Using audio-diaries to capture safety practices and incidental learning about safety

Report submitted to the IOSH Research Committee

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Published in 2016

Cranfield UNIVERSITY
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ACKNOWLEDGEMENT

The authors would like to acknowledge and thank the Institution of Occupational Safety and Health for their financial and all other support for this project.

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EXECUTIVE SUMMARY

It is widely recognised that informal learning complements the learning attained through formal training. While informal learning is intentional, incidental learning is the by-product of engaging in another activity. The importance of incidental learning for developing and sustaining working practices that are safe has not been investigated. Using a novel audio diary method, 25 participants from organizations in three different service sectors (retail, logistics and hotel) recorded their experiences of workplace safety related incidents over a 14 day period. These brief recordings were analysed using Marsick and Watkins[1] framework of incidental learning to reveal the triggers for safety learning, the choice of alternative solutions to the incident, the assessment of the consequences and the lessons learned. Hierarchical differences were found in the susceptibility to various triggers. Front-line workers were more frequently challenged by hazards and violations, whereas managers responded to safety meetings and the practices of safety compliance.

KEYWORDS

Incidental learning, audio diary, safety, service sector.

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1. INTRODUCTION

In developed countries the workplace is generally safer now than it has ever been. There are fewer fatalities and fewer injuries at both major and minor level. In the UK self-reported workplace non-fatal injury rates have fallen from 1018 per 100,000 workers in 2001/02 to 646 in 2012/13 (HSE, 2013a)[2]. These reductions may be attributed to the greater emphasis placed by organizations on safety training for their employees in response to high profile safety campaigns that raise general awareness of safety. For example, the UK Government's "Revitalizing Health and Safety" initiative launched in March 1999 (Smallman, 2001)[3] and the Health and Safety Executive (HSE) "Shattered Lives" campaign launched in 2008 in the UK.

Typically, formal safety training in organizations is provided to employees at their induction and then refreshed at regular intervals, perhaps annually or more frequently if required. By drawing attention to workplace risks and hazards and by providing training to ensure operational competence so that tasks can be executed safely, the aim of safety training is to reduce the frequency and severity of accidents and to effect changes in individual behaviours (e.g. Stuart, 2014)[4]. While accidents and injury statistics in organizations show safety improvements there is little empirical evidence in the safety literature to document that employees are alert to hazards or that the lessons taught in formal safety training have become embedded in daily work practices. How safety training effects improvement is unclear.

As a complement to formal training, informal learning is also important for improving safety in organizations. Safety leadership characteristically emphasizes transformational leadership styles (Mullen and Kelloway, 2009[5]; Innes et al., 2010[6]; Conchie and Donald, 2009[7]), that encourage role modelling, sharing and participation and consideration (Avolio et al., 2009)[8]. These safety leadership behaviours implicitly emphasize informal learning by recognizing "the social significance of learning from other people, pg 247" (Eraut, 2004)[9]. While leaders may seek to encourage safe working practices, employees may also learn from other employees, some of whom may work in unsafe ways. These violations may contravene company policies on working practices, but may not always be unsafe. Mascini (2005)[10] in an ethnographic study of workers in a Dutch coke factory differentiated three types of rule violation, even though the workers strongly believed in safety at work. The first reason for rule breaking was because compliance required too much trouble and effort. The second reason was dilemmas, or tensions between production and safety, especially when supervisors put pressure on employees. The third reason was "impossible" rules. These are rules which seem counterproductive to effective production. Again there appears to be little empirical evidence indicating whether employees pay attention to the messages from safety leaders encouraging good practices and the consequent awareness of violations of safe working practices by others, or accept these violations as part of normal work practices.

In addition, little seems to be known of the actual day-to-day experience of working safely in organizations operating in less hazardous settings. Although guidelines are available (HSE, 2013b)[11], they are not mandatory, allowing organizations to adopt practices to suit their particular context. Perhaps as a consequence there is a dearth of studies investigating what practices are actually enacted, by whom and how frequently. Understanding these differences may allow relevant training to be better targeted at the appropriate employee groups. It may also help to identify sector differences, allowing advisory groups to provide more effective support to specific organizations.

Safety in organizations has been investigated mainly quantitatively through surveys of employees. A recent review of studies of safety in construction by Zou et al., (2014)[12] indicated that almost half of published output in highly-ranked international journals adopted quantitative methods and half of the remainder were conceptual papers or reviews. The use of qualitative methods in safety research is much less common, although not absent entirely (e.g. Dawson et al., 1984[13]; Sanne, 2008[14]; Maslen, 2014[15]). Such qualitative approaches are better suited to investigating what safety practices are adopted and whether training has altered the working practices of employees, making them alert to hazards or violations of working practices thereby implying that learning has occurred. In this study we use a novel audio diary method to capture the moments, perhaps through hazard identification or

rule violations by others, when working safely or safety in a general sense became salient to employees in three different service sector environments.

The objectives of the study were to:

1. Identify those triggering events which stimulate incidental learning about safety;
2. Investigate the process of incidental learning;
3. Identify those work practices that contribute to the enactment of safety in the workplace;
4. Demonstrate the applicability of diary methods for safety research.

2. LITERATURE REVIEW

2.1 Learning

Individual learning may occur both formally and informally. While formal learning is often prioritized, Crossan et al., (1999)[16] noted in a review that workers stressed informal and tacit learning as being more important for their job. Learning in formal education or training environments can be easily measured through accreditation or participation rates (Gorard et al., 1999)[17] and yet is separated from the places where its application necessarily must occur. Nevertheless, learning does occur in these informal, unstructured social contexts including the workplace beyond the classroom (Scheeres et al., 2010)[18]. However, learning in these settings is relatively under-researched because informal learning is invisible, either being taken for granted or unrecognized as learning, often being implied as a natural capability rather than learned practice (Eraut, 2004)[9].

Informal learning is often defined in contrast to formal learning and refers to learning occurring naturally in the everyday experience of life and the execution of daily tasks (Conlon, 2004)[19]. It may be separated into intentional and unintentional or incidental learning (Berg and Chyung, 2008)[20]. Intentional informal learning activities include self-directed learning, mentoring, coaching and networking, which are easier to observe. Incidental learning however is unintentional and the by-product of engaging in another activity, such as task accomplishment or interpersonal interaction, trial and error, or even formal learning (Marsick and Watkins, 2001)[1]. The learner may not be conscious that learning has occurred, since incidental learning is tacit, taken for granted and implicit in assumptions and actions (Marsick et al., 1999)[21].

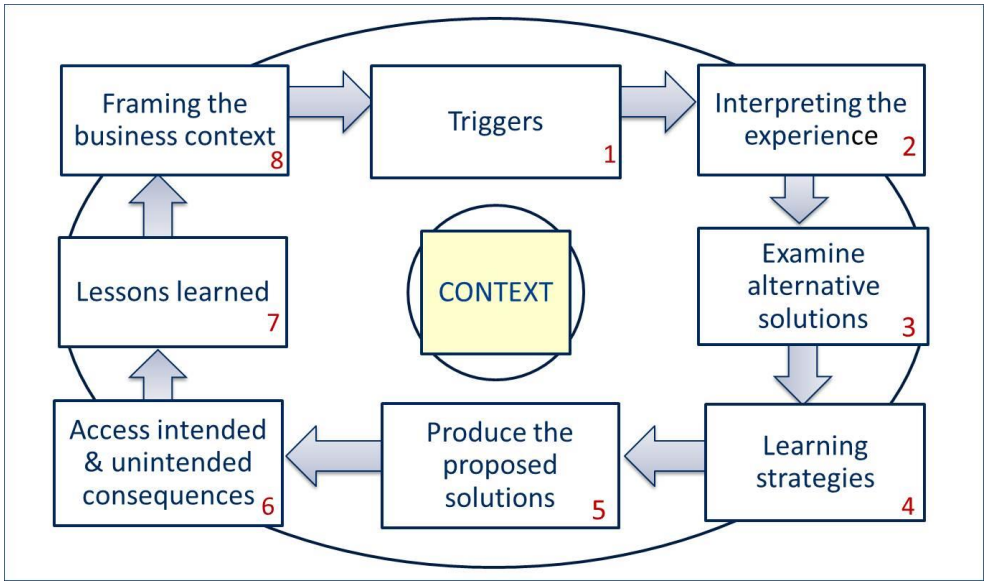
Marsick and Watkins (2001)[1] have characterised incidental learning and developed a model. Incidental learning is:

- Integrated with daily routines;
- Triggered by an internal or external jolt;
- Not highly conscious;
- Haphazard and influenced by chance;
- An inductive process of reflection and action;
- Linked to the learning of others (Marsick and Watkins, 2001, p.28)[1], or of self, because learning cannot effectively take place without prior individual learning (Crossan et al., 1999)[16].

