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**Attitudes and Behaviours towards Slips, Trips  
and Falls – A Literature Review**

**HSL/2006/70**

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## EXECUTIVE SUMMARY

Slips, trips and falls (STFs) account for 33% of all reported major injuries at work (HSE, 2003). HSE/HSC is launching a publicity campaign in the third quarter of 2005 to both raise awareness of slips, trips and falls and to also focus attention towards the main preventative measures that may be taken against them.

The objective for this piece of work was to review the existing scientific literature concerning how attitudes and behaviours may affect the prevalence of STFs.

### Methodology

The literature was searched from 1962 to the present day using electronic databases held at HSE's Information Services facility. The number of articles yielded was 932, however, the vast majority were concerned with the physical and environmental factors affecting STFs. A much smaller number of articles were uncovered relating to attitudes and behaviours, with most of these concerned with behavioural safety programmes.

### Results

A content/ thematic analysis was carried out and shortfalls in the literature were discussed. The key themes identified from the literature were:

- Behavioural safety
- Good housekeeping
- Managerial Influence
- Rewards

### Conclusion

In reviewing the literature relating to attitudes and behaviours towards STFs it is clear that there is great scope for more work to be done. Most of the work retrieved focussed on behavioural aspects towards safety, with very little information concerning cognitive or affective influences. The studies conducted thus far have been in a relatively narrow field of industries, eg, manufacturing and food factories, which raises the issue of cross sector validity. There also appears to be a dearth of follow-up studies to investigate whether the behavioural interventions introduced have long-term persistence.

### Recommendations

The key messages for a publicity campaign, supported by the literature should concentrate on:

- Good housekeeping
- Top management commitment
- Supervisor commitment
- Fair reward systems

# 1 INTRODUCTION

## Background

Slips, trips and falls account for 33% of all reported major injuries at work (HSE, 2003). In the third quarter of 2005, HSC/HSE will launch a national publicity campaign aimed to reduce the number of slips, trips and falls on the level (STFs). This forms part of HSC/HSE's Revitalising Health and Safety strategy launched in June 2000. The following literature review aims to inform the publicity campaign, and establish the key messages relating to the reduction of slips and trips from the human factors perspective.

The factors influencing slips, trips and falls (STFs) fit broadly into two categories: environmental and human. Safety in recent years has focused on physical and engineering controls and upon safe working procedures. It therefore seems sensible that after years of designing equipment and safe systems of work, the focus should now turn to the other main variable – the human being. Greater improvements in safety performance may rest on a greater understanding of employees and their attitudes and behaviours in the workplace (Everley, 1995).

The majority of STF research to date has focussed on environmental factors, and has provided information on matters such as the slip resistance of flooring, cleaning and maintenance regimes, lighting, footwear and work area design. By comparison, fewer studies have delved into the human factors aspect. Human factors relate to the intrinsic properties of individuals. Examples of intrinsic factors include age, gender, physical capabilities, confidence, knowledge and motivation. A number of studies have addressed aspects such as age (with particular emphasis on the elderly) and gender (Davies et al 2003; Kemmlert & Lundholm, 2001; Leamon & Murphy, 1995) in relation to STFs. Aspects such as vision (Davis, 1983) have also been examined.

The specific remit of this report however, was to identify the factors, which influence attitudes and behaviours towards STFs. Attitudes are formed through cognitive, affective and behavioural processes (Eagly and Chaiken, 1993). Studies that examine attitudes to STF are relatively few and most studies are concerned with behavioural measures. Very little attention has been paid to cognitive processes. In view of the dearth of literature on human factors, it seems apposite to examine what has been learned so far to establish what more needs to be done.

Improvement of housekeeping regimes is a commonly cited intervention for targeting slips, trips and falls. Although this intervention seems straightforward, it is not, due to the fact that it relies on human behaviours and attitudes, which can be highly unpredictable. A housekeeping programme may be introduced as part of a behavioural safety campaign, which may also aim to increase, eg, the wearing of PPE. The level of housekeeping maintained in a workplace is influenced by management style and reward systems.

In the following sections the role of housekeeping in reducing slips, trips and falls will be discussed, as will the factors influencing the success of a behavioural safety programme. Management and supervisory styles and reward systems will also be considered.

