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Examining the Influence of Error Climate on Aviation Maintenance Performance

A thesis presented in partial fulfilment of the requirements for the degree of
Master of Arts
in
Psychology
at Massey University, Manawatu, New Zealand.

Megan Elizabeth Hodges
2011
Abstract

Errors and violations are an everyday occurrence but in safety focused industries, such as aviation maintenance, the implications can be grave. To address the urgent need to provide empirical evidence of precursors of unsafe acts, the present study examined the role of error climate in aviation maintenance performance. Survey data were collected from 189 Technical Trade personnel in the Royal New Zealand Air Force.

Error climate is a relatively new construct that refers to employees shared perceptions of organisational practices regarding errors and is divided into two types, error management climate (EMC) and error aversion climate (EAC). An EMC acknowledges the inevitability of error and has practices that deal effectively with error. An error aversion climate (EAC) conversely, denies error and is characterised by a fear of error and a reluctance to discuss error.

The current study revealed two facets of EAC, these were error strain and covering up errors. EAC and EMC were negatively correlated. Higher levels of EMC were associated with better supervision and psychological health and lower levels of EAC, violations and errors. Higher levels of EAC were associated with the opposite pattern of findings, more violations and errors, worse psychological health, poorer supervision and lower levels of EMC. Two types of violations were found, situational violations which were related to getting the job done in the face of situational constraints and routine violations which reflected rule defiance. Significant predictors of situational violations were routine violations, covering up errors, stress, position (seniority) and general psychological health while significant predictors of routine violations were situational violations and fatigue. Significant predictors of errors were routine violations and position. The effect of error climate on errors was partially mediated by violations. This result is consistent with that of safety climate which is a well established predictor of unsafe acts. Unexpectedly, psychological health did not act as a mediator. These findings suggest that error climate is an important organisational factor in safety and aviation maintenance performance that warrants further examination.
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Glossary

Technical Trades

AEROMWKR

Aeronautical Metal Worker: Responsible for the manufacture and repair of a variety of equipment, using various metals and alloys.

ARMMECH

Armament Mechanic: Completed Primary Trade Training and currently undertaking on the job training, but yet to complete Advanced Trade Training to become an Armament Technician.

ARMTECH

Armament Technician: Responsible for maintaining weapons systems, small arms, explosives demolition, countermeasures and guided missiles for our fleet of aircraft. As well as loading and arming aircraft weapons systems for operational tasks, ARMTECHs perform ground handling and aeronautical maintenance duties.

ACFTMECH

Aircraft Mechanic: Completed Primary Trade Training and currently undertaking on the job training, but yet to complete Advanced Trade Training to become an Aircraft Technician.

ACFTTECH

Aircraft Technician: Responsible for maintaining all aircraft mechanical systems used on RNZAF aircraft including: aircraft structures, flight controls, engines, propellers, helicopter rotors, hydraulics, pneumatics, landing gear and fuel.

AVMECH

Avionics Mechanic: Completed Primary Trade Training and currently undertaking on the job training, but yet to complete Advanced Trade Training to become an Avionics Technician.

AVTECH

Avionics Technician: Responsible for all aircraft electronic and electrical systems and components, including radars, radios, navigation equipment, flight instruments, infra red
technology, Night Vision Goggles (NVGs) and electrical generation.

**Composites Mechanic:** Completed Primary Trade Training and currently undertaking on the job training, but yet to complete Advanced Trade Training to become an Composites Technician.

**Composites Technician:** Responsible for the manufacture and repair of aircraft and aircraft support equipment, and composite and metal-bonded components

**Ground Support Equipment Mechanic:** Completed Primary Trade Training and currently undertaking on the job training, but yet to complete Advanced Trade Training to become an Ground Support Equipment Technician.

**Ground Support Equipment Technician:** Responsible for maintaining the ground–based mechanical equipment required to support RNZAF aircraft operations e.g. motor vehicles, refuelling equipment, hydraulic rigs, hoists and other small engine equipment.

**Machinist:** Responsible for the manufacture and repair of aeronautical and non-aeronautical equipment, using a range of complex and technically advanced machines and tools.

**Safety and Surface Mechanic:** Completed Primary Trade Training and currently undertaking on the job training, but yet to complete Advanced Trade Training to become a Safety and Surface Technician.

**Safety and Surface Technician:** Responsible for servicing, maintaining and repairing the RNZAF’s aeronautical safety and survival equipment (e.g. parachutes, aircrew protective equipment, life rafts) as well as applying, maintaining and repairing the painted surfaces of aircraft and components.
STT: **Small Technical Trades:** Normally includes Composites, Aeronautical Metal Workers, Ground Support Equipment Technicians and Machinists, but for the purposes of this study Safety and Surface Technicians and Armament Technicians are also included as Small Technical Trades.

Pictures and role descriptions downloaded from [http://www.stepup.dixs.mil.nz](http://www.stepup.dixs.mil.nz)
Roles, Abbreviations and Descriptions:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AC</td>
<td>Aircraftsman</td>
</tr>
<tr>
<td>Chain of Command</td>
<td>Hierarchical reporting structure</td>
</tr>
<tr>
<td>CPL</td>
<td>Corporal</td>
</tr>
<tr>
<td>DASH</td>
<td>Directorate of Air Force Safety and Health</td>
</tr>
<tr>
<td>FEGs</td>
<td>Force Element Groups (FEGs) - the four operational squadrons (units) within the RNZAF – 3 Squadron (Helicopters), 5 Squadron (Maritime), 6 Squadron (Naval Support Helicopters) and 40 Squadron (Transport).</td>
</tr>
<tr>
<td>JNCO</td>
<td>Junior Non Commissioned Officer – Corporal</td>
</tr>
<tr>
<td>LAC</td>
<td>Leading Aircraftsman</td>
</tr>
<tr>
<td>MFCs</td>
<td>Maintenance Flight Commanders</td>
</tr>
<tr>
<td>MSS</td>
<td>Maintenance Support Squadron</td>
</tr>
<tr>
<td>NCO</td>
<td>Non Commissioned Officer, includes ranks from Corporal to Warrant Officer.</td>
</tr>
<tr>
<td>NZDF</td>
<td>New Zealand Defence Force</td>
</tr>
<tr>
<td>Re-enlist</td>
<td>Re-join a military organisation</td>
</tr>
<tr>
<td>RNZAF</td>
<td>Royal New Zealand Air Force</td>
</tr>
<tr>
<td>SGT</td>
<td>Sergeant</td>
</tr>
<tr>
<td>SNCO</td>
<td>Senior Non Commissioned Officer – Sergeant, Flight Sergeant or Warrant Officer. The only SNCOs involved in this study were Sergeants.</td>
</tr>
<tr>
<td>Squadron</td>
<td>Unit or division of an Air Force</td>
</tr>
<tr>
<td>Tasking</td>
<td>Assigned job or task, usually refers to a flight</td>
</tr>
<tr>
<td>Wing</td>
<td>A Wing is a large division of an Air Force and is comprised of Squadrons.</td>
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