



MONASH University
Accident Research Centre



The Role of Human Factors in Led Outdoor Activity Incidents: Literature Review

Industry Workshop, Thursday 17 September 2009

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Program Overview



3 Stage Program

1. Identification of the Human Factors issues involved in accidents and incidents
2. Design and establishment of industry database and integration of industry reporting with database
3. Implementation of measures to reduce injury and ongoing reporting of incident data

Stage 1: Aims

- To explore the involvement of **Human Factors** in **led** outdoor activity accidents and incidents
- To investigate and demonstrate the utility of a theoretically-driven Human Factors framework for studying such accidents and incidents



Stage 1: Activities

1. Literature review
2. Exploratory case study analysis
3. Workshop

Literature Review: Aims

- To ascertain what is currently known about accidents and incidents in led outdoor activity
- To distil the Human Factors issues which have already been implicated
- To identify current gaps in thinking
- To explore and suggest a more comprehensive and appropriate framework for studying incident causation in led outdoor activities

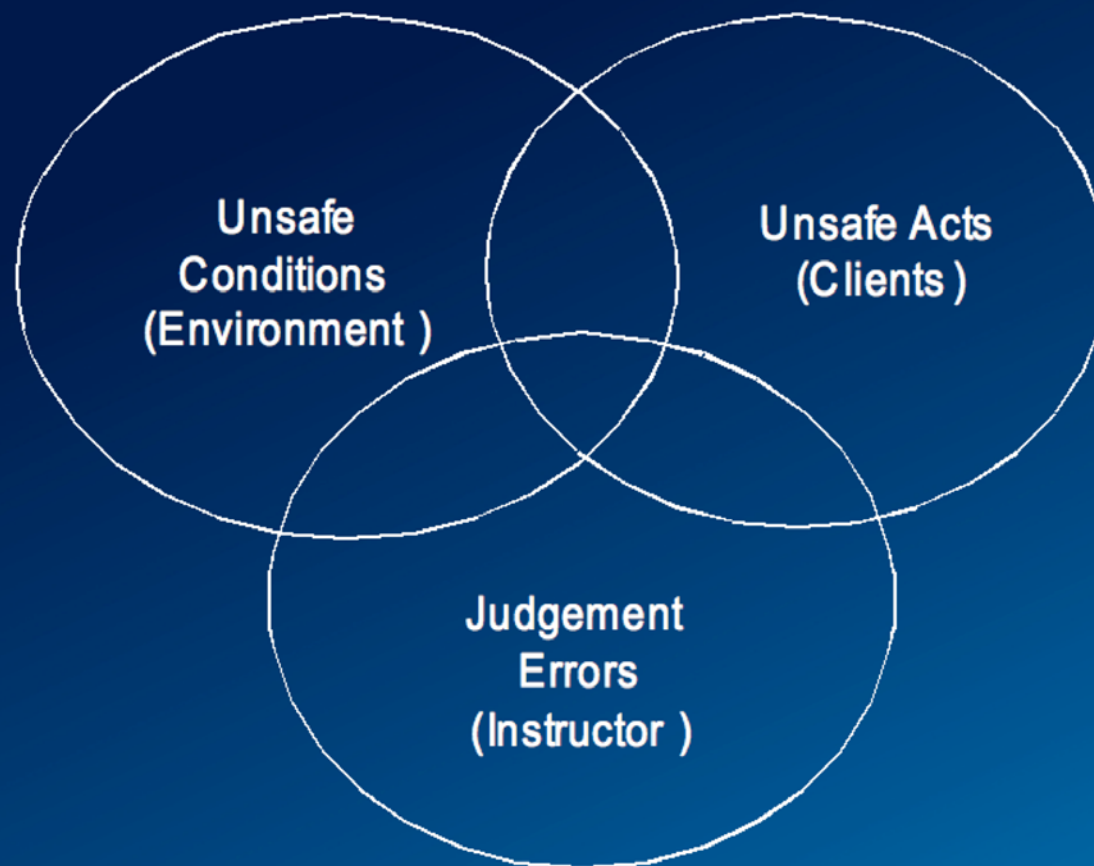
Literature Review: Findings

Existing accident causation models

- Some models exist (e.g. Bentley et al, 2001; Davidson, 2007; Meyer, 1979)
- Largely lack clear, theoretical underpinning
- Absence, or inadequate treatment, of wider systemic failures
- Limited applications