Their model, based on the premise that individual learning is shaped by interaction with the workplace (Conlon, 2004)[19], comprises eight stages, but they caution that it is not necessarily linear, sequential or prescriptive (Marsick et al., 1999)[21] even though it is framed as a cycle beginning with the context of the workplace and how this shapes understanding and frames what individuals pay attention to. There are then seven sequential stages (Figure 1). A trigger event challenges prior experience that demands an interpretation. In assessing what is challenging or problematic about the experience, they discern how the current situation is similar or different to past experience. Drawing on knowledge of the current context including past experience, they identify and evaluate alternative solutions. These solutions may draw on existing capabilities or require new skills. The search for solutions may draw on tacit knowledge, accumulated from the prior experience of similar episodes. An individual may respond to an incident without being aware of the sources of information that they used or its

provenance. They merely 'know' that a particular action is appropriate (Eraut, 2004)[9]. Such tacit knowledge may be used in circumstances where people lack time or disposition to search for better alternatives (Eraut, 2004)[9]. Having enacted a solution, this can then be assessed both for intended consequences, desired results, or unintended consequences. This may require reflection. Lessons then learned contribute to the framing of the next context in which a new experience occurs.

Figure 1
Marsick and Watkin's informal and incidental learning model as adapted with Cseh (Source: Marsick and Watkins, 2001)[1]



2.2 Learning for Safety

Safety training is the primary mechanism for improving safety performance in organizations and is a formal requirement. Much of this training comprises the formal transmission of codified knowledge often in a classroom setting with a qualified instructor, or increasingly via web-based media. Training through these media is relatively easy to administer, to audit and to assess participant competency. However, we have identified a small body of research that challenges the effectiveness of formal Occupational Safety and Health training. Maslen (2014)[15], noticed that courses and seminars "were not identified as a primary learning environment, pg.87" by respondents in her study. Other authors (Somerville and Lloyd, 2006[22]; Rooke and Clark, 2005[23]) also suggest that safe working practices may be effectively learnt through experiential and informal modes of learning. Novice pipeline engineers in Australia learnt from experience and by taking advice from or working with others (Maslen, 2014)[15]. Storytelling was important for developing a deeper understanding of the safety issues not only for these workers (Maslen, 2014)[15] but also for railway maintenance technicians in Sweden (Sanne, 2008)[14]. The stories shared between technicians enabled the group to develop a consensus over the safety practices necessary for working at the track side, rather than adhering to the codified written practices that were formally espoused by the organization. Somerville and Lloyd (2006)[22] from their investigations across a range of high hazard industries of how workers are trained to work safely and how they learn to work safely concluded that training though codified knowledge practices failed to train workers effectively. According to them, much greater attention needs to be given to the learning achieved by engaging with others and through the lived experience of the work task.

2.3 Diaries

In their review of safety management in organizations Zanko and Dawson (2012)[24] asserted that, “we need to examine individuals in work settings, … the workplace environment and daily operating procedures as well as the tasks and activities that occur within context and over time, pg.32”. Diaries are a vehicle for achieving this. Symon (2006)[25] noted that diaries typically are used as a data collection tool in one of two ways. First, they may be used to collect quantitative data, investigating how variables change over time (Bolger, et al., 2003[26]; Ohly et al., 2010[27]). Harris et al., (2003)[28] asked call centre employees to record how their sense of well-being was affected by their achievement of daily work goals using a self-report measure. Used in this way however, diaries do not reveal details about work practices or how they are enacted. For example, in the study by Harris et al., (2003)[28], they do not indicate how or why the variables influenced the call centre workers. To address this issue, diaries may be used as an alternative method to collect qualitative data. For example, Symon (2006)[25] used activity mapping to understand the day-to-day practices and inter-relationships of members of an IT development team. Atewologun (2011)[29] used diaries as a vehicle for eliciting incidents when identity became salient to senior managers who were from a minority group.

A review of the literature revealed 13 studies that have used diaries to collect qualitative data (Table 1) for different purposes and in a variety of organizational and domestic settings. None have investigated safety practices or learning that may arise from enacting these practices. The studies indicate a substantial variation and little consensus in sample size, duration of study, data collection strategy and analysis, and evaluation methods.

Table 1
Studies using qualitative diary methods

Author	Year	Sample	Duration of study	Format	Mode of analysis
Atewologun	2011[29]	24 minority men/women	3/4 times per week for 1 month	Directed diary	Matrix analysis
Balogun and Johnson	2004[30]	26 managers in 3 groups	Monthly for 1 year	Structured questions	Schemata Open-coding
Buchanan	1991[31]	8 managers	2 weeks	Audio diary	Content analysis
Daniels et al.,	2013[32]	29 medical equipment designers	10 entries or 4 weeks (whichever came first)	Diary book with 10 open ended questions	Template analysis
Hawkes et al.,	2009[33]	21 volunteers	1 week	Directed diary with structured prompts	Emergent coding
Katzeff et al.,	2012[34]	6 households	5 days	Diary book	Not described
Kiffin-Petersen et al.,	2012[35]	85 sales employees	5 days	Critical incident	Thematic analysis
Poppleton et al.,	2008[36]	38 employees	14 days	Diary book	Template analysis
Radcliffe	2013[37]	24 couples	28 days	Diary book	Template analysis, diagrammatic representation
Stragier et al.,	2013[38]	72 households	Daily for 2 weeks	Template diary	Tabulations
Symon	2006[25]	10 team members	Daily for one month	Structured diary	Activity map
Waddington	2005[39]	20	Event contingent/ critical incident	Structured diary	Quasi-statistical, template analysis
Waller and Ragsdell	2012[40]	12 people (4 senior managers, 4 middle managers and 4 frontline staff)	7 days	Semi-structured	Content analysis

Twenty-four senior managers completed diaries for between two and four weeks in Atewologun's (2011)[29] study. Balogun and Johnson (2004)[30] asked 26 managers to keep monthly diaries for one year describing how they made sense of their organization's restructuring process. In her study of an IT project, Symon (2006)[25] used 26 people. A larger number (n=85) of sales assistants participated in a study of critical incidents with customers but for a period of five days only (Kiffin-Petersen et al., 2012)[35]. The duration of each of the 13 investigations (Table 1) ranged from five days to one year, although the latter was exceptional. Ten of the studies were conducted for one month or less. Reis and Gable (2000)[41] observed that some participants may consider keeping diaries burdensome and intrusive, which may lead to non-completion.

Three different strategies are available for data collection in diary studies. Event contingent strategies ask participants to respond immediately (or as soon as possible) after the event has occurred. Waddington (2005)[39] used this strategy to investigate gossip in a hospital workplace. Signal based strategies ask participants to respond to a predetermined signal. Interval or time-based strategies such as those used by Symon (2006)[25] ask individuals to respond as a fixed time and often to a specified set of prompts.

Data from qualitative diaries have been analysed and evaluated using a variety of methods. Radcliffe (2013)[37]; Poppleton et al., (2008)[36]; and Daniels et al., (2013)[32] used template analysis to understand the relationship between stress and problem solving amongst medical equipment designers. Kiffin-Petersen et al., (2012)[35] used thematic analysis to describe the critical incidents recorded by sales clerks, while Symon (2006)[25] deciphered the practices and interactions of the IT project team using 'activity diagrams'.

Responding to Zanko and Dawson's (2012)[24] challenge and drawing on the model of Marsick and Watkins[1] we seek to investigate the occurrence of incidental learning in the execution of safe working practices in service organizations. In order to capture these learning incidents we adopted a novel audio-diary method, whereby respondents were asked to use an audio recorder to capture the incident and their responses as the event occurred, where possible within the constraints of normal, safe, working practice.

3. METHODS

3.1 Framing the Business Context (step 8 in Marsick and Watkins'[1] model)

The Health and Safety at Work Act 1974 requires organizations to take reasonable action to ensure the safety of its employees. Although the legal framework specifies outcomes the processes and inputs are not. Nevertheless, in the UK the Health and Safety Executive (HSE) and others provide considerable guidance on accepted good practice. Hale et al., (2010)[42] in their survey of effective safety intervention strategies in 29 companies in The Netherlands, provide a wide ranging list of both practices and behaviours that builds on the practices identified by Shannon et al., (1997)[43]. From these studies and two particular sets of HSE guidelines (HSE, 2013b[11]; HSE 2014[44]) we developed a generic list of safety practices (Table 2) that may be observed in organizations. In addition all of the participating organizations provided employees with safety training at induction primarily by means of on-line training, or watching a DVD, which was refreshed at regular intervals. This forms the basic framing of the safety environment in the organizations as per the Marsick and Watkins[1] framework (Figure 1).

Table 2
Generic safety practices with sub-categories for organizations.
Indicative evidence in italics.

