types of violations were distinguished: erroneous, exceptional, situational, and routine. A model including situations/ control, attitude/ motivation and rules/knowledge as underlying causes for violations was proposed
Lawton et al. (1997)	Drivers (M/F, 17–70 y) in Manchester area in the UK (N = 211)	Driver Behaviour Questionnaire	Measures of positive affect predicted all 3 types of violations. The personality trait 'outward irritability' predicted hostile violations and violations aimed at maintaining progress. Authors suggest that further studies to examine the issue of anticipated affect in relation to experienced affect may advance this research
Lawton and Parker (1999)	Hospital staff from surgery, obstetrics & anaesthetics, including nurses, consultants, managers, etc. (N = 126)	24 focus groups	The groups raised issues about terminology, reasons for developing protocols/guidance, concerns about infringement of professional judgement, and greater adherence to protocols by nurses relative to medical staff. Barriers to implementation of protocols included distrust of management motivation in introducing them, and reluctance of many senior medical staff to use them.

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Table 1 (continued)

Reference	Participants	Method	Factors influencing procedure following
McDonald et al. (2000)	Various personnel from four aircraft maintenance organisations. (N = 622)	Analysis of documents, interviews, surveys	Authors note that implementing protocols requires a balance between standardising practice and allowing use of clinical judgement 34% of the participants reported not following the official procedure for a task; they were less likely to follow the official procedure if there were easier or quicker ways to do the task, or if any aspects of the instructions were unclear. Study was carried out in the development of a model to integrate features of a safety management system with safety culture
Oltedal and Engen (2011)	Crew of 76 Norwegian bulk carriers (N = 1262)	Survey, case studies, interviews, participatory observations	31% of respondents would violate procedures due to the company's demands for efficiency, 21% felt it was difficult to know which procedures are applicable, and 15% felt procedures were difficult to understand or poorly written
Parker and Lawton (2000)	Hospital professionals (obstetrics, surgery, and anaesthetics) (N = 310)	Survey using scenarios	Doctors, nurses, and midwives made significantly different judgments. Midwives/nurses disapproved of violations, even with good patient outcomes; doctors made relatively lenient judgments even when a violation led to a bad patient outcome. The authors argue that "A climate of excessive adherence to over-simplified protocols may, on balance, reduce the quality of care, rather than enhance it."
Phipps et al. (2015)	Anaesthetists (N = 629)	Survey using scenarios	Capability, available resources, time pressure and patient factors all played a role in determining the likelihood of violations
Reason et al. (1990)	Drivers (N = 520)	Driver behaviour questionnaire	Three driver behaviours were identified: violations, dangerous errors and minor lapses. Violations declined with age; but errors did not

motivation and intention to comply.

Moreover, feedback and learning at an individual level contributes to wider organizational learning, and encourages communication and positive error management generally (Krauss and Casey, 2014); thus, an open and positive culture in which poor compliance with procedures is treated as an opportunity for learning (rather than for blame or reprimand) is diffused to the organization as a whole. The leadership role of supervisors is particularly important in managing feedback and learning in relation to procedures. For instance, Dahl and Olsen (2013) found that leadership involvement in daily work operations positively influenced safety compliance on offshore platforms, while Rodriguez and Griffin (2009) noted that "A learning orientation needs to be regularly supported through the observation and interaction of the employees with their leader" (p.102).

2.1.2.3. Management of non-compliance: punitive approaches. Attempts to manage procedure non-compliance by punitive means (e.g. reprimands, sanctions, or disciplinary action) have generally not proved effective. For instance, Hudson et al. (1998) evaluated the effects of a punitive approach to managing procedure violations as compared with a behavioural model. The two main features of the 'supervise and punish' model were the detection of non-compliance (seen as requiring close supervision of employees), and 'strong punishment' when non-compliance did occur. However, this punitive model predicted only 20% of violations, and accounted for very little incremental variance above the 60% of violations explained by the behavioural model.

Consistent with these findings, McKeon et al. (2006) note that attempts to manage deviations from work procedures through disciplinary action are likely to be ineffective, particularly when dealing with a well-qualified and highly motivated workforce. A punitive approach to managing procedure violations tends to create a culture which reinforces the "natural disinclination to confess one's blunders" (Reason and Hobbs, 2003). A reluctance to record or disclose errors also serves to create barriers to group and organizational learning, and hence hinders the prevention of future errors (Zhao and Olivera, 2006). Nonetheless, some authors take a less negative view of punitive responses to non-compliance, suggesting that poor practices should be

discouraged by an effective disciplinary process, consistently and fairly applied (Mason et al., 2000), and evidence indicates that in organizations carrying out safety-critical maintenance, disciplinary responses are not unusual (McDonald et al., 2000). Whilst not necessarily implying a punitive approach to violations, other observed management styles conducive to non-compliance have also been identified. In particular, evidence suggests that 'turning a blind eye', and/or inconsistency in sanctioning violations, are associated with increased likelihood of non-compliance (Baiche et al., 2006; Hale and Borys, 2013a; Lawton, 1998).

2.2. Present study and hypotheses

The present study aims to enhance understanding of factors that influence compliance with procedures in the maintenance work environment. Existing research into procedure compliance has been largely restricted to operational personnel (e.g. process operators, pilots, healthcare staff), or to the aviation industry (Fogarty and Shaw, 2010; Hobbs and Williamson, 2002; McDonald et al., 2000). In other industries, studies of procedures have tended to disregard maintenance work. Specifically, the present study focuses on personnel responsible for the maintenance of heavy plant located at remote mining sites. Maintainers working in remote locations have challenging jobs, and often work in adverse environments. However, little information is available about their work practices and the factors that shape these practices. It is important to address this issue, not only because of the inherent safety risks in maintenance work, but also because the effects of maintenance performance extend into the wider work environment when equipment is returned to operation.

