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To cite this article: Clare Dallat, Natassia Goode & Paul M. Salmon (2018) 'She'll be right'. Or will she? Practitioner perspectives on risk assessment for led outdoor activities in Australia, Journal of Adventure Education and Outdoor Learning, 18:2, 115-131, DOI: [10.1080/14729679.2017.1377090](https://doi.org/10.1080/14729679.2017.1377090)

To link to this article: <https://doi.org/10.1080/14729679.2017.1377090>



Published online: 18 Sep 2017.



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ARTICLE



'She'll be right'. Or will she? Practitioner perspectives on risk assessment for led outdoor activities in Australia

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ABSTRACT

Inadequate risk assessment has been implicated as a contributory factor in the deaths and injuries of participants on led outdoor activity (LOA) programmes in both Australia and overseas. The identification and assessment of risks is a required component of LOA programmes, and multiple risk assessment methods and techniques are available to the practitioner. Little, however, is known about the risk assessment approaches currently applied in practice. This study surveyed Australian LOA practitioners to: (1) determine which risk assessment methods and policy guidance are currently used in practice (if any); (2) understand practitioner perspectives around the utility of risk assessments; and (3) identify perceived challenges and barriers in applying these methods to the LOA context. The results paint a concerning picture of confusion and uncertainty in relation to conducting risk assessments, as well as a lack of policy guidance and formal training. The results imply that new and more suitable methods of risk assessment should be developed, focussing on the development, planning and delivery of led outdoor activities.

KEYWORDS

Risk assessment; systems thinking; outdoor education; practitioner

Introduction

In Australia, inappropriate management of risk, and specifically inadequate risk assessment, is frequently highlighted as a contributory factor in the injuries and deaths of participants during led outdoor activities (LOA) (Chandler, 2012; White, 2014).¹ This problem is not specific to Australia with analyses of major fatalities internationally also citing inadequate risk assessment as a significant contributory factor in both fatal and injury-causing incidents (Ajango, 2000; Salmon, Cornelissen, & Trotter, 2012; Salmon, Williamson, Lenne, Mitsopoulos, & Rudin-Brown, 2010). In addition, analyses of large injury data sets show that inadequate risk assessment is a prominent causal factor in LOA injury incidents in both Australia (Salmon et al., 2017) and New Zealand (Salmon, Goode, Lenné, Cassell, & Finch, 2014).

The LOA sector in Australia comprises a diverse group of organisations who design, plan and deliver LOA programmes. These programmes are varied and may include, for example, multi-day compulsory school camps and outdoor education programmes, single-day outdoor recreation opportunities, therapeutic outdoor programming or tourism opportunities which involve an adventure component (Goode, Finch, Cassell, Lenné, & Salmon, 2014). Although the organisations designing and delivering these programmes may vary, they all share a common legal requirement: a statutory duty of care to those involved to ensure their safety, as far as is reasonably practicable (Goode, Finch, Cassell, Lenné, & Salmon, 2014). Importantly, this duty of care extends to participants, staff and volunteers involved in the LOA programme (e.g. Parliament of Victoria,

Occupational Health and Safety Act, 2004). Consequently, governing bodies within the LOA sector (e.g. Adventure Activity Standards and State Departments of Education) mandate that risk assessments are conducted prior to the commencement of any LOA. Within the Australian LOA domain, several industry or governing organisations (e.g. Department of Education, Victoria, Australian Adventure Activity Standards; www.aas.org.au) reference the international standard for risk management (ISO 31000) as relevant for consideration in the planning and conduct of LOA activities. Risk assessment, according to the ISO 31000, comprises three successive processes: risk identification, risk analysis and risk evaluation (ISO, 2009b). The definition of 'risk' within ISO 31000 refers to something that may impact on the achievement of desired objectives (ISO, 2009b). These suggestive processes are briefly outlined below.

Risk identification involves the identification of, and potential contributors to, events that may have an impact on intended outcomes (e.g. severe weather, pre-existing medical conditions). The ISO standard advocates a systematic approach to the risk identification phase of risk assessment, as any risks not identified at this initial stage are likely to be excluded from further analysis (ISO, 2009).

Risk analysis is a process applied to comprehend the likelihood and the consequences of the risk and to arrive at an estimated level of the risk. It can be conducted qualitatively, quantitatively, or by applying of a mix of both approaches (Marhavilas, Koulouriotis, & Gemeni, 2011). Currently, a large number of techniques exist for conducting risk analyses, and the supporting standard to the ISO 31000 provides guidance on the selection and application of 31 risk assessment methods and techniques (ISO 31010; 2009). These include risk assessment techniques such as brainstorming, Delphi technique, fault and event tree analysis (FTA, ETA), hazard and operability study (HAZOP), human reliability analysis (HRA), failure mode and effects analysis (FMEA), bowtie and finally, statistical methods, such as Monte Carlo and Bayesian analysis (ISO 31010; 2009). For a full review the reader is referred to Dallat, Salmon and Goode (2017). Importantly, ISO 31010 does not stipulate which method(s) organisations must apply. In addition, other methods of risk assessment also exist from other domains such as occupational health and safety, construction, process control and nuclear power (e.g. Altabbakh, Alkazimi, Murray, & Grantham, 2014; Embrey, 1986; Leveson, 2004; Marhavilas et al., 2011). These methods may also be considered for use by LOA practitioners.

The 'risk evaluation' phase involves formal decision-making surrounding the level of risk, and the consequent priorities attached to treatment of the identified risks, again dependent on the specific operating context of the relevant organisation (ISO 31010; 2009).

Conducting risk assessments for LOA's is not new (e.g. Brown, 1995, 1998; Meyer, 1979; Parkin & Blades, 1998; Priest, 1996; Zink & Leberman, 2001). Moreover, how they are conducted, the methods applied and the associated challenges in applying them have long been a point of discussion amongst LOA practitioners (Dallat, 2016; Cruchet, 2006; Dallat, Salmon, & Goode, 2015b) and within the literature (Bailie, 1996; Dallat, Salmon, & Goode, 2015a; Dickson, 2001; Parkin & Blades, 1998). Parkin and Blades (1998), for example, were highly critical of outdoor education risk management resources in general (of which risk assessments are a significant component), attesting that they are failing to meet the practical needs of practitioners, as well as being too theoretical, and not user-friendly. Bailie (1996) comments on the specific lack of clarity in risk assessments, namely, that 'people have not understood what they have been trying to do when writing risk assessments' (p. 6).

Multiple approaches to risk assessment have also been suggested in the literature (e.g. Brown, 1995; Dickson, 2001; Haddock, 2004, 1993; Hogan, 2002), and several LOA-specific risk assessment methods have been developed (Brown, 1998; Parkin & Blades, 1998). These include the Risk Analysis and Management System which involves identifying all the possible risks associated with an activity by applying the lens of people, equipment and the environment to identify the causal factors for each risk (Davidson, 1992). Curtis (1995b, 2008) and Priest (1996) also developed specific risk assessment methods for the LOA domain. However, many of these methods are now dated with some being over 20 years old. Within the past 20 years, the general field of safety science has advanced with the evolution of both theoretical and methodological approaches to understanding accident causation

and analysis (see Dekker, 2011; Hollnagel, 2012; Leveson, 2004). The LOA domain has also experienced significant advancement in its explanations of accidents (see Dallat et al., 2015a; Goode et al., 2014, 2012; Salmon et al., 2010). An important feature of these advances is that it is now widely accepted that accidents and injury-causing incidents have multiple contributory factors outside of the people, environment and equipment directly involved in the incident.