- Risk assessment/Risk Profiling
- H&S policy documentation
- Appointment of H&S representative
- Competence
  - Selection and recruitment
  - Provision of training – formal / informal (*guidance on the job*) Written/On-line
- Communication
  - Provision of information (*briefings etc*.)
  - Signage/posters
  - Visible behaviours
- Cooperation / worker consultation and involvement (*H&S meeting; Joint decision making. Feedback solicited – suggestion box. Facilitated discussion – toolbox talks, H&S walkabout*)
- Control
  - Supervision - Leadership
  - Standard Operating Procedures/Measures-Indicators
  - Reward and Sanction
- Provision of facilities
  - Maintenance of equipment
  - Removal of obstacles or potential hazards (*good housekeeping*)
  - PPE
  - First aid – Medical care
  - Accident book
- Monitor – Inspect –Audit
- Investigate accidents, incidents and near misses
- Reporting
- Review

We anticipated that a variety of events might trigger incidental learning opportunities. These included hazards (or near misses), violations of safety procedures, communication (both verbally and through signs), meetings, normal work procedures, training and accidents or injuries. A range of different potential hazards were identified from a National Health Service website (NHS, 2014)[45]. These included slips, trips and falls, working at height with the use of ladders, musculoskeletal disorders pertaining to manual handling, moving equipment, fire and electrical hazards and the risk of physical injury, including cuts, burns and bruising.

Similarly, several different types of solution (or outcome) were identified in advance of the investigation. These include participation, compliance and voice. According to Neal et al., (2000)[46], safety compliance is “adhering to safety procedures and carrying out work in a safe manner, pg. 101”, while safety participation “involves helping co-workers, promoting the safety programme within the

work place, demonstrating initiative and putting effort into improving safety in the workplace, pg. 101". Some authors differentiate safety voice from safety compliance, defining safety voice as "communication motivated toward changing perceived unsafe working conditions that have implications for individual and organizational health, pg. 320" (Tucker et al., 2008)[47]. It may be both formal and informal and directed towards a wide variety of stakeholders.

3.2 Data Collection

Using an event contingent data collection strategy, audio diary records were kept by 25 respondents of when, during their working day, safety and safe working became salient to them. Respondents came from four organizations across seven different sites. Two units each from two different national retail chains, one selling general merchandise and the other DIY materials and home furnishings, were complemented by two warehouses from a global logistics company. The final organization was a local independent hotel and conference centre. Participants occupied one of three possible roles: manager, supervisor or front-line worker. Table 3 shows the distribution of participants in different job roles across the three sectors.

Table 3
Numbers of participants according to their rank and sector of employment.

Sector	**Diarist's Rank within their Organisation**			
	Frontline	Supervisor	Management	Total Number of Diarists
Hotel	1	2	2	5
Logistics	5	2	2	9
Retail	8	2	2	11
Total Number of Diarists	14	6	5	25

The participants, who were identified by their local manager, were asked to keep a diary for a period of 14 days, recognising that they may not be working every day. These individuals were given a digital voice recorder and then briefed by a research team member. Included in the briefing was an explanation of how to use the voice recorder and a short description of the data collection protocol (see Appendix 1). Diarists were asked to note when, during their working day, they became mindful of safety and safe working. For each of the identified incidents they were asked to respond to five open-ended questions. They were asked to identify when and where the incident occurred, what they were doing, why safety came to mind, whether anything happened, who was involved and what the immediate outcome was. Finally, they were encouraged to make their recording as close to the time of the incident as possible to minimize any hindsight bias or to record, at the end of the working day, if nothing happened during the day to make safety salient to them. Anticipating a low response rate and following the suggestion of Atewologun (2011)[29] and Poppleton et al., (2008)[36], personalized text message reminders were sent by research team members to participants every few days encouraging them to complete their dairy. Upon completion of the two week period of data collection, the recorders were collected by a research team member. Participants were debriefed to better understand their experience of keeping the diaries. Notes of these conversations were captured.

3.3 Data Analysis

The audio recordings for each incident from every participant were transcribed. Using template analysis (King, 2006)[48] the transcribed data were coded according to the safety practice being undertaken, the type of trigger (or event) that raised safety awareness for the respondent and also according to the nature of the outcome of the incident. Building on the model of Marsick and Watkins[1] and with closer inspection of the data, we were able to infer the occurrence of different stages in the model. Specifically, it was possible to infer whether alternative solutions had been examined either explicitly or implicitly. Similarly, it was possible to identify whether the consequences of a solution had been considered and assessed. To ensure our coding of the data was robust, two researchers coded the data against our template and compared their findings and any differences were reconciled through discussion. The data are reported against the stages evident in the Marsick and Watkins[1] model.

4. FINDINGS

The 25 participants recorded a total of 208 different safety-related events across the 14 day period. Figure 2 shows that recordings were made on 151 days from the 350 possible recording-days; if all participants had worked every day for the full 14 day period and made a recording on each of these days - none did. Furthermore, three took a period of at least five days annual leave during the data collection. Diary responses were made for between 1 and 12 days depending on the individual, with an average of six responses per person.

Figure 2
Diary respondent participation pattern over the 14 day period

Participant	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Total Days
1	■		■	■	■	■	■	■	■				■	■	10
2	■	■	■	■			■	■	■	■	■				9
3	■	■	■	■	■	■	■								7
4	■	■	■	■											4
5	■	■	■	■	■	■	■	■	■	■	■				11
6	■	■	■	■	■	■									6
7	■	■	■	■	■	■		■	■	■					9
8	■		■								■	■			4
9	■														1
10	■	■						■							3
11	■	■			■	■		■							5
12	■														1
13	■	■	■	■	■	■									6
14	■	■	■	■	■	■	■	■	■						9
15	■	■	■		■				■				■	■	7
16	■	■	■			■	■	■	■	■					8
17	■	■	■	■	■			■	■	■					7
18	■	■	■	■											4
19	■	■	■	■											4
20	■	■	■	■			■								5
21	■	■	■	■	■	■	■	■	■	■	■	■			12
22	■	■													2
23	■	■	■	■	■		■		■		■				8
24		■	■	■	■	■	■								6
25	■	■	■												3

Some of these 208 recordings (n=11) simply indicated that there were "*no health and safety hazards to report*" or "*no health and safety things today*". Other participants built up a commentary over successive days. For example, a manager in the hotel noted "*a considerable puddle of water has appeared inside the [swimming] pool plant room. Need to find out what's causing that. I have instructed maintenance to have a look. In the meantime the water has been cleared up to make sure there's no issue ongoing for a potential slippage on the floor*". On the following day he/she observed, "*reporting back on the fitness centre pool plant issue. Essentially we've discovered the problem; it could be to do with the probe. Anyway, the matter is resolved in terms of controlling the safety. We're leaving a fan on that's inside the pool area, which seems to prevent the condensation*". Similar

examples of this progressive resolution of a safety-related event are shown in Table 4. The majority of the recordings, however, were self-contained safety-related events.

Table 4
Progression of responses to five different single safety issues over a period of days.

Sector & Rank	Time 1	Time 2	Time 3	Time 4
Logistics Manager	*During a H&S walk around the warehouse we found some scales that hadn't been PAT tested within the last 12 months, so obviously I've taken the scales out of use until that can be done.*	*Electrician in to do the PAT testing on the scales that I reported earlier, so that was passed.*		
Logistics Manager	*Emergency stop buttons on the conveyors were installed today, as an improvement from the incident that we had in January*	*Started to implement a new pre-use check on the conveyors that the emergency stop buttons were installed on, just to check that the emergency stops do work and the machines are all in good working order before being used*	*Visit from our Area H&S advisor, who was coming into check on the action we'd taken following the accident we'd had.*	
Hotel Supervisor	*Just made an appointment for tomorrow to review the fire risk assessment ready for the fire audit* [in 3 days time]	*Risk assessment reviewed*	*Fire risk assessment review revealed we did not have the certificate for the annual discharge test for the emergency lighting. We have now obtained that.*	*Fire Safety audit with the Fire Safety Inspecting Officer. Consideration of signage on the central corridor door. Will report to Estates.*
Hotel Supervisor	*Brought to my attention that a number of room attendants have been using chairs to stand on in order to hang curtains or to clean high up in a room. … Need to have a few more stepladders. I plan to order some more stepladders and have them located in the areas where they're needed*	*As I mentioned yesterday we are short on stepladders and I was concerned that chairs were being used in their place. Ordering some stepladders.*		
Hotel Supervisor	*Our staff room which is used for tea breaks and for communication purposes has become very cluttered. So today we are going to make sure that those items are removed from there.*	*Following on from yesterday's comments…all* [the items] *have now been removed and we've managed to find a more suitable location for those. I've also had a communication meeting today with our team informing them of the changes.*		
Hotel Manager	*Person X noticed that the correct procedure was not being followed when removing filter panels from above kitchen equipment at high level in the kitchen. Person X spotted this and stopped the action immediately, instructed the team members what they should be doing and advised me as to what had happened.*	*In relation to the chefs and kitchen team members not using the correct procedure for cleaning and removal of filters from the canopy, a buzz training session has now taken place. Photographs have been taken and a pictorial risk assessment in addition to the written assessment has been passed onto the chef, so that all team members can be fully trained.*		

4.1 Triggers (step 1 in Marsick and Watkins'[1] model)

Following the instructions each of these events had a focus or a trigger. A wide range of different triggers were evident in the data (Table 5). The most frequent were hazards (or near-misses) typically categorized as slips, trips and falls, although a wide variety of other hazards were discovered, some of which were dependent upon sector. Working at heights, which included the use of ladders in stock rooms, was identified closely with the retail sector. Workplace transportation, including the use of forklift trucks or pallet pumps was confined to environments with warehousing and large stock rooms. Concern for musculoskeletal disorders, caused by manual handling, were more evident in the retail sector. Other hazards also included fire, physical injury/first aid and electrical hazards (Table 5).