## 2 METHODOLOGY

The literature was reviewed between the years 1962 and 2004 with the assistance of HSE's Information Services. The databases Oshrom CDROM (that includes CISDOC, HSELINE, NIOSHTIC, OSHLINE and RILOSH), Ebsco Host Database, Medline, Psyclit, RoSPA database, Excerpta Medica and WebCat were searched. Relevant titles and abstracts to the topic were followed up and the original articles were obtained. Searches were made for articles focussing on factors influencing 'attitudes and behaviours to slips and trips' specifically. These were followed by broader searches into 'slip and trip accidents' and 'safety management'. A search of the physical/environmental factors in slips and trips was made using the key words 'flooring', 'footwear', 'lighting', 'cleaning' and 'obstructions'.

### Results

The vast majority of the literature was concerned with physical/environmental factors. For example, a search of physical factors (since 1980) produced 752 references on flooring, 80 references on footwear, 23 references on lighting and 37 references on cleaning regimes. This contrasts with a narrow search looking at attitudes and behaviours to slips and trips, which yielded only 40 references.

Most of the literature on this topic dates from the 1980's, although some articles were written in the last two or three years and the late 1990's.

### **3 KEY THEMES – BEHAVIOURAL SAFETY**

A number of methods exist that are used to encourage workers to keep their work environment in good order. These methods include training, the enforcement of rules and regulations and disciplinary measures. Training is helpful if the lack of knowledge is genuine, but often it is not. People know how they should act, yet they still behave differently (Saari, 1987). These findings mirror wider research demonstrating that in general knowledge does not guarantee behaviour change (Sheeran and Silverman, 2003)

Everley (1995) described how some safety practitioners believe that employee behaviour can be changed through discipline and reward. Other practitioners believe however, that it is necessary to change employee attitudes through empowerment and involvement in order for long-term behavioural changes to occur.

In this section, the concept of behavioural safety will be discussed. The method of implementing a behavioural safety campaign will be described along with the factors that may influence the success of a safety campaign.

#### **3.1 BEHAVIOURAL SAFETY IMPLEMENTATION**

Behavioural safety programmes are often implemented via a three-stage process (Kamp, 2001 and Ray et al, 1993). Firstly, meetings are held to educate managers, supervisors and workers to gain stakeholder buy-in. At this stage, specific desired safety behaviours are identified with the help of the workplace accident and near-miss records.

Secondly, a set of observable safety-related behaviours is identified. Observers are trained to sample these behaviours and record observations. A baseline level of existing safety behaviour is then established.

The third phase is to provide feedback to employees regarding their safety performance on the target items. Workers are encouraged to improve their compliance.

Behavioural safety programmes differ in, for example, the method of imparting feedback to employees (eg, verbal feedback, charts, private or public feedback). Incentives may also be offered (eg, recognition or financial reward) and a target safety level may be set at the beginning of the programme.

#### **3.2 CHOOSING SAFE BEHAVIOUR**

Choosing safe behaviour over unsafe behaviour almost always requires more time and effort. There are also ongoing pressures not to follow safety rules including production pressures, macho attitudes, poor relationships with supervisors and a lack of understanding as to how workplace rules are related to safety (Ray et al, 1993). There is therefore an overall bias for unsafe behaviour to be chosen over safe behaviour because it is usually the easiest option to take.

Kamp (2001) commented that when employees from a site with a successful behavioural safety programme are asked why the process has worked, they talk about increased awareness, more positive attitudes towards safety and people caring more about safety. Kamp argues that these

elements are all cognitive explanations, which focus on internal processes. Kamp believes that behavioural safety does change behaviour, but also that it does more by changing perceptions, attitudes and values as well.

### **3.3 MEASURING SUCCESS**

Industries often measure the success of safety interventions via accident records and observations of unsafe behaviours. The primary reason for this circumstance is that accidents are easy to measure. The problem with using accident rates as a gauge for safety performance is that they are subject to bias when reward or punishment is dependent upon them (Kamp, 2001).

### **3.4 SAFETY CULTURE DEVELOPMENT THROUGH BEHAVIOURAL PROGRAMMES**

Ray et al (1993) argued how in a selection of studies relating to safety behaviour, the safety index fell back in those studies that focussed directly on behaviour rather than the outcome of behaviour. They proposed that the act of unsafe behaviour is observable only for a short time, whereas the outcome of the behaviour affects the work environment and is observable for a much longer period. More specifically, if feedback is based on the outcome of the behaviour (eg, oil on the floor, or stacked pallets too high), the worker learns to read the feedback directly from the environment and the behavioural initiative may be more likely to succeed.