Fig. 1 represents the conceptual model that forms the basis of our study. As shown in this figure, compliance and non-compliance are considered to be influenced by positive and negative procedure attributes, which in turn are shaped by the management strategies used to regulate procedure-following behaviour.

The model in Fig. 1 suggests specific research hypotheses. First, we propose that compliance and non-compliance are motivated behaviours that individuals choose to enact or not enact. Although we expect that compliance and non-compliance will correlate negatively, we also

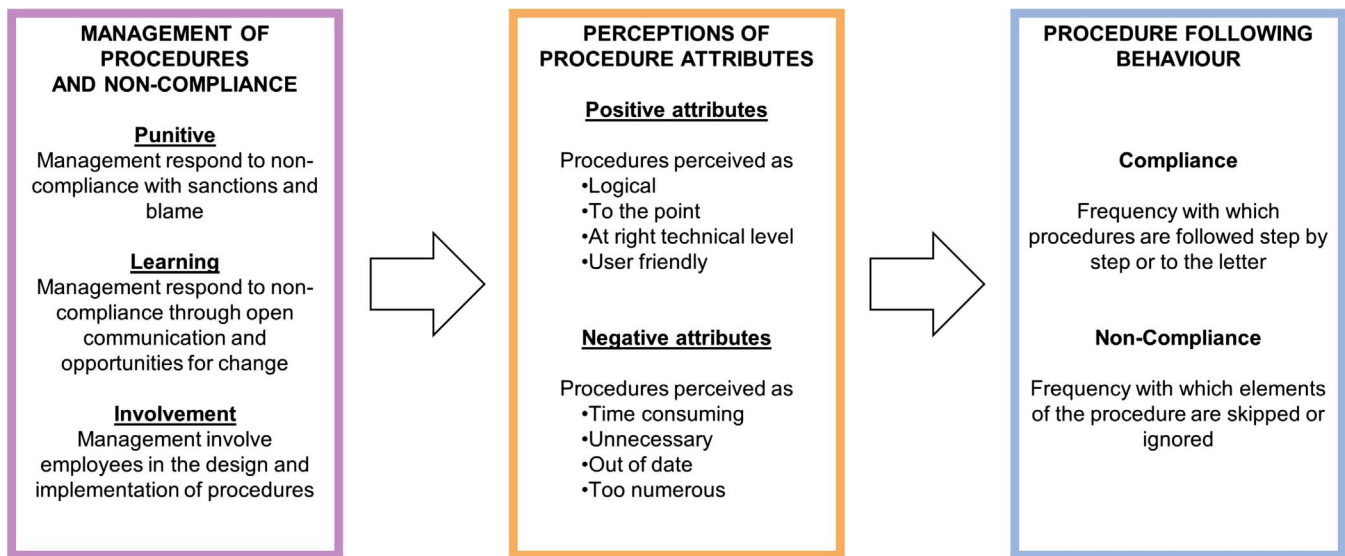


Fig. 1. Proposed research model.

propose that they are distinct behavioural dimensions with different motivational antecedents. Therefore, our first hypothesis is:

H1. Compliance and non-compliance behaviours are distinct constructs.

Second, we propose that the perceived attributes of procedures will motivate procedure-following behaviour. Thus, positive attributes will motivate compliance, while negative attributes will motivate non-compliance. This distinction is important because it suggests separate pathways for compliance as compared with non-compliance. This part of the model is formalised in the following hypotheses:

H2a. Positive and negative procedure attributes will be perceived as distinct constructs.

H2b. Perceived positive procedure attributes will be associated with higher compliance.

H2c. Perceived negative procedure attributes will be associated with higher non-compliance.

Third, we propose that procedure management strategies will shape individual perceptions of positive and negative procedure attributes, as set out in the following hypotheses.

H3a. Greater involvement in the design, modification, and implementation of procedures will be associated with higher ratings of positive procedure attributes, and lower ratings of negative procedure attributes.

H3b. A learning-oriented approach to non-compliance will be associated with higher perceived positive procedure attributes, and lower perceived negative procedure attributes.

H3c. A punitive management approach to non-compliance will be associated with negative perceptions of procedure attributes.

Taken together, these hypotheses imply that pathways linking procedure management to procedure-following behaviours act through positive and negative perceptions of procedure attributes. We do not expect that perceptions of procedure attributes will fully account for the links between procedure management and procedure following behaviours. However, evidence for these pathways will provide new insights into the way procedure attributes motivate compliance and provide practical guidelines for improving the quality of procedures and their management.

3. Method

Two maintenance units of a global mining organisation participated in the present study. Both units were located in the same remote geographical region. Unit 1 was responsible for the maintenance and repair of power, water, communications, and other services; the personnel were predominantly electronics and communications technicians, and electricians. Unit 2 was responsible for the maintenance and repair of heavy mobile equipment; the majority of the personnel were heavy diesel mechanics/fitters and auto-electricians.

3.1. Data collection

Initial interviews were carried out with a small sample of personnel at each maintenance unit; subsequently, a questionnaire was distributed to all maintenance personnel at the units involved. Prior to the start of the work, ethical approval was obtained from the University of Western Australia, Human Research Ethics Committee.