In some cases it was difficult to place a trigger categorically; hazards may be violations of safety practices and vice versa. Two examples from a retail setting serve to illustrate this point. "*The exit route on the showroom mez [mezzanine floor] was blocked by too much stock. This is causing a problem for if there was a fire evacuation or anything like that*…". This was both a fire hazard and a violation of fire regulations. "*Steps used by staff to stack shelves up high and do any work on a high level were out during retail hours, allowing anybody to access it, which could be a customer or a small child*". The availability of a ladder posed a 'working at heights' hazard for the public and its availability was a violation of company safety policy.

Table 5
Numbers of different types of trigger identified from the recordings with illustrative examples.

Type of Trigger	Number of incidents	Illustrative examples
Meeting	10	*We have a quarterly Health and Safety conference call with the area to just discuss anything that may have come up from our previous Health and Safety meetings in store.*
Communication (Visual and verbal)	20	*Noticed that a sign has recently been put up informing staff that if a hi-vis is not worn* [when entering the warehouse] *disciplinary action could take place*. *Member of staff has complained that the cleaner isn't diluting fluid when mopping the floors.*
Standard work practice	32	*Today I'm reviewing the health and safety policy for the conference centre.* *I've just completed my walk around of the stockroom.*
Training	8	*Read a monthly briefing on health and safety.* *Inductions for some new members of staff that joined the company, so it was induction on Health and Safety … all the basic things*
Accident or Injury	4	*Completed accident form for one of our housekeepers who was bending down low to clear a cupboard and banged her head on the cupboard door.*
Hazard	85	*Witnessed a colleague trip over a bag that had some shredded paper inside, that someone actually left around the corner. Nothing happened to this person.* *Items piled up on top of cupboards which obviously shouldn't be there because that's a fire hazard.* *Stools left out.* *Spilt paint.*
Violation of safe working practice	41	*Staff have been walking into the warehouse and not putting on their hi-vis jackets.* *Driving forklift. There are no barriers in place.* *Drivers are not driving into the racking according to the one-way system. Which means green in and red out. They're driving wherever they want.* *Pickers are entering the racking system where the drivers are in operation, instead of waiting until the drivers have left the aisle.*
Other	23	*Removing money out of the till to put it in the machine, and the bottom actually fell off in my hand.*

Different categories of trigger were noted by different groups of staff. Hazards and violations were more frequent triggers for front-line staff, whereas meetings and standard working procedures (e.g. completion of a daily safety check-list) acted as triggers for managers (Table 6).

Table 6
Percentage occurrence of safety event type by rank in the organization.

Rank in Organisation	% of Safety Event Type (incident trigger)							
	hazard	**violation**	**standard work procedure**	**other**	**communication**	**meetings**	**training**	**accident**
Frontline	23	12	4	9	4	2	<1	1
Supervisor	10	5	3	<1	1	1	<1	<1
Management	5	1	7	1	4	2	3	<1
% of total	**38**	**18**	**14**	**10**	**9**	**5**	**4**	**2**

4.2 Examining Alternative Solutions (step 3 in Marsick and Watkins'[1] model)

In 38 cases respondents recorded the choices made. For example a warehouse employee noticed that "*an operator stood with a forklift truck in the racking aisles whilst retrieving a phone from a high location. So I instructed the person to withdraw to an area of safety well away from both the forklift truck and the racking aisle, which was duly done*". This respondent chose to notice the violation of safety rules and to give a variety of instructions to the operator. In another case, a retail assistant noted that objects were overhanging the aisle, "*so they're below the ladder height, so as you push them along they'll pull on top of you. So I just relocated them to a better space*". The assistant noticed the potential hazard of falling objects and removed the item.

Choices were particularly evident where there was a series of actions that followed an event. For example the incident reported by a hotel manager in Table 3 reporting the procedure for removing filter panels revealed a series of actions taken by the supervisor, including stopping the process, instructing team members, advising the manager, conducting a risk assessment and holding a 'buzz' training session. Further actions were taken the next day.

In a further 42 cases it was possible to infer that consideration had been given to examining alternative solutions. The intention to carry out a particular action implied that the alternative choice of taking no action had been rejected by the participant. For example, a retail assistant noticed a "*fairly large item, possibly a wardrobe in a flat pack, has been propped up next to the fire door, and the door leading to the rear collection for the store … . It has been stacked in such a way that it is essentially blocking the fire door … I am going to move this item*". After noticing the violation of safety regulations and the attendant fire hazard, the assistant intended to move the obstruction. A few other examples of this are illustrated in Table 7.

Table 7
Illustrative examples of taking action in response to a safety event having rejected the alternative course of taking no action.

Sector and Rank	Incident	Action
Retail Frontline	*Noticed several pencils on the floor underneath one of the gondolas bearing the catalogues*	*So I am simply going to pick these up*
Retail Frontline	*Seal on the fire doors had been removed due to the health and safety inspection that happened on Thursday*	*I promptly filled out all the correct bits and pieces for it, and went and resealed it*
Retail Frontline	*Noticed two fairly bulky items which have not properly been packed away in one of the lower bays*	*What I shall proceed to do is move them*
Hotel Supervisor	*Very wobbly paving slabs*	*Request that our Estates Department repair them*
Logistics Manager	*Found that the access to the gas valve, the shut-off valve was blocked*	*So arranged for that to be cleared straight away*
Logistics Frontline	*Thermostat on delivery truck set wrong*	*Need to see if new policy is needed*

4.3 Produce the Proposed Solution (step 5 in Marsick and Watkins'[1] model)

In approximately one-third of the recorded incidents no particular solution was provided. Often this was because a simple statement had been made that did not offer a solution, e.g. "*signs on walls not followed*" or "*recently had a recall on quite a few of the roller blinds due to a new regulation for child safety*". Or it was because the respondent "*didn't find any safety issues*". In the other cases different solutions were given that tried to resolve the presenting circumstance. In one instance a retail assistant moved "*a small square table propping open the door of the staff room".* This was a fire door, and "*supposed to be kept closed*". He/She closed "*the door and moved the obstruction to ensure fire safety*". Within these findings three broad categories of solution can be discerned.

In a small number of cases respondents exercised safety voice raising issues with others, sometimes in another department, or even in a separate organization, who were responsible for resolving the issue. For example, a warehouse worker was going to speak to the Human Resources department about the need for colleagues to have refresher training in the use of chemicals, because they had forgotten. Similarly, the manager of a retail store was going to raise issues relating to the access to the store with the landlord of the site.

A slightly larger category of solutions recorded simple compliance with existing policies and practices that were known to the respondent either through formal training or monthly health and safety briefings. A retail assistant observing that a "*child had spilt a drink of some sort onto the shop floor, cleaned* [it] *up immediately and put* [out] *a 'wet floor' sign*". While a hotel manager completed "*the health and safety induction with a new team member*". In some cases existing policies and procedures were not known, or perhaps ignored. A warehouse assistant noted "*a bit of an issue with regard to the understanding of the new health and safety policy that was introduced a couple of weeks ago*". He/She felt it "*needs to be communicated again to every operative so they do have a very clear understanding that they mustn't go up the aisles when a forklift truck is operating*".

The largest category of solutions involved safety participation, often by the respondent although not always, as when a hotel manager "*observed two team members helping each other to move a number of tables from one end of the building to another … quite pleasing to see they're following instructions without being reminded*". In some instances respondents solved problems or showed initiative. A retail supervisor "*looking at the evacuation books to make sure everything was in date, printed off a new next of kin contact list for all staff members, just to make sure that everything was current as we've had some new starters*". In other cases they simply encouraged others to behave safely. For example, a retail assistant recorded that a colleague had "*advised people … that they shouldn't* [leave kick stools] *on the shop floor*". A warehouse operative noticed an "*operator was re-loading a disposable cleaning cloth machine, stood in front of the main door between the fulfilment operation and returns. She was exposed to some risk as the door would have opened on to her. So I asked her to move into a safer area to re-load the machine*". Each of these examples illustrates participation to maintain a safe working environment.