Safety science now generally accepts that accidents emerge from a relationship between parts, layers and components, and not from broken parts in isolation (Dekker, 2011). Put another way, accidents are emergent properties of systems and are caused by the unexpected combination of everyday, expected variability in performance (Hollnagel, 2004). Known as the systems approach, this view now largely prevails within safety management in safety-critical domains (Salmon et al., 2017; Underwood & Waterson, 2014), and the LOA domain is also starting to embrace it in studies involving accident causation, reporting and prevention (see Carden, Goode, & Salmon, 2017; Dallat et al., 2015a; Goode et al., 2014, 2012, 2014, 2017; Salmon et al., 2010; Trotter, Salmon, & Lenné, 2014).

Most theoretical and applied research on risk assessment has focussed on the more well-known safety-critical domains such as healthcare (You et al., 2004), aviation (Trucco, Leva, & Sträter, 2006) and nuclear power (Swain & Guttman, 1983). The LOA domain has largely focussed on related risk management topics including general risk management (e.g. Brown, 1995, 1998; Dickson & Gray, 2011), leader decision-making (e.g. Boyes & O'Hare, 2011, 2003; Galloway, 2002), leader risk assessment (e.g. Aadland, Vikene, Varley, & Moe, 2017; Harper & Robinson, 2005) and incident analysis (e.g. Brookes, 2003a, 2003b, 2004, 2007; Davidson, 2004; Goode et al., 2014; Hunter, 2007, 2012; Salmon et al., 2010). With the exception of Dallat et al. (2015a) and Dickson (2001), little empirical or theoretical attention has been given to risk assessment method design, evaluation and improvement.

As a result, whether contemporary knowledge on risk assessment and accident causation has been translated into the risk assessment methods being applied by LOA practitioners remains unclear. Therefore, important lines of inquiry in this paper include identifying what formal methods and policy guidance around risk assessments are currently being employed, the perceived utility of risk assessments amongst practitioners and what perceived challenges and barriers they face. Although inadequate risk assessment has been highlighted as a contributory factor in recent fatal incidents in Australia (see Chandler, 2012; White, 2014), it remains unclear as to whether this is a problem impacting the LOA domain generally. Such information will allow the LOA domain to better understand current risk assessment practice and whether there is a need for further methodological development and implementation in practice. It will also enable the consideration of additional approaches to further improve the domain's ability to deliver quality experiences safely.

The study described in this article is a direct response to these key gaps in the knowledge base. We present the findings from a study that was undertaken as part of a wider programme of research involving the development of a formal risk assessment method for the LOA domain. In summary, the aims of this paper were to: (1) determine what risk assessment methodologies and policy guidance are currently used in practice (if any); (2) understand practitioner perspectives around the utility of risk assessments; and (3) identify perceived challenges and barriers in applying these methods to the LOA context.

Method

An online anonymous and voluntary survey study design was adopted. The research was approved by the University of the Sunshine Coast Human Ethics Committee.

Sample and recruitment

LOA professionals who had responsibility for completing risk assessments were invited to participate via several outdoor education peak body and professional membership associations, as well as the Understanding and Preventing Led Outdoor Activity Database System (UPLOADS) website (www.uploadsproject.org). Through these channels, approximately 800 people were invited to

participate. In total 97 respondents agreed to participate in the survey, indicating an estimated response rate of 12%.

Survey development

The survey questions were generated based on the study research questions and a review of over 300 risk assessment methods (Dallat et al., 2017). In line with the aims expressed above, the questions were developed to extract information on current risk assessment processes, practice and outcomes as well as information regarding practitioners' perceptions on the utility of current risk assessment approaches and any challenges and barriers faced. Within the LOA domain, actors reside at various hierarchical levels (not only at the instructor level), and subsequent actions and decisions across these levels interact with one another to shape overall behaviour, safety and accidents. The questions in the survey questionnaire were therefore designed specifically to elicit a better understanding of where the risks identified by LOA methods resided within the overall system. The questions were targeted to better understand whether the methods designed to identify sources of foreseeable risk and in turn prevent accidents aligned with contemporary methodologies to study accidents when they did occur. Table 1 displays the specific themes and subsequent survey questions. The survey underwent pilot testing by three LOA professionals with extensive experience in risk and safety management. This was to ensure the questions were understandable and clear and that appropriate information was provided in response to them. During the initial data collection stage and once 10 responses were received, responses were checked for consistency and accuracy. No further changes were made to the survey based on this analysis.

Procedure

The study involved respondents completing an online survey in Qualtrics™. Respondents who indicated a willingness to participate in the survey were either directed to a link (via the invite) or could also contact the lead author who provided them with a link to the survey. The link destination then requested all respondents to enter their responses to the questions posed in Table 1 as well as directing them to providing some additional demographic information. The survey remained live for the period between the months of January–April 2015.

Data analysis

The data from the Qualtrics™ online survey tool were downloaded and exported into a Microsoft Excel spreadsheet. Responses to categorical questions were summarised using descriptive statistics. Responses to open ended questions were analysed using Nvivo 10™, a qualitative analysis software tool. Responses were coded using a thematic analysis approach (adapted from Braun & Clarke, 2006). This involved initially coding responses to each question descriptively into themes. For example, in the case of the response, 'Sometimes it's difficult to draw a line on where to stop assessing risk' was coded as the 'lack of clarity around risk assessment boundaries'. The themes identified were reviewed by two additional analysts, and any discrepancies were resolved through discussion until agreement was reached.

Results

Respondents

In total, 97 respondents (74 male, 23 female) completed the survey. On average, respondents were 40.8 years of age ($SD = 9.83$, Range 25–66) and had 3.39 years' experience in their current role ($SD = 1.47$, Range = 1–10 years plus). Respondent's positions within their organisations are presented in Figure 1. Almost three quarters of the respondents (72%, $n = 67$) were either involved

Table 1. Specific themes and survey questions.

Question	Response option
Theme: Experience in conducting risk assessments	
How many years of experience do you have in this current role?	0–1 2–3 4–5 6–10 10+
Do you create risk assessments for outdoor programmes as part of your current role?	Yes/No
How many risk assessments do you estimate you have created since you have been working in the LOA sector?	1–10 11–20 21–30 31–40 41–50 50+
Where did you first learn to conduct a risk assessment?	• TAFE course • University course • On-the-job • Other
Do you lead outdoor activities as part of your current role?	Yes/No
Do you have formal outdoor education/recreation qualifications?	Yes/No
Do you have outdoor qualifications?	Yes/No
Theme: Risk assessment methods	
Does your workplace provide policies, procedures or guidelines on how to conduct a risk assessment?	Yes/No/Unsure
How do you conduct a risk assessment in your organisation?	Open Ended
Do you create a risk assessment for?	Check those that apply, plus free response option
• Specific activities • Specific venues • Specific groups of participants • Specific programmes • General programme types • Other	
Theme: Perceived challenges in conducting risk assessments	
How useful are risk assessments in preventing harm and injury on outdoor programmes?	Scale 1–10, 1 = Not at all useful, 10 = Extremely useful
Do you experience any confusion regarding risk assessments?	Yes/No, plus free response option Further open ended response request for Yes responses
Do you believe there are any issues regarding the application of risk assessments to the LOA context?	Yes/No Further open ended response request for Yes responses

in LOA programme coordination or planning (48%, $n = 47$), in a stated role involving field LOA management (14%, $n = 14$), or in a direct teaching or lecturing of students (10%, $n = 10$).