3.1.1. Interviews

Interviews were carried out during site visits by researchers with experience in the industry. Participants were selected on a voluntary basis from the personnel present; they included 11 maintainers (a mix of heavy diesel fitters, auto electricians, and electronics/communications technicians, as well as an apprentice mechanic), seven maintenance supervisors/superintendents, a maintenance manager and a health and safety adviser. This sample was representative of the various maintenance trades and roles across both units. Participants were given an information sheet and, prior to the interview, they signed a consent form that included an assurance that all responses would be treated as confidential and not reported back to the organisation. The purpose of the interviews was to obtain information to facilitate the development of a survey instrument. The interviews took between 30 and 60 min with the majority at least 45 min, in a safe, private setting.

The semi-structured interview protocol used allowed some flexibility in the questions, and provided opportunities to follow up points of particular interest. Following initial questions about work roles, qualifications and experience, participants were asked to give examples of procedures they considered to be good or bad, and to explain the reasons for their views. Other topics included participants' perceptions of the role of procedures in their work, factors influencing decisions about whether or not to follow procedures, information about how procedures were implemented and reviewed, and issues of compliance

management. Judging by the level of criticism on procedures given by the interviewees, and the sensitive nature of some of their comments, the responses were deemed to be frank and honest. Analysis of the interview transcripts contributed to the development of the survey.

3.1.2. Survey data

The survey (see [appendix](#)) on which this paper reports was distributed to a total of 313 maintainers (181 in Unit 1 and 152 in Unit 2), no supervisors or safety staff, as it needed first-hand information on maintainer practices and perceptions. The majority of the surveys were completed on-site during scheduled safety meetings, but personnel who were absent when the surveys were distributed could complete the survey online. For both the paper based and online options, the participants were taken through an informed consent process covering the purpose of the survey, how confidentiality and anonymity would be ensured, and were asked to complete the survey individually. Safety meeting attendees who did not want to participate were asked to place the unused survey in their anonymous return envelope. Completed paper surveys were forwarded to the researchers in individual sealed return envelopes by company staff returning from the site. In total, 192 surveys were received (61% response rate). Of the surveys returned, 90 were from Unit 1 and 102 from Unit 2. Overall, 176 surveys were sufficiently complete to be included in the data analysis; as in the study population as a whole, the great majority of this sample ($n = 171$, 97%) were men.

3.2. Measures

3.2.1. Compliance and non-compliance

The measure of compliance included three items concerned with the extent to which procedures are followed. To measure non-compliance, we developed items that covered taking shortcuts, skipping parts of the procedure, or even completely overlooking it.

3.2.2. Positive and negative procedure attributes

These measures were based on interview material, with some additional items from [Laurence \(2005\)](#). To measure perceived positive attributes, respondents were asked to rate the extent to which they thought the procedures applying to their work were logical, to the point, at the right technical level, and user friendly. To measure negative attributes, respondents rated the extent to which they perceived the procedures to be out-of-date, time-consuming, unnecessary, and excessive in number.

3.2.3. Approaches to procedure management

Two management responses to non-compliance were assessed, a positive learning-oriented approach and a punitive approach. The items were derived from interview responses to the question “What happens is someone is seen not following a procedure?” Learning-oriented responses included provision of information, feedback, and

communication, while the punitive responses focused on reprimand and disciplinary action.

3.2.4. User involvement in the procedure management process

Items derived from the interview material and other relevant research ([Hale and Borys, 2013a](#); [Laurence, 2005](#); [Weichbrodt, 2015](#)) were used to assess this variable. The items covered the extent to which maintainers were involved in the design and review of procedures, and the existence of communication channels through which procedures could be improved.

Control variables. Evidence suggests that age and work experience are associated with compliance behaviour, e.g. ([Dahl et al., 2013](#); [Reason et al., 1990](#)); these demographic variables were therefore included in the analyses for control purposes. Four age groups: < 25.0 y ($n = 12$), 25– < 35y ($n = 81$), 35– < 45 y ($n = 39$), ≥ 45.0 y ($n = 38$) were identified; missing ($n = 6$). Similarly, four levels of maintenance experience were identified: < 1 y ($n = 7$), 1–3 y ($n = 27$), 3–10 y ($n = 69$), > 10 y ($n = 70$), missing ($n = 3$). In addition, to control for overall differences between the units in factors potentially relevant to compliance (e.g. management attitudes, leadership ([Dahl and Olsen, 2013](#); [Fogarty and Shaw, 2010](#))), a dichotomous variable representing Unit 1/Unit 2 was included in the analyses.

3.2.5. Maintenance and safety performance measures

These measures were derived from company records rather than survey questions. A commonly used measure of maintenance performance is the Scheduled Work Percentage (SWP). SWP monitors the percentage of actual scheduled work hours to all recorded work hours in the period. It is a measure of the level of control over the work management process. Also frequently used, the All Injuries Frequency Rate (AIFR) is a lagging safety performance indicator. AIFR is the number of injuries per 200,000 h worked. This includes medical treatment cases, restricted work-day and lost-day injuries for employees and contractors.

4. Results

4.1. Means, standard deviations, and inter-correlations of the study variables

[Table 2](#) shows descriptive statistics and inter-correlations of the study variables. In general, scales assessing favourable characteristics received higher ratings than those that assessed negative characteristics. Thus, compliance received higher ratings than non-compliance; similarly, but to a lesser extent, positive procedure attributes were more highly endorsed than negative attributes, and learning-oriented approaches to procedure management were more highly endorsed than punitive approaches. Compliance correlated negatively with non-compliance. Positive and negative procedure attributes also correlated negatively, while involvement was significantly related to all the study

Table 2
Means, standard deviations and inter-correlations of the study variables.