4.4 Assess Intended and Unintended Consequences (step 6 in Marsick and Watkins'1 model)

The recordings also indicate whether the respondent assessed the possible consequences of the action (or solution). In some cases respondents expressed satisfaction with the outcome. Following a review of the health and safety documents a retail manager observed that, "*everything seems to be okay*", and a supervisor in a different store noted that a fire evacuation "*went well*". A hotel manager exclaimed "*all happy with it*", following an asbestos re-inspection. A warehouse manager "*had a conversation with person X relating to some temporary scaffolding on the walkway* [and] *whether we should take out a fixed barrier to allow staff to manoeuvre safely around the scaffolding, or whether we should just leave the scaffolding as there was enough space for staff to get past as the scaffolding was just on the walkway. We … assessed the situation and agreed that we would leave it as it is*". Here the manager expressed satisfaction with the decision to do nothing.

But not all cases were satisfactory. A waiter in the hotel expressed concern that "*a grave situation*" had occurred when night porters began to mop the kitchen floor before the final desserts had been served to table. Other respondents simply stated that the incident has been resolved and the possibility of further consequences had been removed. For example, a supervisor in a retail outlet noted that "*a big paint spillage* [which] *would have caused a spill hazard and possibly a slip hazard as well … has been sorted straightaway*".

4.5 Lessons Learned (step 7 in Marsick and Watkins'1 model)

The data are much less clear on lessons learned although positive inferences that prior learning has occurred are possible because many respondents removed hazards that they observed or complied with safety policies and the practices taught in training sessions. Some of these are indicated in the quotations in the preceding paragraphs. Nevertheless, there were a few examples that indicated directly that learning had occurred. In the first case future action was anticipated. Following the injury to the housekeeper, the hotel manager was going to "*see her later to see what happened and to remind her to be more aware of her surroundings*". In a second case, a retail assistant used his prior knowledge of the store to "*check a couple of layouts where* [he knew] *there to be problems in the past*". Learning had increased his vigilance and encouraged targeted action.

4.6 Practices

A wide range of different safety practices were reported during the 14 day period. More than one third of the practices related to the provision of safety equipment and the maintenance of a safe working environment. Approximately one quarter of the reported practices had to do with controlling for safety, mainly through standard operating procedures or supervision. Monitoring, inspecting and auditing accounted for a little more than one-tenth of the practices. The remaining quarter of reported practices

were mainly given to communication, cooperation and competence. Risk assessment, reporting and writing H&S policy documentation accounted for the remaining five percent.

Table 8 shows how these practices were experienced differentially by employees of different rank. Front-line employees were heavily involved in creating a safe work place, particularly in removing obstacles. This was supported by supervisors, but much less practiced by managers, although not entirely absent. Front-line employees also observed standard operating procedures. In contrast with front-line employees, managers and supervisors were more pre-occupied with monitoring and with communicating safety, while managers alone were more involved in ensuring training had been completed, that risk assessments had been undertaken and accidents and incidents reported.

Table 8
Number of different safety practices reported by employees of different rank within three service sector organizations in a 14 day period.
Percentages of rank total are italicized in parenthesis.

Practices identified from diaries	Frontline	Supervisor	Management	Total
Provision of Facilities	91 (*47*)	28 (*42*)	27 (*31*)	146 (*41*)
Removal of Obstacles or hazards	71	25	17	113
Maintenance of equipment	12	2	9	23
PPE	7			7
First Aid / medical care	1	1	1	3
Accident Book				
Control	56 (*29*)	14 (*21*)	15 (*17*)	85 (*24*)
Supervision -leadership	12	3	3	18
Standard Operating Procedures/ Measures	42	11	12	65
Reward & Sanctions	2			2
Monitor - Inspect - Audit	17 (*9*)	10 (*15*)	13 (*15*)	40 (*11*)
Communication	10 (*5*)	8 (*12*)	9 (*10*)	27 (*8*)
Provision of information	5	7	8	20
Signage, posters	5	1	1	7
Visible behaviours				
Co-operation / worker consultation	10 (*5*)	2 (*3*)	5 (*6*)	17 (*5*)
Competence	4 (*2*)	2 (*3*)	7(*8*)	13 (*4*)
Selection and recruitment				
Provision of training	4	2	7	13
Risk assessment/Risk Profiling	2 (*1*)	1 (*2*)	6 (*7*)	9 (*3*)
Reporting	2 (*1*)		5 (*6*)	7 (*2*)
H&S policy documentation – writing		2 (*3*)	1 (*1*)	3 (*1*)
Appointment of H&S representative				
Investigate accidents, incidents, near misses				0
Review				0
Other				
Total	**192**	**67**	**88**	**355**

Different sectors emphasized different safety practices (Table 9). Retail companies appeared to emphasize the need for good housekeeping and maintaining a safe working environment. This was less evident in the hotel. The logistics company emphasized control, especially through supervision and cooperation, amongst workers. Again this was less evident in the hotel. The hotel laid greater emphasis on communicating by providing information, conducting risk assessments and reporting, which occurred less frequently in the other organizations.

Table 9
Number of different safety practices reported in three different service sectors by employees of different rank in a 14 day period.
Percentages of sector total are italicized in parenthesis.

Practices	Hotel	Logistics	Retail	Total
Provision of Facilities	34 (*37*)	47 (*42*)	65 (*46*)	146 (*41*)
Removal of Obstacles or hazards	24	36	53	113
Maintenance of equipment	6	9	8	23
PPE	2	2	3	7
First Aid / medical care	2		1	3
Accident Book				0
Control	18 (*19*)	34 (*30*)	33 (*23*)	85 (*24*)
Standard Operating Procedures/ Measures	16	23	26	65
Supervision -leadership	1	11	6	18
Reward & Sanctions	1		1	2
Monitor - inspect - audit	13 (*14*)	8 (7)	19 (13)	40 (*11*)
Communication	9 (*10*)	8 (7)	10 (7)	27 (*8*)
Provision of information (briefings etc)	8	6	6	20
Signage, posters	1	2	4	7
Visible behaviours				
Co-operation / worker consultation	1 (*1*)	11 (*10*)	5 (*4*)	17 (*5*)
Competence	5 (*5*)	2 (*2*)	6 (*4*)	13 (*4*)
Provision of training	5	2	6	13
Selection and recruitment				
Risk assessment/Risk Profiling	6 (*7*)	2 (*2*)	1 (*1*)	9 (*3*)
Reporting	5 (*5*)		2 (*1*)	7 (*2*)
H&S policy documentation – writing	2 (*2*)		1 (*1*)	3 (*1*)
Appointment of H&S representative				
Investigate accidents, incidents, near misses				
Review				
Other				
Total	93	112	142	355

5. DISCUSSION

5.1 Informal and Incidental Learning

Informal learning plays an important role in the transmission of working practices in the organizational environment (Eraut, 2004)[9]. According to Somerville and Lloyd (2006)[22] safe working practices are no exception. Commonplace experiences at work provide opportunities for incidental learning and using Marsick and Watkins's (2001)[1] framework for this study has demonstrated how incidental learning may contribute to the development and embedding of safe working practices amongst employees in three different service sectors (retail, hotel and logistics). Through the narrative quotes obtained from the audio recordings we have been able to evidence many of the steps in the framework, although not every comment revealed every step. Some, like learning strategies, were difficult to discern. However, some recordings do reveal most steps, as the following example indicates. A hotel manager "*just walked back into the building and observed, at the front door of the main hotel building, extremely wet conditions and we have a nice polished stone floor. Just need to make sure that the protective mats are in place and was there any need for anything else such as wet floor signs. Observed that the mats were doing their job, nobody needing to be told*". Here the manager clearly understood and anticipated the hazards associated with water lying on a smooth floor. In response to this framing and trigger, he/she looked for the solution first in the mats and then in the possible need for a wet floor sign. The concluding comment suggested that the solutions were having the desired effect and consequently alternative solutions, for example someone with a mop, were not required.

Marsick and Watkins (2001)[1] note that "the steps are neither linear nor necessarily sequential, pg. 29". Our observations of the data suggest that often respondents were reflecting on the trigger rather than the solution. For example, a retail assistant observing that garden chemicals were stacked too high noted that it was hazardous because it could fall on someone, but also the chemicals themselves were a hazard to the public. Another retail assistant noticed that customers would be standing in the path of moving vehicles if they wanted to purchase the plants on sale in front of the store. He "*moved them all down so they're all flush with the building*". Another retail assistant noted that the mezzanine area in the store was full of stock causing not only a fire hazard because it blocked the exit, but also a lone working hazard. An object falling on someone and trapping or injuring them would go unnoticed, "*because it's out of view for staff, if anything happens … you wouldn't see it*".