The types of organisations that respondents worked for at the time of completing the survey are presented in [Figure 2](#). Respondents held a high level of educational qualifications with 78% ($n = 76$) holding a degree at Bachelors level or above. The majority also held outdoor (76%, $n = 74$) and technical (74%, $n = 74$) LOA qualifications. Outdoor qualifications included Certificate III, IV, Diploma or a Post-Graduate Diploma in an outdoor education related field. Technical qualifications included flat water canoe instructor, white water canoe instructor, bushwalk instructor, high-ropes course supervisor, cross-country ski instructor, and Wilderness First Aid (97% of technical qualifications were obtained in Australia).

Experience in conducting risk assessments

Respondents were asked to describe their experience in conducting risk assessments for LOA's as well as the level of risk assessment training that they had received. The majority of respondents (77%, $n = 75$) conducted risk assessments as part of their current role. [Figure 3](#) shows respondent estimations of the number of risk assessments they have completed during their LOA career. Over half (57%, $n = 56$) of respondents indicated that they had first learned how to conduct a risk

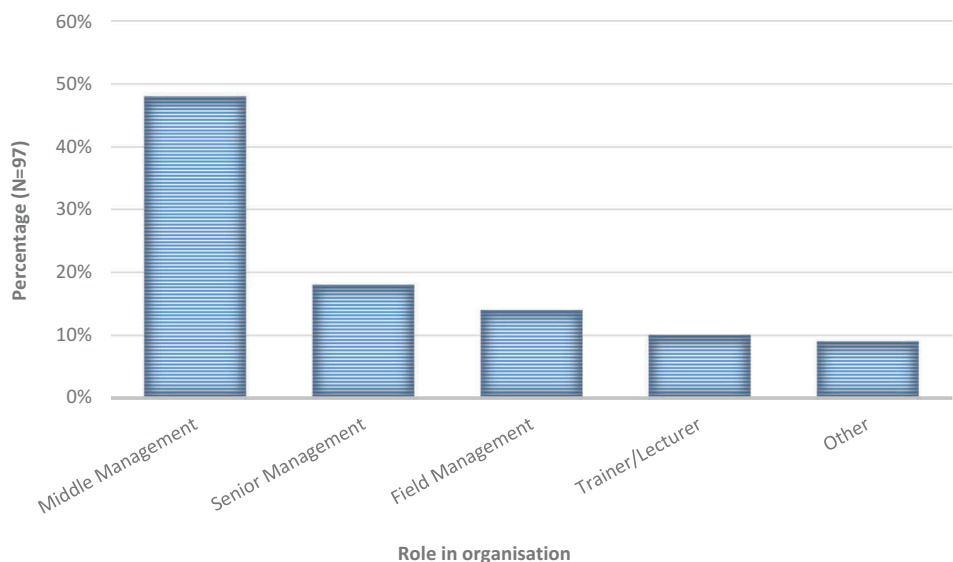


Figure 1. Respondents' position within their organisation.

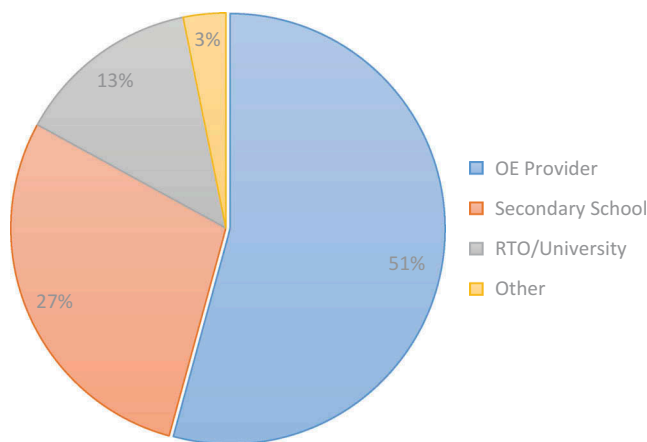


Figure 2. Respondents' employers.

assessment 'on the job'. All other respondents (43%, $n = 41$) indicated that they had first learned to conduct a risk assessment during formal courses.

Methods of risk assessment

Respondents were asked to describe how they conduct risk assessments in their organisation including: the method employed, the types of risks considered, the timeframes for completion and the organisational resources.

Risk assessment methods

Figure 4 provides an overview of the different types of methods identified. 'Complete proforma/ template' was the most frequently mentioned type of risk assessment method (24%, $n = 23$). In

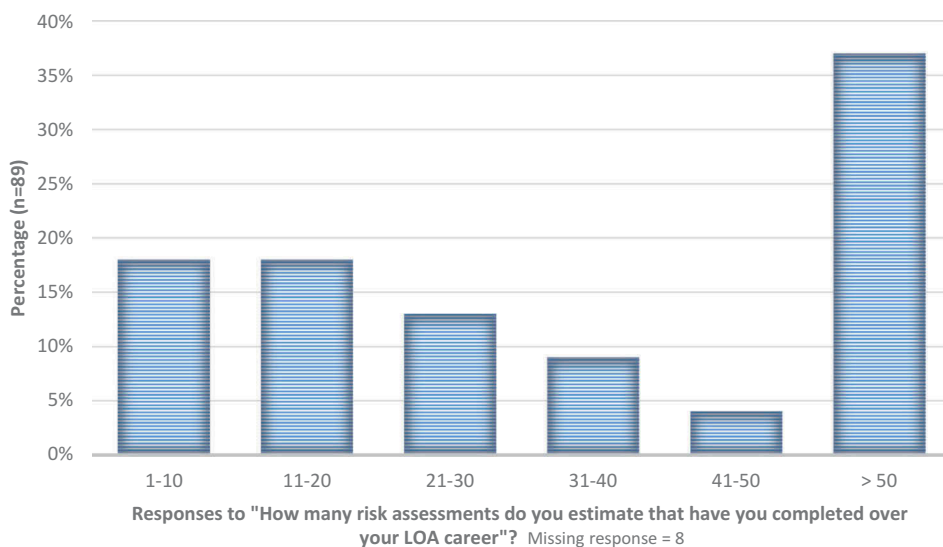


Figure 3. Responses to 'How many risk assessments do you estimate that have you completed over your LOA career'?