		Mean	SD	1	2	3	4	5	6	7
1	Non-compliance	1.85	0.84	–						
2	Compliance	3.70	0.83	–0.53**	–					
3	Pos. procedure attributes	3.28	0.75	–0.30**	0.42**	–				
4	Neg. procedure attributes	3.05	0.79	0.44**	–0.27**	–0.49**	–			
5	Learning approach	3.69	0.76	–0.41**	0.49**	0.42**	–0.23**	–		
6	Punitive approach	3.39	0.72	–0.04	0.18*	–0.13	0.12	0.24**	–	
7	Involvement	3.15	0.84	–0.18*	0.33**	0.46**	–0.29**	0.41**	0.01	–

N = 151–174; missing values deleted pairwise.

All items were rated on 1–5 scales; the table shows the item means for each scale.

** $p < 0.01$.

* $p < 0.05$.

Table 3
Factor loadings.

Item category and content	1	2	3	4	5	6	7
1. Compliance^{1,3}							
<i>When doing a task which requires a procedure...</i>							
I closely follow the procedure step by step	0.85						
I invest a lot of personal effort to ensure the task is completed in adherence with the procedure	0.82						
I follow the procedure to the letter	0.81						
2. Non-compliance¹							
<i>When doing a task which requires a procedure...</i>							
I overlook the procedure to do the task as I like		0.91					
I take shortcuts where possible		0.80					
I skip some parts of the procedure		0.85					
I bend the rules to get the job done quickly		0.85					
3. Positive procedure attributes²							
<i>The procedures for my job are...</i>							
Logical			0.84				
To the point			0.77				
At the right technical level			0.80				
User friendly			0.79				
4. Negative procedure attributes²							
<i>The procedures for my job are...</i>							
Out-of-date				0.63			
Time-consuming				0.63			
Unnecessary				0.86			
Too many				0.62			
5. Procedure management – Learning²							
<i>If someone is seen not following a procedure...</i>							
The person will be advised how s/he should have acted				0.80			
There will open communication about why the person acted that way				0.93			
This might prompt people to look into whether the procedure is appropriate				0.84			
6. Procedure management – Punitive²							
<i>If someone is seen not following a procedure...</i>							
The person will be informally reprimanded					0.74		
There will be disciplinary actions against the person					0.96		
It will hurt the person's performance evaluation					0.78		
7. Procedure management – Involvement²							
Maintainers are involved in writing new procedures						0.81	
Maintainers are consulted before a procedure is introduced						0.77	
Procedures written by someone experienced in the job						0.72	
There are channels through which procedures can be improved						0.68	

¹ 5 point rating scale from 1 = very rarely to 5 = very often.² 5 point rating scale from 1 = strongly disagree to 5 = strongly agree.³ Based on Hu et al. (2015).

variables except punitive responses. Comparisons across units showed that higher ratings of learning-oriented approaches ($p < 0.01$) and maintainer involvement in procedure management ($p < 0.05$) were reported in Unit 1 relative to Unit 2. Procedure attributes and compliance outcomes were also more favourable in Unit 1.

The maintenance and safety performance measures for both units were calculated from company records. In the year leading up to the survey, the average monthly SWP for unit 1 was 81% and for unit 2 67%. The average monthly AIFR was calculated for the year in the

middle of which the survey was conducted; the values were 0.42 for Unit 1 and 1.74 for Unit 2.

4.2. Confirmatory factor analysis

We first conducted a confirmatory factor analysis (CFA) using Mplus 7.2 software (Muthén and Muthén, 2010) to test how well the items were related to their hypothesized constructs. We estimated a CFA model with seven factors corresponding to the constructs shown in Fig. 1. This measurement model provided a good fit to the data ($\chi^2 = 372.59$, $df = 278$, CFI = 0.95, NNFI = 0.94, RMSEA = 0.052). The item loadings on each of the factors are shown in Table 3. The lowest factor loadings were for items on the negative procedure attributes scale. Factor inter-correlations were also examined; the highest correlations were those for compliance/non-compliance and positive/negative procedure attributes (0.62 in each case). The results of the measurement model support *Hypothesis 1* which proposed that compliance and non-compliance would constitute distinct (albeit negatively correlated) constructs. The results also support *Hypothesis 2a* which proposed that positive and negative attributes of procedures would be perceived as distinct constructs.

4.3. Structural model

To test the remaining hypotheses we used the measurement model described above to estimate a structural equation model (SEM). We tested a fully saturated SEM that included all paths between the variables shown in Fig. 1 plus all possible indirect paths leading to the two outcome measures (compliance and non-compliance). In addition, all paths from the control variables (age, maintainer experience, and unit) to other variables in the model were specified. This fully saturated model allowed us to test whether the hypothesized paths were significant and to evaluate the significance of paths that were not hypothesized. Examples of such non-hypothesized paths are the paths from perceived negative procedure attributes to compliance, and from perceived positive procedure attributes to non-compliance. Fig. 2 summarizes the results from the final model; it shows all the hypothesized paths, plus the additional paths that were significant but not hypothesized. With one exception (the path from punitive procedure management to negative perceptions of procedures), all the predicted paths were statistically significant in the expected direction.

Hypotheses 2b and 2c were supported; positive procedure attributes predicted compliance ($\beta = 0.25$, $p < 0.05$) but not violations ($\beta = 0.18$, $p > 0.05$), and negative procedure perceptions predicted violations ($\beta = 0.60$, $p < 0.001$) but not compliance ($\beta = -0.11$, $p > 0.05$). *Hypothesis 3a* was partially supported; involvement in procedure management was significantly related to higher ratings of positive procedure attributes ($\beta = 0.34$, $p < 0.001$) but not to lower perceptions of negative procedure attributes ($\beta = -0.19$, $p > 0.05$). *Hypothesis 3b* was also supported in that a learning-oriented approach to procedure management was related to higher levels of perceived positive procedure attributes ($\beta = 0.31$, $p < 0.01$) and lower levels of negative procedure attributes ($\beta = -0.20$, $p < 0.05$). *Hypothesis 3c* was not supported; punitive procedure management was not related to negative procedure attributes ($\beta = 0.11$, $p > 0.05$).