Some of the vignettes also suggest the importance of social learning for safety practices. While this has been noted in high hazard contexts (Sanne, 2008[14], Maslen, 2014[15]) it has not been shown in low hazard service sector environments. In social learning theory (Bandura, 1977)[49] stated behaviour is learned from the environment through the process of observational learning. Lave and Wenger (1991)[50] suggest that learning is not simply the transmission of abstract and decontextualized knowledge from one person to another. Rather, learning is a social process where knowledge is co-constructed. Clearly, learning about safety depends on more than formal training as Somerville and Lloyd (2006)[22] suggested earlier. Nevertheless, formal training may be necessary to frame the operational context within which safe working must be practiced. The data do indicate that prior safety training made respondents alert to potential hazards in their environment. A key challenge arising from this and other studies would be how to integrate informal and incidental learning effectively into safety training programmes to complement the existing formal learning activities.

5.2 Hazards and Violations

Hazards and violations of safe working practices make a significant contribution to the total number of 'triggers' observed in this study. These numbers are surprising for settings nominally designated as low hazard or low risk (Young, 2010)[51] are therefore not subject to regular external inspection regimes. While many of these hazards and violations constitute 'near-misses', the numbers of reported near-misses in these organizations was very much lower. For example, in one retail store there were no reported near-miss incidents during the period of this investigation, yet there were 12 hazardous incidents and one violation of safe working practices according to the three respondents over a two week period. This directly challenges the veracity of near-miss data and suggests that

greater emphasis needs to be placed on effectively and accurately reporting near-misses if this information translates into better safety behaviours and reduced accidents.

An examination of the triggers also showed difference across ranks in the organizational hierarchy. Managers were more attentive to meetings and communication with front-line employees more attentive to hazards and violations. Such variation confirms Smallman's (2001)[3] earlier call for more safety research across hierarchical levels. Safety research has typically focussed on front-line employees and their supervisors (Zohar and Luria, 2003[52]; Kapp, 2012[53]), and ignored those further up the organizational hierarchy, who might have different experiences of safety, but also make a different contribution to safe working in the organization.

5.3 Practices

While the legislative context does not require organizations to adopt specific practices to ensure the safety of their employees, nevertheless, isomorphic pressures (Di Maggio and Powell, 1983)[54] ensure that firms typically adopt similar practices. The data reported here suggest that organizations in three different service sectors adopt a broadly similar set of practices, although there is also variation in where the emphasis is placed. This variation requires further investigation to ensure that it is more than an artefact of sampling; there were fewer front-line employees selected in the hotel compared to the other two sectors.

The generic list of practices developed from the HSE guidelines provides an analytical structure for the data and will allow OSH practitioners and others to recognize the data and use it for comparative benchmarking purposes. Nevertheless, such a list has spurious authority, given that the legislation is not prescriptive. Furthermore, it suggests that safety practices can be implemented as discrete practices. This is not the case. The recordings often referred to multiple practices in a single event suggesting that more often than not practices are bundled together in some way. Unpacking these bundles to discern which practises are commonly found together and which are never associated, merits further investigation so that coherent integrated packages of practices can be developed.

It is important to note that the identification of the occurrence of a practice in the recording should not be taken to indicate that the practice was actually being implemented correctly, in a manner to ensure safety. In many cases, particularly in relation to standard operating procedures, the commentary referred to where procedures were incomplete or not being followed properly. This reinforces the earlier observation that further investigation of violations is warranted.

A consideration of practices according to this framing device privileges "imposed" or "top-down" practices. An earlier analysis that created categories of practice inductively from the data seemed to highlight the importance of interaction with others, which is less obvious in the framing of the data presented here in Tables 8 and 9. For example, such interaction might be captured in the cooperation/worker consultation category, or perhaps under control either as supervision or as standard operating procedures (which were being discussed or explained) or alternatively under provision of facilities where individuals remind or instruct each other to remove obstacles. The importance of personal interactions to enact safe working practices merits closer examination. These interactions may be more important for enacting some practices that others, for example, those that reduce harm arising from inattention due to boredom or fatigue. Safe working in service sector organizations may be learnt by social interactions with other more experienced workers as other studies suggest (Maslen, 2014[15]; Somerville and Lloyd, 2006[22]).

5.4 Use of Diaries in Future Safety Research

As far as we are aware diary methods have not been used in safety research reflecting the paucity of qualitative research in this field (Zou et al., 2014)[12]. On the basis of this study, audio-diaries have the potential to make a significant contribution to four areas of safety research. Firstly, they may help to develop our understanding of the practices of safe working. They may reveal how employees bundle activities together to create more or less safe combinations of practices. Secondly, drawing on

Snook's (2000)[55] theory of practical drift, they may help to reveal where 'actual practices' in the work place differ from the 'espoused practices' of the documented safety policy and written procedure. This might also allow a more in-depth study of safety violations without the need for participant observation which is time-consuming, costly and more limited in scope. Thirdly, the high reliability organization literature indicates that mindfulness is critical for safe operations in high hazard settings (Weick and Sutcliffe, 2001)[56]. The use of audio recorders in service sectors that are convenient to carry, simple to operate, unobtrusive and potentially permitting 'real-time' reflection, may allow an examination of mindfulness in these settings. Fourthly, Gary and Silbey (2011)[57] suggest that safety compliance is experienced differentially across an organizational hierarchy. Those at the front line typically experience accidents more frequently than middle and senior managers, yet often do not have a full understanding of the requirements to achieve compliance. Diaries, like the recordings in this study, may reveal when safety becomes salient to employees of different rank in low hazard settings.

5.5 Challenges for Using Diaries as a Data Collection Method

The following challenges using diaries have been identified (Radcliffe, 2013[37]; Bartlett, 2012[58]).

a. Effective Recording
   One of the challenges experienced in this study was ensuring that sufficient detail was captured. Unlike semi-structured interviews, the researcher is not present to prompt respondents and request more detailed information.

b. Participant commitment
   Similarly, the absence of the researcher means that it is easy for the participant to miss a diary entry because of, for example, being busy, forgetfulness or dwindling enthusiasm, with the attendant loss of data. Maintaining commitment over a sustained period is critical for success. One way of combatting respondent fatigue is by maintaining contact with the participants throughout the period of study. Regular text messages or emails acted as reminders and encouraged participation in this study.

c. Accuracy
   Not all respondents will adhere to the carefully prepared and detailed guidelines conveyed both verbally and in writing. While useful, the data may not always be complete. Moreover, there is a danger that participants may complete diaries retrospectively rather than 'in the moment' as per the instructions. A small number of participants in our study admitted doing this in the post-diary interview. Asking participants to record the date and time of entry might indicate whether retrospective entries have been made, although this too could be falsified.

d. Ethical Issues
   Asking respondents to record triggers for safety will inevitably surface violations of safety policy and practice. How this information is handled in the light of agreed confidentiality with the participants needs further discussion. Due consideration needs to be given to the severity of the violation and perhaps points to the socially constructed nature of safety and risk.

5.6 Methodology for Conducting Diary Studies

The following step-wise approach seems to be commonly used in diary studies and may be adapted by safety researchers wishing to use this method.

a. Pre-diary interview
   Explaining what is involved. It is necessary to explain exactly what is involved at the outset so that participants know what to expect including the demands that participation will make upon them. Although tempting to downplay the commitment required to recruit more participants, in the long run this is potentially counter-productive as dropout rates may be higher.

Ensure understanding regularly during reporting. Clear instructions need to be provided so that participants know exactly what they are being asked to record. This should indicate the amount of detail required.

Agree when diaries entries should be made. Signal-based diary studies avoid this difficulty. However, event-based diary studies require participants to make entries as close to the event as possible. This may be inopportune, for example, when dealing with a spillage on a busy shop floor. Agreement needs to be reached as to when the entry should be made to avoid retrospective fabrication of details. Asking participants to note the date and time of the incident and the elapsed time between the incident and the report helps to mitigate this danger.

b. During diary completion
Maintain contact with participants. Personal contact more than 'good will towards science, pg 595' (Bolger et al., 2003)[26] will ensure completion. Our experience, building on the advice of others, suggests contacting participants at least once per week helped to ensure the completion of diary entries. Obviously there is a trade-off between frequency of contact and duration of the study; fewer contacts may be required in a shorter study.

c. Post-diary interview
Discuss impact. Interviews provide an opportunity to discuss the impact on the participant of keeping a diary. While the diaries are a research tool they are also an intervention that has the potential to enable reflection and raise consciousness that may permit greater understanding and personal change. Several participants acknowledged the value of the recorder for this reason. One even mentioned it as an entry, "*doing this has definitely made me look at things differently actually. It made me take a step back and have an outsider's point of view really. So thank you for that*". They also acknowledged its value as a device for capturing issues to be dealt with or as a means of near-miss reporting.