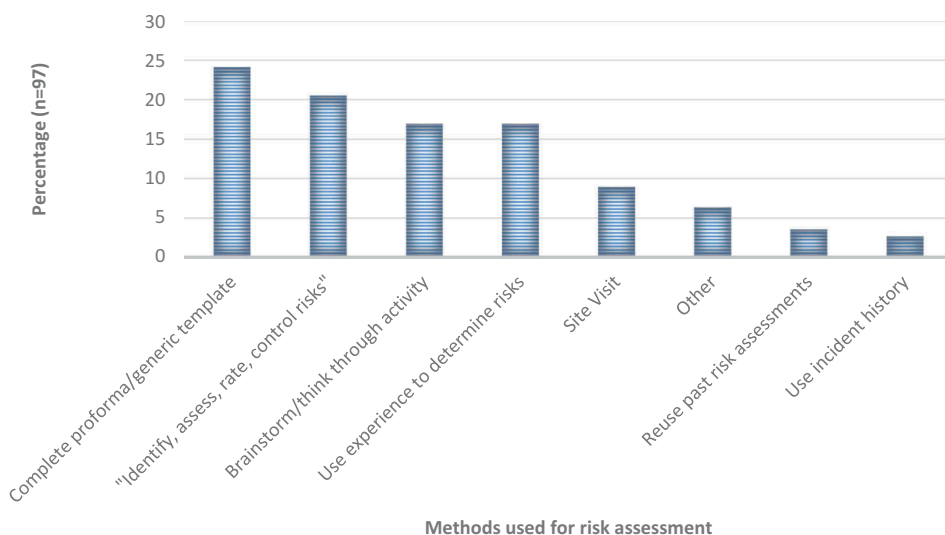


Figure 4. Methods used to conduct risk assessments.

addition, a significant proportion of responses (21%, $n = 20$) employed the terms, 'Identify, assess, rate, control risk' to describe how their organisation conducted risk assessments. This language is specific to the international risk management standard (ISO 31000; 2009). Further, 'Thinking' and 'brainstorming' was described by almost 20% ($n = 19$) of the sample. In these cases, past experience in an activity was used to inform the present risk assessment. For example, one respondent described his method of risk assessment as simply: 'Thinking up things that could go wrong on the basis of my experience'. The specific focus on the 'past' also emerged as an important source of information for the identification of risks. For example, using experience to determine risks, reusing past risk assessments and previous incident history all were mentioned in the results. Together, these methods accounted for nearly a quarter of the methods employed. In

several cases, both methods were applied together and involved multiple staff, as the following response indicates: ‘We have a staff discussion as to what we foresee can be hazardous in the programme/area/activity. We use a template to guide the structure’. Overall, the findings indicate that a range of different methods are used to conduct risk assessments, both formal and informal.

The types of risks considered

Figure 5 presents a summary of the types of risks assessed by respondents, according to the UPLOADS LOA Accident Analysis Framework. Figure 5 demonstrates that respondents primarily assess risks at the bottom two levels of the framework, specifically focussing on the activity, the environmental conditions and the staff/participants directly involved in the conduct of the activity. The most frequently mentioned type of risk related to the activity (40%, $n = 32$). For example, one respondent described the activity as the key focus in their risk assessment approach: ‘Work through entire process of activity from the time the client arrives at the car park to the time the client leaves the car park. Detail every conceivable risk’.

Timeframes for completion

The majority of respondents stated that the risk assessment was considered complete prior to the commencement of the activity/programme (74%, $n = 72$). Only 3% ($n = 3$) indicated that the risk assessment process extended beyond the programme commencing. Notably, 23% ($n = 22$) of respondents chose the ‘other’ category. Explanations for this response indicated that the risk assessments were considered either, ‘ongoing’ or ‘continuous’. One respondent commented that: ‘Ours are set all year. They are always ready to go’. Another respondent stated that their risk assessments are: ‘Ongoing. We are always monitoring and adjusting as required—it’s an outdoor program after all, and therefore open to changes according to infinite variables’.

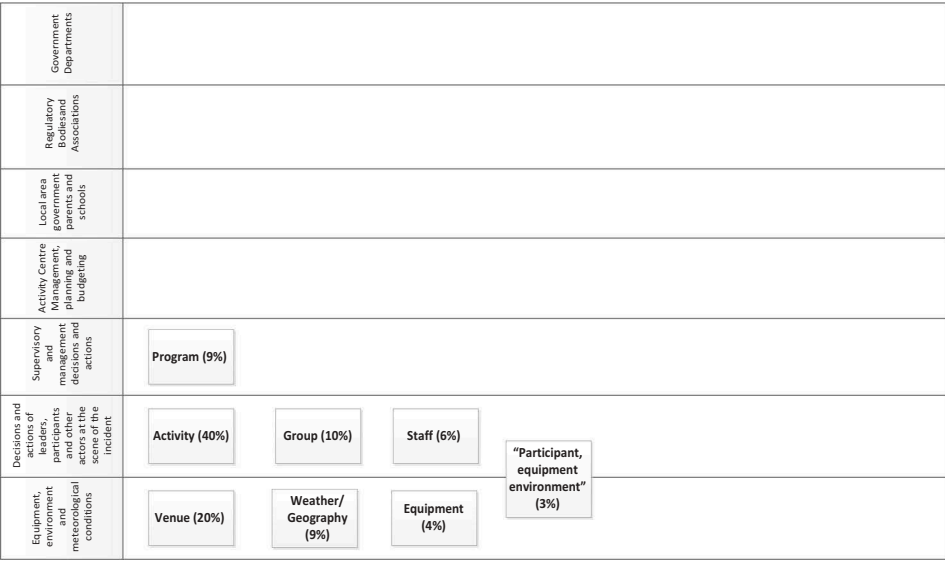


Figure 5. Accimap representing the LOA system where the risks identified for assessment reside (adapted from Salmon et al., 2010).

Risk assessment policy and guidelines

The majority of respondents (73%, $n = 71$) indicated that their organisations provided policies, procedures or guidelines in relation to how to complete a risk assessment. Organisations where there was a lack of policy guidance surrounding risk assessments accounted for 19% ($n = 18$) of the total responses, and 8% ($n = 8$) of respondents were unsure as to whether their employers provided policy guidance.

Utility of risk assessments in preventing harm

Respondents were asked to rate the utility of risk assessments in preventing harm and injury on outdoor programmes. As shown in [Figure 6](#), almost all respondents (90%), rated risk assessments as more than 'moderately' useful. Over 50% ($n = 52$) rated the usefulness of risk assessments as 8 or above, indicating that they are considered very useful.

Confusion around risk assessment

Over half of respondents indicated that they experienced confusion regarding risk assessments (52%, $n = 50$). [Table 2](#) provides an overview of the respondent's sources of confusion, as well as example quotes.

The most frequent source of confusion surrounded the scope associated with actually conducting a risk assessment. Almost 50% ($n = 52$) of the total reported issues of confusion related to uncertainties of level of detail required, clarity around boundaries of risk identification, risk acceptability and risk tolerance, and who bore ultimate accountability for decisions around risk assessment approval.

The second most frequent theme was 'Methodological issues', which featured in 23% ($n = 33$) of the responses. Areas of confusion related to methodological issues included: the existence of multiple types of risk assessments across the LOA domain, leading to issues of consistency ($n = 10$); the complex nature of the risk assessments ($n = 9$); the actual purpose or intent behind a risk assessment ($n = 6$); and calculating residual risk ratings, risk likelihood and consequence ($n = 8$).