In addition to the paths representing the initial hypotheses, there were also three significant paths that had not been hypothesized in the model. Thus, punitive procedure management was directly linked to compliance ($\beta = 0.20$, $p < 0.05$). Also, a learning-oriented management approach showed a direct positive link with compliance ($\beta = 0.28$, $p < 0.01$) and a direct negative link with violations ($\beta = -0.32$, $p < 0.001$), highlighting the pervasive role of a learning-oriented approach throughout the model. The dichotomous variable representing Unit 1/Unit 2 was significantly associated with each of the procedure management variables (learning-oriented approach, $\beta = 0.18$, punitive approach, $\beta = 0.19$, involvement, $\beta = -0.19$,

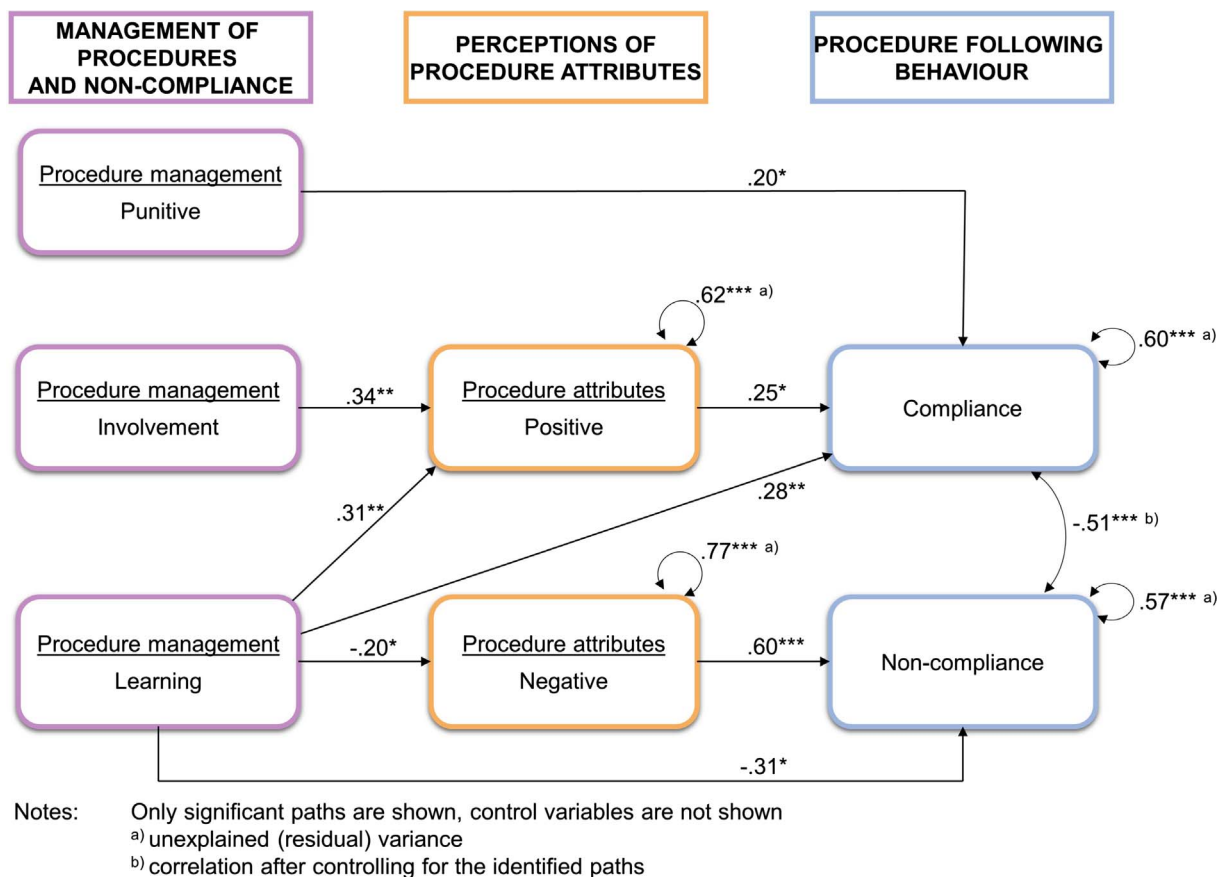


Fig. 2. Summary results for the final structural model.

$p < 0.05$, in each case), but not with other variables in the model, which points to different procedure management practices between the units. Older age groups reported lower perceptions of negative attributes ($\beta = -0.19$, $p < 0.05$). More experienced employees reported higher levels of negative attributes ($\beta = 0.18$, $p < 0.05$), and lower levels of involvement in procedures ($\beta = -0.21$, $p < 0.05$).

5. Discussion

The present study sought to extend existing research findings relating to compliance with procedures, with particular reference to the maintenance of heavy industrial equipment located at remote mining sites. The study throws new light on the process by which organizational approaches to procedure management may act to enhance or reduce compliance, and the roles of positive and negative perceptions of procedure attributes in this process. Consistent with the view that compliance and non-compliance with procedures can be distinguished as separate behaviours with potentially different antecedents, the study demonstrated that different pathways lead to these two outcomes. In discussing the results, the findings are first reviewed in relation to the research model and initial hypotheses; practical implications are then considered and, finally, methodological issues are addressed.