5.7 The Utility of Audio-Recorders in Safety

Audio recorders have utility for four groups of people: Inspectors and Environmental Health Officers (EHOs); Managers and Supervisors; HR Professionals; and Researchers.

Capturing data on safety practices in organizations is an important aspect of managerial and supervisory roles and also of inspectors and auditors. This study suggests that audio recorders may be a useful tool to assist this process. They have considerable advantage over other methods being:

- Low cost;
- Easy to use;
- Readily portable;
- Accessible to a wider population (e.g. non-natives who may find writing difficult);

Data captured by recorders when linked to voice recognition software makes report writing simpler and quicker. This may be valuable for time pressed Inspectors and EHOs.

The convenience of audio recorders may encourage near-miss reporting and permit a more accurate analysis of hazards in organizations. Our study suggested that recorders carried in a pocket are more accessible than forms, perhaps stored in an office, for reporting near misses and therefore more likely to capture accurately the number of near-miss events.

HR Professionals may find recorders useful for two reasons. First, they may encourage recipients of H&S training to be mindful in practice, applying what they have learnt. Asking trainees to record their experiences may help to not only embed training but also to reveal deficiencies in training. Second, these recordings may also indicate aspects of organizational practices more generally that need attention through specific training.

Recorders provide a useful tool for researchers. Increasing interest in processual studies of practices (Langley, 1999)[59] suggest a role for audio recorders as a convenient tool for the collection of 'real-time' data. They also return power to the participant, giving them greater control over the data collection phase of a research project.

5.8 Limitations of the Study

The study has a number of limitations associated with the method and the analytical framework. A two week time frame for the duration of data collection may be insufficient to gather adequate data, especially to cover the breadth of possible safe working practices. Other diary studies have longer durations. This was a compromise decision reached after discussions with line managers and participants in the organizations. It sought to avoid the task becoming too onerous and the consequent participant response rate diminishing to unacceptably low levels. Despite clear written and oral instructions prior to commencing the study, participants provided a wide variety of responses ranging from a brief observation to a more lengthy observation and reflection. While we used template analysis to examine the responses, alternative methods for analysing short sound-bites may be more appropriate. Crucially, we were dependent upon the respondent remembering to make recordings. Some were more diligent that others. How this affects the quality and characteristics of the data are not known. Would the data from those who didn't remember to record have been different from those who did? Would they have been less attentive and therefore offer fewer incidents?

6. CONCLUSIONS

Four conclusions may be drawn from this study. First, we have demonstrated that incidental learning following the framework of Marsick and Watkins (2001)[1] is an integral part of the enactment of safe working in organizations and complement the learning achieved through formal training. Second, the triggers for safer working practices in service organizations vary across the organizational hierarchy. Front-line employees respond to triggers emphasizing hazards and safety violations, whereas managers respond to compliance oriented triggers including safety meetings and completion of safety checklists. Third, a wide range of safety practices were observed, but some were more prominent. The two most dominant sets of practices were providing safe facilities through good housekeeping and control by exerting standard operating procedures. Finally, audio diaries may be used to effectively gather data on safety practices in organizations providing qualitative data to support our understanding of safe working.

REFERENCES

(1) Marsick, V.J. and Watkins, K.E. (2001). Informal and incidental learning. New Directions for Adult and Continuing Education 89:25-34.

(2) HSE (2013a). http://www.hse.gov.uk/statistics/lfs/ (accessed 28 September 2014).

(3) Smallman, C. (2001). The reality of “Revitalizing Health and Safety”. Journal of Safety Research 32:391-439.

(4) Stuart, A. (2014). A blended learning approach to safety training: student experiences of safe work practices and safety culture. Safety Science 62: 409-417.

(5) Mullen, J.E. and Kelloway, E.K. (2009). Safety leadership: a longitudinal study of the effects of transformational leadership on safety outcomes. Journal of Occupational and Organizational Psychology 82(2): 253-272.

(6) Innes, M., Turner, N., Barling, J. and Stride, C.B. (2010). Transformational leadership and employee safety performance: a within-person, between-person job design. Journal of Occupational Health Psychology 15(3): 279-290.

(7) Conchie, S. and Donald, I. (2009). The moderating role of safety-specific trust on the relation between safety-specific leadership and safety citizenship behaviors. Journal of Occupational Health Psychology 14(2): 137-147.

(8) Avolio, B.J., Walumbwa, F.O. and Weber, T.J. (2009). Leadership: current theories, research and future directions. Annual Review of Psychology 60: 421-449.

(9) Eraut, M. (2004). Informal learning in the workplace. Studies in Continuing Education 26(2): 247-273.

(10) Mascini, P. (2005). The blameworthiness of health and safety rule violations. Law & Policy 27(3): 472-490.

(11) HSE (2013b). Managing for Health and Safety (HSG65). http://www/hse.gov.uk/pubns/priced/hsg65.pdf (accessed 14 October 2014).

(12) Zou, P.X.W., Sunindijo, R.Y. and Dainty, A.R.J. (2014). A mixed methods research design for bridging the gap between research and practice in construction safety. Safety Science 70: 316-326.

(13) Dawson, S., Poynter, P. and Stevens, D. (1984) Safety specialists in industry: roles, constraints and opportunities. Journal of Occupational Behaviour 5(4): 253-270.

(14) Sanne, J. (2008) Incident reporting or storytelling? Competing schemes in a safety-critical and hazardous work setting. Safety Science 46: 1205-1222.

(15) Maslen, S. (2014). Learning to prevent disaster: An investigation into methods for building safety knowledge among new engineers to the Australian gas pipeline industry. Safety Science 64: 82-89.

(16) Crossan, M. M., Lane, H. W. and White, R. E. (1999). An organizational learning framework: from intuition to institution. Academy of Management Review 24(3): 522-537.

(17) Gorard, S., Fevre, R. and Rees, G. (1999). The apparent decline of informal learning. Oxford Review of Education 25(4): 437-454.

(18) Scheeres, H., Solomon, N., Boud, D. and Rooney, D. (2010). When is it OK to learn at work? The learning work of organisational practices. Journal of Workplace Learning 22(1/2): 13-26.

(19) Conlon, T.J. (2004). A review of informal learning literature, theory and implications for practice in developing global professional competence. Journal of European Industrial Training 28(2-4): 283-295.

(20) Berg, S.A. and Chyung, S.Y. (2008). Factors that influence informal learning in the workplace. Journal of Workplace Learning 20(4): 229-244.

(21) Marsick, V.J., Volpe, M. and Watkins, K.E. (1999). Theory and practice of informal learning in the knowledge era. Advances in Developing Human Resources 1: 80-95.

(22) Somerville, M. and Lloyd, A. (2006). Codified knowledge and embodied learning: the problem of safety training. Studies in Continuing Education 28(3): 279-289.

(23) Rooke, J. and Clark, L. (2005). Learning, knowledge and authority on site: a case study of safety practice. Building Research and Information 33(6): 561-570.

(24) Zanko, M. and Dawson, P. (2012). Occupational Health and Safety management in organizations: a review. International Journal of Management Reviews 14: 328-344.

(25) Symon, G. (2006). Qualitative research diaries. In Essential Guide to Qualitative Methods in Organizational Research. Ed Cassell, Catherine and Symon, Gillian. SAGE Publications, London, UK. pp 98 –113.

(26) Bolger, N., Davis, A. and Rafaeli, E. (2003). Diary methods: capturing life as it is lived. Annual Review of Psychology 54(1): 579-616.

(27) Ohly, S., Sonnentag, S., Niessen, C. and Zapf, D. (2010). Diary studies in organizational research. Journal of Personnel Psychology 9(2): 79-93.

(28) Harris, C., Daniels, K. and Briner, R.B. (2003). A daily diary study of goals and affective well-being at work. Journal of Occupational and Organizational Psychology 76(3): 401-410.

(29) Atewologun, A.O. (2011). An examination of senior black, asian and minority ethnic women and men's identity work following episodes of identity salience at work. PhD Thesis, Cranfield University.

(30) Balogun, J. and Johnson, G. (2004). Organizational restructuring and middle manager sensemaking. Academy of Management Journal 47(4): 523-549.

(31) Buchanan, D. A. (1991). Vulnerability and agenda: context and process in project management. British Journal of Management, *2*(3): 121-132.

(32) Daniels, K., Glover, J., Beesley, N., Wimalasiri, V., Cohen, L., Cheyne, A., and Hislop, D. (2013). Utilizing job resources: Qualitative evidence of the roles of job control and social support in problem solving. Work & Stress 27(2): 200-221.