The third most frequent theme was the actual applicability of risk assessments within the LOA domain ($n = 20$, 14%). Almost one-fifth of respondents indicated doubts as to the applicability of

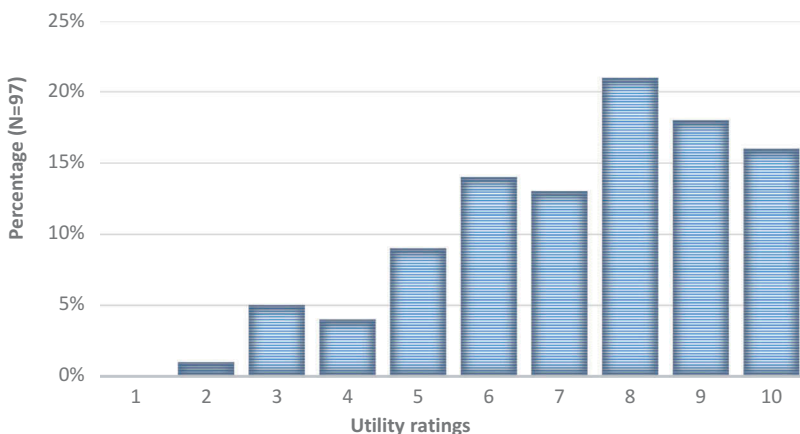


Figure 6. Responses to 'How useful are risk assessments in preventing harm and injury on outdoor programmes? (1 = not at all useful and, 10 = extremely useful.

Table 2. Sources of respondent's confusion when conducting risk assessments.

Reason for confusion	N
Amount of detail required	
Lack of clarity around how far to go to assess risks	28
What is an acceptable risk?	11
What is a relevant/important risk to assess?	5
What level is required for control measures?	4
Who does them and who should sign off on them?	4
Workplace Health and Safety Act (WHS) and legal implications of risk assessments	2
Methodology	
Lack of consistency with multiple types in different organisations	10
Too complex	9
Lack of clarity around purpose of risk assessments	6
Lack of understanding of residual risk ratings	4
How should frequency and severity be determined?	4
Applicability to LOA context	
Translation of risk assessments to LOA domain due to dynamic nature of outdoors	10
Subjectiveness of risk assessments	8
Compliance exercise to protect organisation	2

current risk assessment methods and approaches to the LOA context ($n = 20$). Here, sources of confusion existed around the subjective nature of risk assessments as well as queries around risk assessments to be able to predict LOA domain risks, considering the domain's 'dynamic' properties. One respondent suggested that, in current risk assessments, there is a 'Failure to be dynamic and reflect constantly changing individual, group and environmental factors that the outdoor instructor must manage'.

Applicability of risk assessments to the LOA context

The majority of respondents believed there were challenges associated with the applicability of risk assessments to the LOA context (79%, $n = 77$). Table 3 provides an overview of the themes as well as example illustrative quotes which emerged in relation to applicability.

Several themes emerged in relation to applicability of risk assessments to the LOA context, which had also been raised previously by respondents in an earlier question relating to sources of confusion with risk assessments. The lack of clarity in relation to what risks require assessment appears as a significant challenge that creates confusion. Further, the influence of additional actors, specifically those at the instructional or delivery level of the LOA programme featured as the second highest factor in the respondent's expressed challenges surrounding applicability of risk assessments. These respondents felt that they didn't have a significant influence on whether the risk assessment was applied in the field. The reasons the respondents gave for whether risk assessments would in fact be applied appeared dependent on whether the instructors consciously chose to use and adhere to the risk assessment. Words such as 'slack', 'complacency', 'lackadaisical', 'choosy', 'insolent attitudes', 'individual staff being the problem' and 'instructor awareness gaps' were used in responses surrounding this theme. To sum up, although the risk assessment may have been conducted, whether the outdoor leader chose to follow and apply the risk assessment was sometimes beyond the control of the respondents.

The dynamic nature of the LOA context was also revealed as a limiting factor surrounding the applicability of risk assessments to be able to identify all foreseeable risks. One respondent commented that 'there are many variables that can only be assessed in the field at the time'. Further, practicality of the risk assessment methods available emerged in several forms throughout the respondent's comments, for example, in the perceived time constraints required to complete risk assessments, the lack of training and understanding in how to complete them and the assertion that conducting them was primarily a compliance-related task, as opposed to a proactive approach aimed at identifying and managing risk of harm.

Table 3. Respondents' comments in relation to the applicability of risk assessments in the led outdoor activity context.

Theme surrounding applicability of risk assessments	Example comments:	N
Difficult to cover all risks	'Things are easily missed. Sometimes it's easy to create management strategies that are hard to implement in the field and this isn't identified until later'. 'Sometimes it is difficult to draw a line on where to stop assessing risk?'	16
Field staff not following risk assessment	'It's the individual that can become the problem if they don't follow the risk assessment'. 'You can have an awesome risk assessment but at the end of the day it comes down to the people in the field...'	15
Other	'We all use different systems and there isn't necessarily a clear standard for industry'. 'The system is upside down—needs less hierarchy/politics, more support for action on the frontline'.	12
Dynamic nature of LOA	'There are many variables that can only be assessed in the field at the time'. 'The dynamic nature of things make it harder to statistically assess the situation'.	11
Inadequate training/ understanding	'For those people signing off—in my experience they don't have the background in outdoor programs to know the real risks or be realistic in appropriate risk-minimisation controls'. 'Activities are at risk of not being conducted should a risk assessment be done by an unskilled operator (or by people in a management position who aren't aware of acceptable levels of risk) who comes to the conclusion that an activity is "too risky" when in actual fact these are "acceptable" levels of risk than can be managed by appropriate management techniques'.	10
Management/compliance related task	'Risk assessment often becomes a tick box exercise in legal compliance rather than a tool to assist the outdoor leader manage safety on programs and activities'. 'I believe a lot of Risk Assessments are being implemented to mitigate risk from the company and not necessarily to provide good information to those actually using them in the field'.	9
Lack of time	'Activity providers that don't have the expertise, time or manpower to do them'. 'Time poor organisers completing RA's properly'.	4

Organisational motivations also featured in the applicability of risk assessments with 12% ($n = 9$) of respondents considering the risk assessment was a management task and not something that was of practical field use or application, in the identification or prevention of harm to participants on LOA programmes.

Discussion

Inadequate risk assessment has become something of a go-to term in incident investigation and coronial inquiry reports in the LOA domain in Australia. Although it is a statutory requirement in both compliance and practice, it has received scant attention from the LOA research community. Consequently, this study aimed to explore how LOA practitioners in Australia are currently conducting risk assessments. In particular, the survey sought to (1) determine what risk assessment methods and policy guidance are currently used in practice (if any); (2) understand practitioner perspectives around the utility of risk assessments; and (3) identify perceived challenges and barriers in applying these methods to the LOA context.

The findings are compelling. First and foremost, they indicate that there is currently little in the way of formal and structured support for practitioners when conducting risk assessments. Over half of the sample reported that they learned how to conduct risk assessments on the job. Consequently, the quality of risk assessments may be largely dependent on the experience of the practitioner, the quality of supervision and training, and the supporting documents provided by the employer (i.e. policies, guidelines). While many organisations provide supporting documentation, almost a fifth of the respondents reported that their organisation had no policy or guidelines around risk assessment. In addition, almost two-thirds of the sample reported that they are currently confused around risk assessment. Factors underpinning this varied from a lack of clarity regarding which risks should be identified and assessed, to a lack of understanding of how to

conduct and apply results relating to assessments of likelihood, consequence and residual risk ratings.