5.1. Research model and hypotheses

5.1.1. Tests of initial hypotheses

Hypotheses 1 and 2a. Hypothesis 1, which proposed that compliance and non-compliance would constitute distinct constructs rather than opposing poles of a single scale, was supported. Although the two measures were significantly negatively correlated, the item loadings for each scale fell clearly on separate factors of the confirmatory model. A similar result supported Hypothesis 2a, which proposed that positive

and negative attributes of procedures would be perceived as distinct constructs. Again, each item loaded on its respective factor, although loadings for positive attributes tended to be higher than those for negative attributes. Thus, for both compliance and procedure attributes, positive and negative dimensions could be identified as distinct constructs, not simply opposing poles of single scales.

Hypotheses 2b and 2c stated that positive perceptions of procedures are associated with compliance, and negative perceptions of procedures are associated with non-compliance. Both hypotheses were supported by significant paths in the structural model, although the magnitude of the relationship was greater for the negative path to non-compliance than for the positive path to compliance. These results are consistent with findings from several published studies (Dahl et al., 2013; Laurence, 2005; McDonald et al., 2000).

Hypothesis 3a was only partially supported. Although greater involvement in procedure design and review was associated with higher ratings of positive attributes, involvement was not significant in relation to negative attributes (thus providing further justification for treating positive and negative procedure attributes as separate constructs). The present analysis does not allow causal inferences, but the findings for positive attributes support the view that participation in procedure development and review serves to reinforce positive perceptions and 'psychological ownership' of procedure attributes (Weichbrodt, 2015). However, contrary to initial prediction, involvement in procedure design and review did not reduce negative perceptions of procedures. It is possible that such involvement does not always mitigate negative perceptions, but could serve to reinforce them if procedure users find their concerns disregarded when procedures are reviewed. An interview quotation illustrates this point: "If a procedure is incorrect the expectation is that they will red pen the procedure and hand it back to the document writer and have it amended. That amendment part is where it gets stuck. The maintainer can sit there and red pen it and hand the

document in, then all he sees is the next time the procedure comes out that nothing has changed so he says “why do I bother?” And that’s when the maintainers switch off.”

Hypothesis 3b was fully supported. Thus, management responses that treated non-compliance as an opportunity for learning and feedback (e.g., clarification of procedure requirements and potential risks of non-compliance) were associated with significantly higher ratings of positive procedure attributes and with lower ratings of negative attributes. These findings emphasize the role played by management support and the provision of learning opportunities in encouraging procedure compliance. Management support and commitment also enhance motivation and engagement among employees, thereby contributing indirectly to compliance (Antonovsky, 2010). Conversely, ‘manager commitment lacking’ and ‘management turns a blind eye’ were among the reasons for rule violations among mining (Laurence, 2005) and railway (Lawton, 1998) employees.

Hypothesis 3c was not supported; the path analysis did not show that punitive management responses to non-compliance were associated with negative perceptions of procedure attributes. Instead, as noted below, punitive responses were directly and positively related to compliance.

5.1.2. The overall structural model

Considering the structural model as a whole, two main pathways linked procedure management practices to compliance outcomes. One pathway showed that positive perceptions of procedure attributes were implicated in the associations of compliance with both user involvement and managers’ learning-oriented responses. The second main pathway indicated that negative perceptions of procedures were involved in the inverse association between learning-oriented responses and non-compliance, i.e. lack of learning and feedback predicted negative perceptions of procedure attributes, which in turn predicted non-compliance.

These findings highlight the role of perceived procedure attributes in the processes by which management practices translate into procedure compliance or non-compliance; thus, interventions to increase compliance are likely to be more effective if they act to enhance user’s favourable perceptions of procedure attributes, and reduce their negative perceptions (e.g. by improving procedure clarity and relevance, and by regular updating). Quotations from the interviews illustrate frequent problems experienced with procedures and in doing so hint at possible remedial actions: “Procedures are difficult to work with if they are too long or complicated”, and “Procedures need to be reviewed”.

5.1.3. Direct paths between procedure management strategies and compliance outcomes

The indirect paths that operated through procedure attributes did not fully account for the compliance outcomes observed; as outlined below, some direct links between management practices and compliance were also significant, although not predicted. Thus, punitive responses were associated with greater compliance independently of procedure attributes, and links between learning-oriented responses and compliance outcomes were not fully accounted for by indirect pathways through procedure attributes.

Punitive management responses directly predicted compliance. This result, whilst contrary to the view that disciplinary action is not an effective means of reducing non-compliance (McKeon et al., 2006), is consistent with the argument that an effective disciplinary process, if fairly applied, acts to discourage non-compliance (Mason et al., 2000). Moreover, McDonald et al. (2000) note that in safety-critical industries, disciplinary responses are not unusual. Consistent with this observation, in the present study, respondents were only marginally less likely to agree that non-compliance would give rise to punitive management responses than with statements that indicated non-compliance would be met with learning-oriented responses. Punitive responses were perceived as threats by interviewees, “I get the feeling from some of the guys

that they use them [the procedures] because they have to, they will get reprimanded if they don’t.” and, “Our biggest risk out there is not getting hurt or dying, but losing our job if we are spotted not following procedure (by the wrong person).” The mechanisms through which punitive management affects compliance and non-compliance would merit further research.

Learning-oriented management responses were directly related to compliance (positively) and to non-compliance (negatively); thus, the pathways predicted in the initial hypotheses did not fully account for compliance outcomes observed. It is possible that other organizational factors potentially associated with learning-oriented responses, such as favourable management attitudes, team expectations, and work environment characteristics (de Brito, 2002; Fogarty and Shaw, 2010), may contribute to compliance outcomes irrespective of perceived procedure attributes. Overall, management learning-oriented responses were found to play a particularly pervasive role in relation to compliance; this variable was linked to compliance outcomes by three paths, each of which (directly or indirectly) was associated with more favourable procedure-following, either greater compliance or lesser non-compliance.