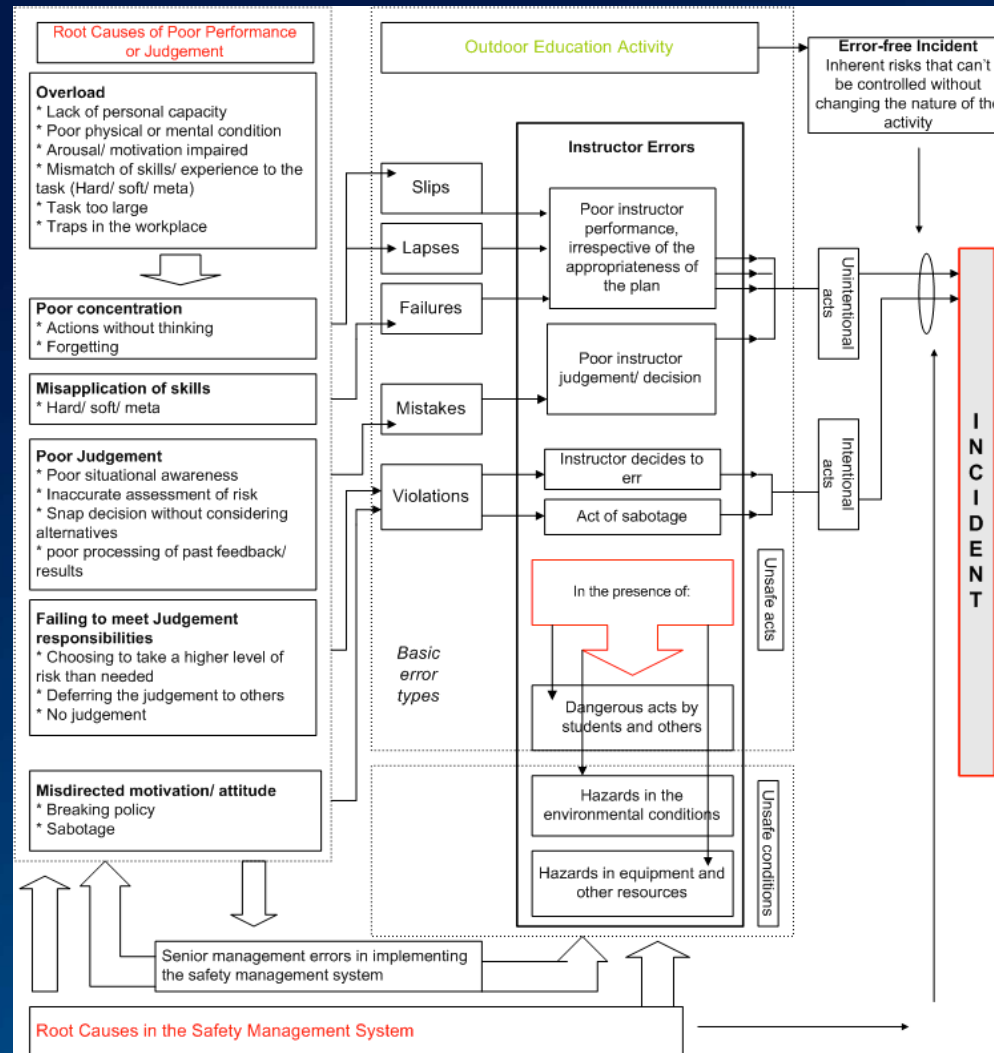


Meyer (1979)





Root cause model (Davidson, 2007)





Root causes leading to poor performance or judgement

Over load

1. Lack of Personal Capacity
 - a. Physical
 - b. Mental
2. Poor Physical or Mental Condition
 - a. Injury
 - b. Sickness
 - c. Physical fatigue
 - d. Mental fatigue
3. Arousal/Motivation Impaired
 - a. Drugs/ alcohol
 - b. Biorhythmic
 - c. Menstrual
 - d. Bored
4. Mismatch of Skills/ Experience to Task
 - a. Local knowledge
 - b. Hard skills
 - c. Soft skills
 - d. Meta skills
5. Task too Large
 - a. Hours per day too great
 - b. Days without break too great
6. Traps in Work Environment
 - a. Equipment traps
 - b. Environment traps
 - c. Student traps

Poor Concentration

7. Actions without thinking
8. Forgetting

Misapplication of Skills

9. Misapplication of Skills
 - a. Hard skills
 - b. Soft skills
 - c. Meta skills

Poor Judgement

10. Poor Situational Awareness
 - a. Availability
 - b. Selective perception
 - c. Selective focus
 - d. Frequency desensitivity
 - e. End of session
 - f. Transferred responsibility
 - g. Concrete information
11. Inaccurate Assessment of the Risk
 - a. Inconsistency
 - b. Failure to review
 - c. No-risk perception
 - d. Perceived as unlikely to happen
 - e. Justifying away the risk
 - f. Sunny day syndrome
 - g. Negative event feedback
 - h. Illusion of control
 - i. Wishful thinking
 - j. Risk homeostasis
12. Snap Decision Without Considering Options
 - a. Habits/ rules of thumb
 - b. First impressions
13. Poor Processing of Past Experiences
 - a. No-accident errors
 - b. It must go right next time
 - c. Success/ failure attribution
 - d. Rebuilding of events
 - e. Hindsight bias

Failing to Meet Judgement Responsibilities

14. Choosing to take a Higher Level of Risk than Needed
 - a. Physical comfort/ ease
 - b. Mental ease
 - c. Emotion comfort/ ease
 - d. Personal ego needs
 - e. Others' needs/ values
 - f. Personal goals/ values
 - g. Perceived goals of management
 - h. Pressured by time/ conditions
 - i. Risky shift
 - j. Illusions of
 - k. Natural risk taker
 - l. Gender and other social interactions
15. Deferring Judgement to Others
16. No Judgement Made

Misdirected Motivation/ Attitudes

17. Breaks Organisational Policies
18. Sabotage



Key Human Factors issues?