The findings also revealed various challenges faced by practitioners when attempting to apply risk assessment methods, with several practitioners questioning their usability in the LOA domain. Taken together these findings suggest that there are some important gaps in the support for LOA practitioners around risk assessment. Indeed, they also indicate that some practitioners may be entering the workforce without any formal training in risk assessment and may not be supported by their employers through the existence of risk assessment policies or guidelines. As a corollary, there appears to be confusion about what risk assessment is, how it should be done and how the resulting outputs should be used. These findings confirm some of the challenges expressed in the LOA literature surrounding risk assessment. The sense of confusion expressed by respondents correlates with Bailie's similar assertion made over 20 years ago (Bailie, 1996). Parkin and Blade's (1998) assertion that outdoor education risk management resources are failing to meet the practical needs of practitioners, are too complex and not user friendly, were also well confirmed in the present study. This suggests that LOA risk assessment practice has remained stagnant for the last two decades.

A second important finding relates prior published work in the LOA literature surrounding safety and risk. In general, attention to the subject of risk assessment itself has been limited, with the exception of a few studies (e.g. Bailie, 1996; Dickson, 2001). Notably, many of the themes which emerged in this study (e.g. risks considered, timeframes, policy and guidelines, utility, confusion and applicability to the LOA domain) have not been widely considered in previous studies. What was apparent, however, was a synergy between the approaches to risk assessment detailed in this study with much of the domain's dominant discourse surrounding accident/fatality prevention (see Brookes, 2003a, 2003b, 2004, 2007, 2011; Brown, 1998; Davidson, 2004). This engenders a focus on the risks associated with the activity participants, equipment and environment. Brookes (2004), for example, concludes that 'knowledge of particular environments is more important for fatality prevention than knowledge of outdoor recreation activities' (p. 44). Of note, the activity, the specific venue and the weather/geographic conditions accounted for 69% of the risks identified by participants. These authors wholly agree that identification of foreseeable risks and implementation of risk controls regarding the activity and the environmental factors are critical to a well-managed programme. Nevertheless, recent analyses of LOA incidents indicate that there are additional contributory factors involved in LOA incidents (e.g. Salmon et al., 2014, 2017; van Mulken et al., 2017).

To date, a handful of studies have been conducted applying the systems approach within the LOA domain involving regulation (Carden et al., 2017), incident reporting and analysis (Goode et al., 2014, 2012, 2014, 2017; Salmon et al., 2010), and risk assessment (Dallat et al., 2015a). These studies have demonstrated that the approach is transferable to the LOA domain. In analyses of multiple LOA injury incidents, Salmon et al. (2017) and van Mulken et al. (2017) identified injury incident causing factors relating not only to instructors, leaders and the environment, but also relating to schools, activity centre management, parents, activity leader supervision, risk assessment and programme design. In the current study, respondents reported they currently assess the activity, the venue or site, staff, the group, the weather and the category of programme. This leads to the conclusion that, at least for the sample used, only a small proportion of the potential risks around LOA programme development and delivery are currently being assessed. A key requirement for future research therefore involves the development of risk assessment methods that can identify and assess risks across the wider LOA system, including risks associated with schools, parents, programme design, and activity centre management, policies and procedures.

The findings from the current study also compare with Dallat et al. (2017), who reviewed over 300 risk assessment methods across multiple safety-critical domains (e.g. health care, nuclear, aviation and process industries). They reported that only a few risk assessment methods aligned with contemporary accident causation theory (see Dekker, 2011; Underwood & Waterson, 2014).

Comparing these findings with the present study suggests that the lack of systems-based risk assessment methods is not isolated to the LOA domain. However, it is notable that systems thinking-based risk assessment methods do exist and they have been applied in the safety-critical domains (e.g. the Systems Theoretic Process Analysis (STPA, Leveson, 2011). Future research should explore the application of such methods for risk assessment in the LOA context.

The findings of this study also raise other important issues around the risk assessment methods currently utilised. Brainstorming, or thinking up risks, either in groups or individually, was a risk assessment method reported by a fifth of respondents. This method is proposed as a hazard identification technique by a workplace health and safety regulator; however, this is in addition to a structured and systematic process (Worksafe Victoria, Handbook for controlling risks). Such an approach appears to be largely lacking amongst LOA practitioners. Whilst the importance of experience in assisting LOA leaders to make successful decisions when faced with unfolding and dynamic situations has been well documented in the LOA literature (Boyes & O'Hare, 2011; Galloway, 2012), it may be the case that a bias exists towards over-reliance on previous experience. In a study of how LOA practitioners communicated risk with parents, Dallat (2009) reported that the specific risks communicated were present in incidents that they themselves had personally been involved in (e.g. falling off bikes or becoming injured while skiing). Essentially, what the coordinators considered (and subsequently communicated) as being risky emerged from their own direct experience. Although specific experience is certainly valuable, the lack of a systematic approach (of which prior experience is only one aspect) when conducting an organisational risk assessment may result in the failure to identify, assess and manage the potential risks across the system involved in the planning, preparation and delivery of LOA programmes.

Further, studies of injury-causing incident data sets have demonstrated that individual organisations experience very few incidents, especially those which are severe or fatal (Salmon et al., 2014, 2017; van Mulken et al., 2017). As a result, relying on past experience alone is unlikely to yield important insights into future foreseeable risks. Consequently, the findings of this study indicate that there may be room within the LOA domain to more fully consider how to identify and subsequently address those factors during the risk assessment process using a more systematic and consistent approach. This adds further weight to the assertion that work is required to develop formal risk assessment methods for the LOA domain.

Despite these issues, an important point to highlight is that overwhelmingly, respondents were positive and supportive of risk assessment. Most respondents agreed with the need to conduct risk assessments; however, the need to improve LOA risk assessment processes and methods is emphasised by these findings.

This study does have some notable limitations. Firstly, the sample size ($n = 97$) is reasonably small. However, the sample does represent all states and territories in Australia, and all employer types within the sector; therefore, the findings should be considered to be reasonably representative. In addition, as the sample was self-selecting, it is possible that only those for whom risk assessment was an important subject responded. This, however, was not felt to be a significant concern due again to both the spread of geographical representation and organisational makeup of the final sample. Third, while sufficient for addressing the aims of the current study, the questionnaire methodology limited the depth of detail on individual risk assessment practices and the sources of confusion. A future study could adopt a case study approach to better understand the specific challenges that are faced when conducting risk assessments in the LOA domain. This is particularly important given the complex and dynamic nature of the LOA environment (Carden et al., 2017).

Implications for practice

So what do these findings tell us about risk assessment for LOA programmes? First and foremost, they suggest that the risk assessment methods available to practitioners are difficult to appropriately adapt to the LOA context. In addition, current approaches to risk assessment are in contradiction to current thinking and approaches to accident causation, both within the led

outdoor activity domain itself (e.g. Salmon et al., 2014) and within the wider field of safety science (e.g. Cassano-Piche, Vicente, & Jamieson, 2009; Rasmussen, 1997). Therefore, as a result of this study, the authors recommend further research around the design and testing of methods of risk assessment which are underpinned by the same theoretical approaches currently employed to analyse accidents. In short, the systemic nature of accident causation within the LOA domain will require that any risk assessment process is also designed for and able to focus on risks across the system. A starting point for this could be in identifying the foreseeable tasks across the system that are instrumental in the design, planning, conduct and review of an LOA programme. Such a step in and of itself enables the risk assessment process to be grounded and focused on the tasks, actors and total system, as opposed to the alternative of individual brainstorming based largely on personal experience, or a singular focus on the activity conduct itself.