Another important aspect regarding the success of a behavioural initiative is whether the workers are involved from the offset of the campaign. If workers are included in the planning stages, and the selection of observable behaviours, the sense of ownership for the programme is enhanced and is thus more likely to succeed. According to Hubler (1995 cited in Quintana, 1999) World Class Safety Status is predicted by an organisation's ability to eliminate unsafe work practices by its employees and contractors and gain the active involvement of its workforce to prevent injuries.

Kamp (2001) commented on the importance of group working for the success of a safety campaign. If group members provide consequences that shape other's behaviour, the likelihood of a successful campaign is increased. This circumstance would depend however, on group members coaching each other outside of formal observation.

### **3.5 CONCLUSIONS**

Behavioural safety initiatives may be used to target issues such as the improvement of housekeeping levels or the wearing of PPE. In setting up a behavioural safety campaign, the background level of eg, housekeeping, is measured. Subsequent levels are then measured against this benchmark. The persistence of a behavioural campaign appears to depend on factors such as worker involvement and the effect of group working.

## 4 KEY THEMES - HOUSEKEEPING

In this section, a number of studies relating to the management and monitoring of housekeeping shall be discussed. One of the studies relates directly to the reduction of STFs by managing housekeeping. The other studies discuss the effect of improving housekeeping in relation to workplace hazards, and for our purposes, improvements in housekeeping will inevitably have beneficial effects by reducing the number of STF hazards in a workplace.

### 4.1 ORDERLINESS

One of the first priorities in the prevention of STFs is to improve orderliness in the workplace. According to Manning et al (1988 cited in Kemmlert & Lundholm, 2001), every fourth STF accident could be prevented if objects and spillages on floor surfaces were removed or cleaned up.

Reber and Wallins (1983, cited in Ray et al, 1993) found an inverse relationship between behavioural performance and overall injury rate for a farm machinery manufacturing plant. This suggests that programmes aimed at increasing safe behaviours should be associated with a reduction in workplace injuries. Reber et al (1984) observed that a 35% increase in safe behaviours was associated with a reduction of accidents by 54%.

Furthermore, Saari & Nasanen (1989, cited in Ray et al, 1983) found in a Finnish shipyard that the reduction in accidents (70-90%) was much more than could be accounted for by improvements in safety behaviour relating to housekeeping. The authors believed that the experiment encouraged workers to take care of all workplace hazards, not just those they were trained to target. Thus in targeting a greater variety of workplace hazards, the overall accident rate decreased more than anticipated.

Good order in the workplace has many other positive knock-on effects. These include: more time spent productively and not used up in, for example, finding tools and equipment; less money spent on equipment if better care is taken of it; enhanced company image; enhanced working environment and better fire and safety management. Industrial housekeeping is therefore a concrete area, which both management and employees should aim to improve (Laitinen et al, 1997).

### 4.2 TASK DELINEATED SAFETY

Quintana (1999) reported a task-delineated safety (TDS) approach for slip, trip and fall (STF) hazards at a used clothes-sorting facility. The cost of STFs for the company at the time was reported to be approximately two million US dollars in the previous three years. The foundations for the task-delineated safety approach is four-fold:

1. Focussed and unambiguous safety instructions that minimizes role ambiguity
2. Individual worker accountability with clear, enforceable consequences for not performing safety tasks
3. Extensive management involvement with expectations which are measurable, thus providing feedback to the worker
4. Hazard tracking and feedback structure

The traditional attitude towards housekeeping in the plant was that employees disregarded it, and others did the same because it was easier to avoid the problem than rectify it. When the hazard became intolerable, it would be picked up but would usually reappear over time. The cycle would continue in the same fashion until an accident occurred, after which company practice would be addressed.

In the study, two matched areas were chosen. Employees from one area were given instruction during safety meetings on the specific STF hazards they were required to monitor and control. The underlying human and economic consequences for not removing hazards in relation to the company and employees was also explained. Each employee was assigned an equally divided and specific area of responsibility.

For the employees in the 'experimental' group, an accountability system was introduced. A verbal warning from the first-line supervisor was given on the first violation, a memo from the engineering manager sent on the second, followed by a possible termination of work on the third instance. A violation was defined as a STF hazard in the material handler's designated area of responsibility.