5.2. Practical implications

Factors that predict compliance with operational procedures and rules have been widely researched in industries such as aviation, transport, and offshore oil/gas. However, this topic has rarely been addressed in relation to maintenance procedures, although maintainers play a front-line role in heavy industries that operate complex plant and machinery. The performance of maintainers, particularly their adherence to procedures, is critically important to the safety and efficacy with which maintenance tasks are carried out, and also to the operational use of equipment when it is returned to service. Thus, the present findings provide information not only of research interest but also of potential value to managers, supervisors, and safety personnel in industry. Several findings of particular relevance are outlined below.

5.2.1. Safety and reliability

Maintenance failures have been identified as causal factors in incidents and accidents (Sterling, 2013), and evidence suggests that maintenance personnel tend to contribute disproportionately to the fatality statistics of heavy industries (Department of Mines and Petroleum, 2014). In this context, the present survey data offer some encouragement in that the descriptive analyses revealed high levels of reported compliance, and low levels of reported non-compliance. However, there were also significant differences between the two units involved in the study; thus, Unit 1 (relative to Unit 2) reported significantly more favourable ratings for the management of procedures (learning-oriented responses and involvement), procedure attributes, and compliance.

Recent research, based on qualitative data from nine petroleum production facilities, indicated that maintainers’ perceptions of operational effectiveness in their work facility were significantly related to an objective measure (Mean Time Between Failures) of the facility’s reliability (Antonovsky et al., 2016). In the present study, the two objective measures available, Scheduled Work Percentage and All Injuries Frequency Rate, were both more favourable for Unit 1 as compared with Unit 2. Thus, the differences across the two units in objective performance were consistent with the view that differences in procedure management and involvement, acting through perceived procedure attributes and compliance, may contribute to the differences in objective performance. Although no definite conclusions are possible, the pattern of results accords with findings from accident investigations (Sterling, 2013), and other research that identifies significant links between compliance and safety performance (Neal and Griffin, 2006). These findings suggest that further research into associations between objective safety/reliability measures and maintainers’ subjective perceptions of procedure management, procedure attributes, and

compliance could provide valuable insights into the role of maintenance performance in promoting or detracting from reliability and safety.

5.2.2. Management of procedures

The path analyses findings were generally consistent with the hypothesized model and suggested that procedure attributes play a significant role in the process by which procedure management strategies may impact compliance. From an industry viewpoint, two aspects of the findings merit attention. First, a management approach involving provision of feedback and learning opportunities in response to procedure violations was a strong positive predictor of compliance and a negative predictor of non-compliance; significant direct paths linking these variables, and indirect paths through procedure attributes, were found. However, punitive responses to procedure violations were also positively associated with compliance, although less strongly than learning-oriented responses. This result suggests that an environment in which managers take a primarily supportive and co-operative role in relation to their maintainer work groups, but may respond more punitively if the circumstances demand it, will tend to promote favourable compliance with procedures.

Maintenance work involves a wide range of tasks, some of which are only carried out infrequently; also, some maintenance may have to be done at short notice and under pressure to restore the equipment to service. In both these respects, it is important that the necessary procedures are clear, easy to follow, and readily accessible; thus, as noted by two interviewees, “Procedures are especially useful for unfamiliar jobs” and “It’s difficult to follow procedures when you are under time pressure”. Moreover, it is essential that all procedures are kept up-to-date. Failure to update procedures potentially creates safety risks; for instance, the BP Texas refinery accident report recommended updating ‘outdated and ineffective’ procedures (Mogford, 2007).

The present findings also suggest that, as reported by Weichbrodt (2015), the involvement of maintainers in the development and modification of the procedures they use may act to enhance positive perceptions of procedure attributes and levels of compliance. Thus, overall, the present study identifies a combination of management strategies associated with favourable perceptions of procedure attributes and good compliance; whilst the data analyses do not allow causal interpretation, the results suggest that an intervention designed to promote use of these positive management strategies, would be likely to enhance procedure compliance. Such an intervention could draw on guidelines for the effective management of rules and procedures put forward by several authors (Embrey, 1999; Hale and Borys, 2013b; Weichbrodt, 2015).

5.3. Methodological issues

The methodological approach adopted in the present study makes several significant contributions to a research area in which qualitative and descriptive methods have tended to predominate. First, rather than relying on exploratory methods, the study tested an *a priori* model that identified specific pathways from procedure management strategies to compliance outcomes acting through perceptions of procedure attributes. Second, new measures were developed to assess each of the variables in the model. Third, these scales separately assessed favourable and unfavourable procedure attributes, and compliance versus non-compliance, thus allowing positive and negative dimensions to be treated as distinct constructs rather than opposing poles of single scales. This approach was justified by evidence that the positive and negative measures were implicated in different pathways of the structural model.

Finally, the data analyses included both confirmatory factor analysis and structural equation modelling. An initial confirmatory analysis demonstrated that the factor structure of the survey instrument corresponded to the scales developed. Subsequent structural equation modelling evaluated the extent to which the significant pathways supported the initial hypotheses. Structural equation modelling has rarely been used in research into procedure compliance, although a study of

procedure use in healthcare provides one example (McKeon et al., 2006); moreover, few studies have examined procedure compliance among maintenance workers. Thus, in both these respects, the present study contributes new findings to existing research.

However, the study also has several methodological limitations. In particular, relying on cross-sectional, survey data raises issues of method variance and self-report biases; moreover, causal direction cannot be unambiguously determined, although the significant pathways identified were consistent with the initial model. The fact that data collection took place in only two maintenance units, and the relatively small sample size, represent further drawbacks. These limitations highlight issues that could be addressed in future research.