As well as further methodological design and development, the findings indicate the need for rethinking in both policy development and subsequent training of LOA practitioners in the conduct of risk assessments. A need for policy guidance and clarity is necessary regarding organisational support, resources and direction in relation to risk assessments. Peak bodies, departments of education and employer's involvement are necessary to address key gaps in direction and process. Additionally, it is apparent that significant gaps will remain unless both training in accident prevention and causation with the LOA domain are developed and delivered. Further, the sources of confusion raised by the respondents in this paper are likely to remain unless a specific attempt is made to address them; doing just that as part of a wider programme of training development and policy guidance and support will go a long way to making risk assessment clearer for those accountable for it.

Conclusion

The results indicate that there is a lack of consistency regarding risk assessment in the LOA sector in Australia. Additionally, a substantial level of confusion is evident in both the current approaches to risk assessment, and in applying them to the LOA domain. Further, the current approaches to conduct risk assessments demonstrate a lack of synchronicity between the dominant approach to accident causation, underpinned by the understanding that accidents are caused by multiple factors and actors throughout the entire LOA system. In order to both address its critics and identify and manage those factors that are known to contribute to accidents, the LOA domain must develop more systematic, effective and consistent methods of risk assessment. Just as importantly, such development will enable the domain to support practitioners further improve their ability to provide appropriate, meaningful and enriching experiences for their participants.

Note

1. 'Led' outdoor activities have been formally defined as facilitated or instructed activities in outdoor settings (Salmon et al., 2010).

Acknowledgments

The authors wish to express genuine thanks to the two anonymous referees whose comments and feedback improved an earlier version of this manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

Paul M. Salmon's contribution to this article and research programme is supported through an Australian Research Council Future Fellowship (FT140100681).

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References

- Aadland, E., Vikene, O. L., Varley, P., & Moe, V. F. (2017). Situation awareness in sea kayaking: Towards a practical checklist. *Journal of Adventure Education and Outdoor Learning*, 1–13.
- Ajango, D. (2000). *Lessons learned: A guide to accident prevention and crisis response*. Anchorage, AK: Alaska Outdoor & Experiential Education.
- Altabbakh, H., Alkazimi, M. A., Murray, S., & Grantham, K. (2014). STAMP – Holistic system safety approach or just another risk model? *Journal of Loss Prevention in the Process Industries*, 32(0), 109–119. doi:10.1016/j.jlp.2014.07.010
- Baillie, M. (1996). Risk assessments, safety statements and all that guff. *Journal of Adventure Education and Outdoor Leadership*, 13(3), 6–7.
- Boyes, M. A., & O'Hare, D. (2003). Between safety and risk: A model for outdoor adventure decision making. *Journal of Adventure Education & Outdoor Learning*, 3(1), 63–76. doi:10.1080/14729670385200251
- Boyes, M. A., & O'Hare, D. (2011). Examining naturalistic decision making in outdoor adventure contexts by computer simulation. *Australian Journal of Outdoor Education*, 15(1), 22–34.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. doi:10.1191/1478088706qp063oa
- Brookes, A. (2003a). Outdoor education fatalities in Australia 1960–2002. Part 1. Summary of incidents and introduction to fatality analysis. *Australian Journal of Outdoor Education*, 7(1), 20–35.
- Brookes, A. (2003b). Outdoor education fatalities in Australia 1960–2002. Part 2. Contributing circumstances: Supervision, first aid, and rescue. *Australian Journal of Outdoor Education*, 7(2), 34–42.
- Brookes, A. (2004). Outdoor education fatalities in Australia 1960–2002. Part 3. Environmental circumstances. *Australian Journal of Outdoor Education*, 8(1), 44–56.
- Brookes, A. (2007). Research update: Outdoor education fatalities in Australia. *Australian Journal of Outdoor Education*, 11(1), 3–9.
- Brookes, A. (2011). Research update 2010: Outdoor education fatalities in Australia. *Australian Journal of Outdoor Education*, 15(1), 35–55.
- Brown, T. J. (1995). Adventure risk management: A practical model. *Australian Journal of Outdoor Education*, 1(2), 16–24.
- Brown, T. J. (1998). Risk management: Research needs and status report. *The Journal of Experiential Education*, 21(2), 71–85. doi:10.1177/105382599802100203
- Carden, T., Goode, N., & Salmon, P. M. (2017). Not as simple as it looks: led outdoor activities are complex socio-technical systems. *Theoretical Issues in Ergonomics Science*, 18(4), 318–337.
- Cassano-Piche, A. L., Vicente, K. J., & Jamieson, G. A. (2009). A test of Rasmussen's risk management framework in the food safety domain: BSE in the UK. *Theoretical Issues in Ergonomics Science*, 10(4), 283–304. doi:10.1080/14639220802059232
- Chandler, R. C. (2012). Inquest into the death of Rene Levi, TAS CD092. Retrieved from Tasmania http://www.magistratescourt.tas.gov.au/decisions/coronial_findings/l/levi_rene_-_2012_tascd
- Cruchet, M. (2006, October 28). *Evaluating risk: The HIRA approach*. Paper presented at the Wilderness Risk Management Conference, Killington, VT.
- Curtis, R. (1995b). *OA guide to planning a safe river trip*. Outdoor Action Program, Princeton, NJ: Princeton University.