(33) Hawkes, G., Houghton, J. and Rowe, G. (2009). Risk and worry in everyday life: Comparing diaries and interviews as tools in risk perception research. Health, Risk & Society 11(3): 209-230.

(34) Katzeff, C., Nyblom, Å., Tunheden, S. and Torstensson, C. (2012). User-centred design and evaluation of EnergyCoach – an interactive energy service for households. Behaviour & Information Technology 31(3): 305-324.

(35) Kiffin-Petersen, S., Murphy, S.A. and Soutar, G. (2012). The problem-solving service worker: appraisal mechanisms and positive affective experiences during customer interactions. Human Relations 65(9): 1179-1206.

(36) Poppleton, S., Briner, R. and Kiefer, T. (2008). The roles of context and everyday experience in understanding work-non-work relationships: a qualitative diary study of white and blue collar workers. Journal of Occupational and Organizational Psychology 81: 481-502.

(37) Radcliffe, L. (2013). Qualitative dairies: uncovering the complexities of work-life decision-making. Qualitative Research in Organizations 8(2): 163-180.

(38) Stragier, J., Derboven, J., Laporte, L., Hauttekeete, L., and De Marez, L. (2013). Kilowhat? A multidisciplinary approach on the development of a home energy management system. Behaviour & Information Technology 32(11): 1086-1104.

(39) Waddington, K. (2005). Using diaries to explore the characteristics of work-related gossip: methodological considerations from exploratory multimethod research. Journal of Occupational and Organizational Psychology 78(2): 221-236.

(40) Waller, A. and Ragsdell (2012). The impact of e-mail on work-life balance. New Information Perspectives 84(2): 154-177.

(41) Reis, H.T. and Gable, S.L. (2000). Event-sampling and other methods for studying everyday experience. Handbook of Research Methods in Social and Personality Psychology. Cambridge University Press: Cambridge. Pp 190-222.

(42) Hale, A.R., Guldenmund, F.W., van Loenhout, P.L.C.H. and Oh, J.I.H. (2010). Evaluating safety management and culture interventions to improve safety: Effective intervention strategies. Safety Science 48: 1026-1035.

(43) Shannon. H.S., Mayr, J. and Haines, T. (1997). Overview of the relationship between organisational and workplace factors and injury rates. Safety Science 26(3): 201-217.

(44) HSE (2014). Health and Safety made simple. The basics for your business. http://www.hse.gov.uk/pubns/indg449.pdf (accessed 14 October 2014).

(45) NHS (2014). Healthy Working Lives (http://www.healthyworkinglives.com) (accessed 16 September 2014).

(46) Neal, A., Griffin, M.A. and Hart, P.M. (2000). The impact of organizational climate on safety climate and individual behaviour. Safety Science 34(1): 99-109.

(47) Tucker, S., Chmiel, N., Turner, N., Hershcovis, M.S and Stride, C.B. (2008). Perceived organizational support for safety and employee safety voice: the mediating role of co-worker support for safety. Journal of Occupational Health Psychology 13(4): 319-330.

(48) King, N. (2006). Using templates in the thematic analysis of text. In Essential Guide to Qualitative Methods in Organizational Research. Ed Cassell, Catherine and Symon, Gillian. SAGE Publications, London, UK. pp 256-270.

(49) Bandura, A. (1977). Social Learning Theory. Englewood Cliffs, NJ: Prentice Hall.

(50) Lave, J. and Wenger, E. (1991). Situated Learning. Legitimate peripheral participation, Cambridge: University of Cambridge Press.

(51) Young, D. (2010). Common sense, common safety. The Cabinet Office, London.[Last accessed 18 Sep 2014.] Available from URL: http://www. number10. gov. uk/wp-content/uploads/402906_CommonSense_acc. pdf.

(52) Zohar, D and Luria, G. (2003). The use of supervisory practices as leverage to improve safety behaviour: a cross-level intervention model. Journal of Safety Research 34(5): 567-577.

(53) Kapp, E. (2012). The influence of supervisory leadership practices and perceived group safety

climate on employee safety performance. Safety Science 50(4): 1119-1124.

(54) DiMaggio, P.J. and Powell, W.W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. American Sociological Review 48(2): 147-160.

(55) Snook, S.A. (2000). Friendly fire: the accidental shootdown of US Black Hawkes over Northern Iraq. Princeton University Press: Princeton.

(56) Weick, K.E. and Sutcliffe, K.M. (2001). Managing the unexpected: Assuring high performance in an age of complexity. San Franscico, CA: Jossey-Bass.

(57) Gary, G.C.and Silbey, S.S. (2011). The other side of the compliance relationship. In Explaining compliance: business responses to regulation. Eds. C. Parker and V.L. Nielsen. pg 123-138. Edward Elgar: Cheltenham, UK.

(58) Bartlett, R. (2012). Modifying the diary interview method to research the lives of people with dementia. Qualitative Health Research 22(12): 1717-1726.

(59) Langley, A. (1999). Strategies for theorizing from process data. Academy of Management Review 24(4): 691-710.

Appendix 1: Diary Instruction Booklet

Thank you for participating in this project in conjunction with Cranfield School of Management and IOSH. Should you have any questions or concerns, please contact me:

Dr Colin Pilbeam at colin.pilbeam@cranfield.ac.uk or Telephone: +44(0) 1234 751122
Dr Ross Davidson at ross.davidson@cranfield.ac.uk or Telephone: +44(0) 1234 751122

Please keep a daily diary of when you think about safety.

- *Over the next 14 days please record any time when you think about safety. There may be one or more times during the day. Please record them all.*
- *Below are a series of prompts that we request you answer that will help describe the safety incident.*
- *Please carry the recorder with you and report your thoughts about safety as soon as you can. If you did not think about safety please record this.*
- *Upon completion of your diary, we will gather the recorder.*

Please see the following page for examples of safety.

Prompts for keeping your diary:

Name and organisation:

Position with company:

Date:

Location:

Please talk about situations at work today that made you think about safety

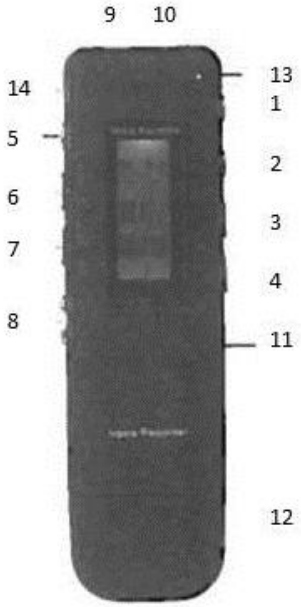
(There may be more than one)

For each situation separately answer the following questions:

a. When and where was it? (If you have a mobile phone could you take a photograph?)
b. Why did safety come to mind in this situation?
c. Did anything happen? What?
d. Who was involved? What did they do?
e. What was the outcome?

When did you pay attention to safety? A few examples…		
		
After attending safety training?	**Unsafe work areas?**	**Poor communication?**
		
Improper safety procedures (others)?	**An accident occurs?**	**Threatened at work or feel threatened?**
		
Short cuts?	**Thinking about safety off the job?**	**Any other time you think about safety?**

How to operate the recorder



1 – Play/stop playing
2 – Menu/delete
3 – Back
4 – Forward
5 – Record (REC)
6 – Volume (+)
7 – Volume (-)
8 – Power Off/On
9 – Signal In
10 – EarPlug
11 – Screen
12 - USB Plug(remove cap)
13 - Indicator light
14 - Built in microphone

Turn on /off
- push power switch to on (8)
  (after 5 seconds, screen shows numbers on screen)

Record
- To start press REC button (5) when you see number in screen
- To stop recording repress REC (5)
  (Recording is automatically saved)

To play back recording
- Press (1) to play; repress (1) to stop

Connect to computer to recharge or send files
- Remove protective cap (12)
- Plug into your USB computer drive
- Display will show (NB. Production issue, some recorders plug in upside down)
- Transfers recordings with no special software (Windows 98, Me, 2K, XP, Vista)
- Save file to your computer (please label it YourName_1 etc and send as an attachment to: ross.davidson@cranfield.ac.uk

To recharge recorder
- Place USB plug into recharger
- Plug recharger into an AC plug
- A red light showing indicates recorder is recharging

NB! When you make your diary recording for the day, the next recording does not write over the previous recording

While this paper reports on research that was funded by IOSH, the contents of the document reflect the views of the authors, who are solely responsible for the facts and accuracy of the data presented. IOSH has not edited the text in any way, except for essential formatting requirements. The contents do not necessarily reflect the views or policies of IOSH.

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Suggested reference
Pilbeam C, Davidson R, Doherty N, Denyer D. *Using audio-diaries to capture safety practices and incidental learning about safety*. Leicestershire: IOSH; 2016.

Published by IOSH
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POL3193a/141016/IOSH