Personnel randomly sampled STF hazards in the plant and these were displayed graphically to provide feedback on safety.

Safety violations were also included in annual performance evaluations which determined the amount of salary increase the employee would receive.

It was found that the TDS methodology out-performed the normal approach with respect to the number of hazards observed. By decreasing the number of hazards observed, the probability of a STF incident occurring was also diminished.

### **4.3 FEEDBACK**

Saari (1987) conducted a study relating to the management of housekeeping by feedback. The study was conducted in a margarine factory. The factory was divided into observable areas and an observation form was compiled. Examples of observations included: 'gangways are kept free from materials and other objects', 'empty pallets are returned to stores and stacked one on top of another' and 'grease, water and litter are removed from the floor'. These items could then be scored as correct or incorrect.

Photographs were also produced for this study to demonstrate correct and incorrect practice. A baseline measure of housekeeping was initially established and then measures were subsequently taken for a further two months. Large poster boards were hung up to provide workers with positive feedback about their performance. The housekeeping index rose from an initial baseline level of between 50 and 70 and in the following months the housekeeping index increased to more than 80. Saari considers the use of positive feedback (via tracking of housekeeping levels) as a promising approach to the management of human behaviour.

### **4.4 OBSERVATION CHECKLIST**

Laitinen et al (1997) conducted a housekeeping study in a Finnish metal workshop. An observation checklist was constructed including items such as 'Is the container too full', to which each item was scored as correct or incorrect. After establishing a baseline level of

housekeeping, the mean housekeeping index increased from 57% to 89%. Furthermore, sickness absence decreased from 12.8% of the total working hours in 1991 to 9.9% in 1994.

#### **4.5 CONCLUSION**

These studies appear to demonstrate that good housekeeping practice is a sound method for reducing STF hazards and consequently reduce STF injuries. Good housekeeping has additional, positive knock-on effects such as increased production and enhanced company image, and is a good method for getting the workforce involved in safety issues.

## **5 KEY THEMES - MANAGEMENT / SUPERVISION**

In managing safety, a delicate balance exists between the respective stakeholders within a company (employers, managers and employees). The process of managing safety is essentially self-regulatory, backed up by external enforcement from organisations such as the HSE (Lehane and Stubbs, 2001).

### **5.1 INDIVIDUAL ACCOUNTABILITY**

In recent times there has been a move towards greater individual accountability for health and safety. At senior management level this is reflected in the increased pressure to bring more Section 37 prosecutions under the 1974 Health and Safety at Work Act. The police are also increasingly bringing manslaughter charges against directors who do not adequately ensure the safety of their employees. Furthermore, employees have to do more than just comply with the procedures set down by their employers. Employees should also report any shortfalls in procedures, which their knowledge and training should enable them to detect (Everley, 1995).

### **5.2 MANAGEMENT COMMITMENT**

The US National Safety Council (cited in Bentley and Haslam, 2001) described those companies with good safety records as having (amongst others): a strong management commitment to safety; a humanistic approach to dealing with employees; frequent positive contact and interaction; presence of both formal and informal workplace inspections and a balance of supervisor and senior worker led training for employees.

### **5.3 SAFETY VS PRODUCTIVITY**

Traditionally, top line managers have viewed safety as a secondary performance indicator in the workplace, behind such targets as productivity and profit. Quintana (1999) discussed how it could be that workers choose not to follow established safety practices, regardless of how clear and well defined they may be, because by doing so the worker's actual or perceived productivity may decrease. Thus, until the worker receives instruction from management that safety should take the precedence, he or she may avoid safety practices that are viewed as counter-productive. Individual accountability must therefore be based on clear consequences for non-conformance. Furthermore, these consequences must be such that the penalty for getting caught significantly outweighs the perceived or actual productivity gain of not adhering to safety practices. A rational thinking individual would therefore opt for adhering to established safety practice.

### **5.4 MEASUREMENT**

Thomas (1996, cited in Quintana, 1999) commented that the key to successful behaviour based safety lies in the commitment from top management and that this needs to be reinforced by a way of measuring safety compliance. Progress measurements can be based on several indicators including worker's compensation costs, reduced injuries and continuous hazard monitoring.