- Curtis, R. (2008). Risk assessment & safety management (RASM): The complete risk management model for outdoor programs. Retrieved September 12, 2016, from <https://www.outdoored.com/articles/risk-assessment-safety-management-rasm-complete-risk-management-model-outdoor-programs>
- Dallat, C. (2009). Communicating risk with parents: Exploring the methods and beliefs of outdoor education coordinators in Victoria, Australia. *Journal of Outdoor and Environmental Education*, 13(1), 3.
- Dallat, C. (2016). Time to confront the bear in outdoor program safety; aligning what we now know with what we're currently doing. One practitioner's call to action. *UPLOADS Project Blog*, posted on February 12, 2017. Retrieved March 30, 2017, from <https://uploadsproject.org/2017/02/20/a-practitioners-call-to-action/>
- Dallat, C., Salmon, P. M., & Goode, N. (2015a). All about the teacher, the rain and the backpack: The lack of a systems approach to risk assessment in school outdoor education programs. *Procedia Manufacturing*, 3, 1157–1164. doi:10.1016/j.promfg.2015.07.193
- Dallat, C., Salmon, P. M., & Goode, N. (2015b, October 13). *More than people, equipment and environment; the design of a risk assessment method which considers hazards and risks throughout the led outdoor system*. Paper presented at the Wilderness Risk Management Conference, Salt Lake City, UT.
- Dallat, C., Salmon, P. M., & Goode, N. (2017). Risky systems versus risky people: To what extent do risk assessment methods consider the systems approach to accident causation? A review of the literature. *Safety Science*. Advanced online publication. doi:10.1016/j.ssci.2017.03.012
- Davidson, G. (1992). *A safety auditing instrument for adventure education* (Unpublished master's thesis). University of Minnesota, Duluth.
- Davidson, G. (2004). Fact or folklore? Exploring "myths" about outdoor education accidents: Some evidence from New Zealand. *Journal of Adventure Education & Outdoor Learning*, 4(1), 13–37. doi:10.1080/14729670485200401
- Dekker, S. (2011). *Drift into failure: From hunting broken components to understanding complex systems*. Aldershot: Ashgate.
- Dickson, T. J. (2001). Calculating risks: Fine's mathematical formula 30 years later. *Australian Journal of Outdoor Education*, 6(1), 31.
- Dickson, T. J., & Gray, T. L. (Eds.). (2011). *Risk management in the outdoors: A whole-of-organisation approach for education, sport and recreation*. New York: Cambridge University Press.
- Embrey, D. E. (1986). SHERPA: A systematic human error reduction and prediction approach. In *Proceedings of the international topical meeting on advances in human factors in nuclear power systems*.
- Galloway, S. (2002). Theoretical cognitive differences in expert and novice outdoor leader decision making: Implications for training and development. *Journal of Adventure Education & Outdoor Learning*, 2(1), 19–28. doi:10.1080/14729670285200131
- Galloway, S. (2012). *Macro cognition: A naturalistic approach outdoor leader development. Controversial issues in adventure programming*. Champaign, IL: Human Kinetics.
- Goode, N., Finch, C. F., Cassell, E., Lenné, M. G., & Salmon, P. M. (2014). What would you like? Identifying the required characteristics of an industry-wide incident reporting and learning system for the led outdoor activity sector. *Australian Journal of Outdoor Education*, 17(2), 2–15.
- Haddock, C. (1993). *Managing risks in outdoor activities*. Wellington: NZ Mountain Safety Council.
- Haddock, C. (2004). *Outdoor safety; risk management for outdoor leaders*. Wellington, NZ: New Zealand Mountain Safety Council.
- Harper, N., & Robinson, D. W. (2005). Outdoor adventure risk management: Curriculum design principles from industry and educational experts. *Journal of Adventure Education & Outdoor Learning*, 5(2), 145–158. doi:10.1080/14729670585200671
- Hogan, R. (2002). The crux of risk management in outdoor programs – Minimising the possibility of death and disabling injury. *Australian Journal of Outdoor Education*, 6(2), 71–76.
- Hollnagel, E. (2004). *Barriers and accident prevention*. Aldershot: Ashgate.
- Hollnagel, E. (2012). *FRAM: The functional resonance analysis method: Modelling complex socio-technical systems*. Ashgate Publishing.
- Hunter, I. R. (2007). An analysis of whitewater rafting safety data: Risk management for programme organizers. *Journal of Adventure Education & Outdoor Learning*, 7(1), 21–35. doi:10.1080/14729670701349624
- ISO. (2009). *ISO 31000: 2009 Risk management – Principles and guidelines*. Geneva, Switzerland: International Organization for Standardization.
- Leveson, N. (2004). A new accident model for engineering safer systems. *Safety Science*, 42(4), 237–270. doi:10.1016/S0925-7535(03)00047-X
- Leveson, N. (2011). *Engineering a safer world: Systems thinking applied to safety*. Cambridge: MIT press.
- Marhavilas, P. K., Koulouriotis, D., & Gemeni, V. (2011). Risk analysis and assessment methodologies in the work sites: On a review, classification and comparative study of the scientific literature of the period 2000–2009. *Journal of Loss Prevention in the Process Industries*, 24(5), 477–523. doi:10.1016/j.jlp.2011.03.004
- Meyer, D. (1979). The management of risk. *Journal of Experiential Education*, 2(2), 9–14. doi:10.1177/105382597900200203

- Parkin, D., & Blades, G. (1998). Risk management and outdoor education: A practical approach to ensuring positive outcomes. *Outdoor Educator's Association of Queensland's Journal Horizons*, 66 (1).
- Priest, S. (1996). Thoughts on managing dangers in adventure programmes. *Journal of Adventure Education and Outdoor Leadership*, 13(1), 18–22.
- Rasmussen, J. (1997). Risk management in a dynamic society: A modelling problem. *Safety Science*, 27(2–3), 183–213. doi:10.1016/S0925-7535(97)00052-0
- Salmon, P. M., Cornelissen, M., & Trotter, M. (2012). Systems-based accident analysis methods: A comparison of Accimap, HFACS, and STAMP. *Safety Science*, 50(4), 1158–1170. doi:10.1016/j.ssci.2011.11.009
- Salmon, P. M., Goode, N., Lenné, M. G., Cassell, E., & Finch, C. (2014). Injury causation in the great outdoors: A systems analysis of led outdoor activity injury incidents. *Accident Analysis & Prevention*, 63, 111–120. doi:10.1016/j.aap.2013.10.019
- Salmon, P. M., Goode, N., Taylor, N., Lenné, M. G., Dallat, C. E., & Finch, C. F. (2017). Rasmussen's legacy in the great outdoors: A new incident reporting and learning system for led outdoor activities. *Applied Ergonomics*, 59, 637–648. doi:10.1016/j.apergo.2015.07.017
- Salmon, P. M., Williamson, A., Lenne, M. G., Mitsopoulos, E., & Rudin-Brown, C. M. (2010). Systems-based accident analysis in the led outdoor activity domain: Application and evaluation of a risk management framework. *Ergonomics*, 53(8), 927–939. doi:10.1080/00140139.2010.489966
- Swain, A. D., & Guttman, H. E. (1983). *Handbook of human-reliability analysis with emphasis on nuclear power plant applications. Final report* (No. NUREG/CR-1278; SAND-80-0200). Albuquerque, NM: Sandia National Labs.
- Trotter, M., Salmon, P. M., & Lenné, M. G. (2014). Impromaps: Applying Rasmussen's risk management framework to improvisation incidents. *Safety Science*, 64, 60–70. doi:10.1016/j.ssci.2013.11.021
- Trucco, P., Leva, M. C., & Sträter, O. (2006). Human error prediction in ATM via cognitive simulation: Preliminary study. In *Proceedings of the 8th international conference on probabilistic safety assessment and management (PSAM8)* (pp. 1–9). New Orleans, Louisiana.
- Underwood, P., & Waterson, P. (2014). Systems thinking, the Swiss Cheese Model and accident analysis: A comparative systemic analysis of the Grayrigg train derailment using the ATSB, AcciMap and STAMP models. *Accident Analysis & Prevention*, 68, 75–94. doi:10.1016/j.aap.2013.07.027
- van Duijne, F. H., Aken, D., & Schouten, E. G. (2008). Considerations in developing complete and quantified methods for risk assessment. *Safety Science*, 46(2), 245–254. doi:10.1016/j.ssci.2007.05.003
- van Mulken, M., Clacy, A., Grant, E., Goode, N., Finch, C. F., Stevens, E., & Salmon, P. M. (2017). The UPLOADS national incident dataset the first twelve months: 1st June 2014 to 31st May 2015. Retrieved March 13, 2017, from <https://uploadsproject.files.wordpress.com/2014/05/annual-report-1st-june-2015-to-31st-may-2016.pdf>
- White, P. (2014). *Inquest into the death of: Kyle William Vassil*. Southbank: Coroners Court of Victoria.
- You, H., Simmons, Z., Freivalds, A., Kothari, M. J., Naidu, S. H., & Young, R. (2004). The development of risk assessment models for carpal tunnel syndrome: A case-referent study. *Ergonomics*, 47(6), 688–709. doi:10.1080/0014013042000193291
- Zink, R., & Leberman, S. (2001). Risking a debate – Redefining risk and risk management: A New Zealand case study. *The Journal of Experiential Education*, 24(1), 50–57. doi:10.1177/105382590102400110