First, there is a need for longitudinal studies with larger samples to evaluate the extent to which procedure management strategies play a causal role in compliance over time, to identify the pathways involved, and to determine which strategies are most effective in promoting compliance. Following a study design similar to that used by Bradlow and Fitzsimons (2001), a modified survey design could be tested, in which the items representing compliance and non-compliance are randomly mixed together in the same rather than separate survey sections, to assess if the item loadings on each of the model’s constructs continue to support the hypothesized distinctions between the constructs. Similar approaches could be used for items reflecting positive and negative procedure attributes, and for items reflecting learning oriented and punitive management. Moreover, inclusion of organizational and social factors could clarify the roles of other variables (such as leadership, management attitudes, and team expectations) in relation to procedure following.

Also, a different study design that includes more objective measures of procedure quality, as well as user perceptions regarding positive and negative procedure attributes, would allow testing to what extent non-compliance with good procedures and compliance with bad ones occurs, and how user perceptions relate to the objective procedure quality measures. Finally, the extent to which compliance with procedures is associated with objective measures of safety and reliability at a unit or organizational level merits more attention than it has yet received. Such work requires that formal safety measures are available for a sufficient number of maintenance settings to allow the correlations of the safety measures with self-reported procedure attributes and compliance to be determined.

6. Conclusions

In developing and evaluating a structural model of the pathways by which procedure management strategies and perceived procedure attributes are linked to compliance outcomes among maintenance personnel, the present study contributes new findings to the literature. The model was found to be a good fit to the data; indirect pathways (acting through procedure attributes) and direct pathways between procedure management strategies and compliance outcomes were statistically significant. The study is also of practical relevance to industry managers; in particular, it identified the pervasive positive role played by procedure management strategies involving the provision of learning opportunities and the lesser, but also positive, role played by punitive responses. In addition, user involvement in procedure design and review was associated with positive perceptions of procedures which, in turn, predicted greater compliance. Thus, although many research questions remain, the contribution of the present study is of potential value to both researchers and industry personnel.

Acknowledgements

This project was funded by grants from a mining company and the University of Western Australia’s Centre for Safety under the ‘Linking maintenance practices to business outcomes’ research program. The authors would like to thank the staff of the mining company who assisted with the logistics involved in this project.

A: Maintenance Procedures and Practices Survey

About you

The questions in this section are intended to provide us with some context to take into account when interpreting your answers. This information is only seen and used by the research team to combine and analyse data, and none of these questions will be used to identify you in any reports. Can you please tick the relevant answers?

- a. What is your gender? ☐ M ☐ F
- b. What is your age? ☐ Younger than 25
☐ Between 25 and 35
☐ Between 35 and 45
☐ 45 or older
- c. How long have you worked as a maintainer? ☐ Less than 1 year
☐ Between 1 and 3 years
☐ Between 3 and 10 years
☐ 10 years or more

Working with procedures

*The statements below describe what people do **when completing a task which requires a procedure**. Please indicate for your work during the past six months, **how frequently each statement applies to you**.*

When doing a task which requires a procedure,

	Very rarely		Some times		Very often
1. I closely follow the procedure step by step.....	1	2	3	4	5
2. I invest a lot of personal effort to ensure the task is completed in adherence with the procedure.....	1	2	3	4	5
3. I follow the procedure to the letter.....	1	2	3	4	5

When doing a task which requires a procedure,

	Very rarely		Some times		Very often
1. I overlook the procedure and do the task as I like	1	2	3	4	5
2. I take shortcuts where possible.....	1	2	3	4	5
3. I skip some parts of the procedure.....	1	2	3	4	5
4. I bend the rules to get the job done quickly.....	1	2	3	4	5

Your thoughts on procedures

The questions in this section address your views on the procedures for doing your tasks. Please indicate the extent to which you agree with the following statements.

Quality of the procedures for my job

The procedures for my job are:

	Strongly disagree		Neither agree nor disagree		Strongly agree
1. Logical.....	1	2	3	4	5
2. User friendly.....	1	2	3	4	5
3. At the right technical level.....	1	2	3	4	5
4. To the point.....	1	2	3	4	5
5. Time-consuming.....	1	2	3	4	5
6. Out-of-date.....	1	2	3	4	5
7. Unnecessary.....	1	2	3	4	5
8. Too many.....	1	2	3	4	5

Management of the procedures for my job

	Strongly disagree		Neither agree nor disagree		Strongly agree
1. Maintainers are involved in writing new procedures...	1	2	3	4	5
2. Maintainers are consulted before a procedure is introduced.....	1	2	3	4	5
3. Procedures are written by someone who is experienced with the job.....	1	2	3	4	5
4. There are channels through which procedures can be improved.....	1	2	3	4	5

Your work context

The questions in this section concern the norms and values in your workplace surrounding procedures. Please circle the appropriate responses.

If someone is seen not following a procedure:

	Strongly disagree		Neither agree nor disagree		Strongly agree
1. The person will be advised how s/he should have acted.....	1	2	3	4	5
2. There will open communication about why the person acted that way.....	1	2	3	4	5
3. This might prompt people to look into whether the procedure is appropriate.....	1	2	3	4	5
4. The person will be informally reprimanded.....	1	2	3	4	5
5. There will be disciplinary actions against the person.....	1	2	3	4	5
6. It will hurt the person's performance evaluation.....	1	2	3	4	5

Many thanks for your participation!

Are there any issues related to your job that we missed in this survey that you think could be relevant to our research? Please enter any suggestions you may have below.

Are there any topics in this survey that you feel are irrelevant? Please list them below with a brief explanation why.

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