<u>Instructor/ student factors</u>	Sources
Risk management	Boyes & O'Hare 2003, Hogan 2002, American Camp Association, Capps 2007, Wilks & Davis 2000, Brown 1995, Davidson 2004, Brookes 2003, Powell 2007, Cline 2007, Hunter 2007, Harper & Robinson, 2005).
Failure to record near misses	Brackenreg 1999, Capps 2007, Brookes 2003, Watters 1996, Davidson 2004, Haddock 1999.
Risk perception	Dallat 2007, Dickson Chapman & Hurrell 2000, Powell 2007, Brown 1995, Cline 2007.
Leadership	Boyes & O'Hare 2003, Galloway 2002, Harper & Robinson 2005, Brookes 2003, Wilks & Davis 2000, Brown 1995, Davidson 2004.
Instructor qualification	Crosby & Bensemen 2003, Wilks & Davis 2000, Australian Canoeing, Brookes 2003.
Supervision	Davidson 2001 and 2004, Brookes 2002 and 2003.
Decision making	Ewert, Shellman & Glenn 2006, Boyes & O'Hare 2003, Watters 1996, Galloway 2002, Wickens & Hollands 2000.
Situation awareness	Boyes & O'Hare 2003, Galloway 2002.
Complacency and fatigue	Hunter 2007, Haddock 1999, Davidson 2004, American Camp Association.

<u>Instructor/ student factors</u>	
Hazards arising from instructor and student attitudes, skills and behaviours	Brackenreg 1999
Client unsafe acts i.e. inadequate protection, instruction	Meyer 1979, cited in Davidson 2004
Judgement errors on behalf of the instructor	Meyer 1979, cited in Davidson 2004
Poorly skilled/ trained instructors	Meyer 1979, cited in Davidson 2004
Overload	Davidson 2007
Poor concentration	Davidson 2007
Misapplication of skills	Davidson 2007
Poor judgement, failing to meet judgement responsibilities	Davidson 2007

<u>Wider systems factors</u>	
Hazards in the local surroundings	Brackenreg 1999
Hazards associated with the activity	Brackenreg 1999
Environmental conditions i.e. falling rocks, weather, inadequate security, equipment, clothing	Meyer 1979, cited in Davidson 2004
Poor safety management	Davidson 2007
Poor implementation of safety management system	Davidson 2007

Conclusions

- Delineation of contributing factors is in its infancy
 - Current knowledge of contributing factors is limited
 - Existing research is disjointed
 - Existing models lack depth, cohesion, and clear theoretical underpinning
 - Absent or inadequate treatment of wider systemic factors
 - No universally accepted model or taxonomy
 - Limited evidence of applications of models
 - Lack of spin in from other domains



Reporting systems & Incident databases

- Widely accepted approach and commonly used in most safety critical domains
- Widely recognised as a key provision in the outdoor activity sector
- Used for various purposes
 - > In-depth studies
 - > Error trends
 - > Development of domain-specific taxonomies of error
 - > Error analysis
 - > Inform the development of countermeasures



Incident Databases

Database	Country	Activities
International Incident Database Project	USA	<ul style="list-style-type: none"> - Headed by a working group- an international consortium of program and risk managers in the outdoor ed field, initiated by Risk Curtis - Aims to define an international standard for collecting incident data - Define key elements essential to incidents - Create a common, accessible database to integrate data from around the world - Project website built as an application model for the outdoor community
National Incident Database	NZ	<ul style="list-style-type: none"> - NZ Mountain Safety Council, Outdoors NZ, Education Outdoors NZ, Ministry of Ed - Online incident data collection and analysis tool using a standard method - Launched in 2004, now contains over 15 745 incidents - Works towards creating an international standard to integrate data - Identify trends, increase understanding about risks and causal factors - Voluntary and anonymous with growing support
Wilderness Risk Managers Committee Incident Reporting Project	USA	<ul style="list-style-type: none"> - Consortium of outdoor schools and organisations - Collection and management of data with the aim of better understanding risk - Sponsored by NOLS- recently concluded (2009) - Over 65 organisations submitted data, 1195 incident records
Outdoor Medical Incident Database	Australia	<ul style="list-style-type: none"> - Incident recording and management system designed to help organisations manage risk
National Accident Incidence Report Form Database	Australia	<ul style="list-style-type: none"> - Outward Bound Australia- 3 years - Voluntary reporting database to assist organisations in the review of their operations
Australian Accident Database	Australia	<ul style="list-style-type: none"> - List of accident, including near misses that have occurred in the outdoor and adventure environment - Now covers all of Australia - Established as a readily accessible learning tool



Conclusions

- Current state of incident reporting in the led outdoor activity industry is fragmented
- Lack of a standardised data collection, storage, and analysis system
- Data quality
- Lack of appropriately trained investigators
- Closed-ranks culture