## **5.5 FRONTLINE MANAGEMENT**

### **5.5.1 Foremen**

Foremen have been identified as key to accident prevention because their job is to guide and control the workers. Salminen and Saari (1995) commented how production managers and foremen are mainly motivated by production goals, and therefore safety must be integrated into these goals to maintain their motivation. Employees at management level need to understand that not only do accidents cause harm and suffering, but also cause economic and production losses. Company management could therefore use safety management to reduce costs.

### **5.5.2 Supervisors**

Simard and Marchand (1994 cited in Quintana, 1999) investigated the recurrence of hazards and accidents in spite of persistent efforts by organizations to target them. They found that the influence of the supervisor's behaviour in accident prevention and the effectiveness in occupational safety, based on a sample of 100 manufacturing workplaces, had a profound effect. A bivariate analysis revealed that a participatory style in a supervisor's behaviour contributed to effective occupational safety. However, additional active development of the workplace safety programme by top management was even more effective in improving aspects of occupational safety.

### **5.5.3 Service Industries**

Lehane and Stubbs (2001) found that managers in the service industries were most likely to place causal responsibility for a STF on the accident subject. As a result, managers were less likely to implement any remedial actions involving alterations to the environment, plant or work systems. Instead they attempted to modify worker behaviour. Managers also seemed to place causal responsibility with the accident subject to divert any criticism away from potential management failure.

### **5.5.4 Post Office**

Bentley and Haslam (2001) found that delivery office managers from post offices with low accident rates displayed the following characteristics: better quality of safety communication (discussion with delivery officers), dealing with hazards (STF) reported on delivery walks and better accident investigation and remedial action.

## **5.6 CONCLUSION**

The influence of management on safety culture and safety performance in an organisation appears to be key. In controlling STFs, supervisory staff that demonstrate enthusiasm for, and take part in safety practice will be more likely to help nurture a positive safety culture. The involvement of top management in safety matters also appears to be crucial, such that employees are in no doubt that safety is just as important as other criteria such as profit and production targets.

## 6 KEY THEMES - REWARDS

The provision of rewards (either monetary, material or peer recognition) to recognise safe behaviour may provide an incentive for practising safe behaviour and may be used as part of a behavioural safety campaign. Kamp (2001) argued however, that material rewards for safe behaviour merely creates a cognitive justification for working safely during observation. This in turn may limit the development of favourable attitudes towards working safely when not being observed.

Rewards in the form of peer recognition, such as 'employee of the month' may therefore be a more favourable option. However, such schemes in general, based on injury rates, often fail as they can help perpetuate a blame culture (Fell-Carlison 2004)

Another aspect relating to rewards is that they must be delivered with consistency.

## 7 OVERALL CONCLUSIONS

In conducting a review of the literature in relation to the attitudes and behaviours towards slips, trips and falls, it became apparent that comparatively little research has been conducted in this area. Most of the literature is concerned with the physical and environmental factors influencing slip, trip and fall occurrence.

However, from current research, three recurrent themes associated with attitudes and behaviours to STFs could be established. These were: housekeeping, management style and rewards, with evidence that an interaction exists between these factors. Most studies, reporting successful attempts to address slip and trip accidents, included all three of these factors, usually within the context of a behavioural safety programme.

There were limitations to the studies, which have attempted to reveal the factors that influence attitudes to slips and trips. Most of the studies have been performed in specific environments and the findings cannot necessarily be generalised to other milieus. For example, Hubler (1995, cited in Quintana, 1999) reported on a safety approach adapted for a drilling operation. This is a specialised area with staff that are trained to deal with that particular set of circumstances. It is a potentially dangerous place and those who work in it, enter it with a different mind set. The safety approach would not automatically be useful in other workplaces.

Many of the studies reported improvements in safety, but there was minimal or no follow-up to the findings over time. Therefore, there was limited evidence of long-term improvement, which is vital if a behavioural safety approach is to be used as an effective intervention. The majority of articles focussed on behavioural measures, with almost none looking at cognitive (or affective) factors. This represents a gap in the literature.

In summary, the research conducted thus far in relation to attitudes and behaviours towards STFs is limited. Where it does exist it tends to focus on behavioural safety as a means of intervention, in particular, focusing on housekeeping. Important aspects to consider for the success of a behavioural safety initiative involving housekeeping are: managerial influence and reinforcement, particularly for sustaining new behaviours. However other research demonstrates that behavioural change is more likely if the underlying attitudes are also addressed e.g. through appropriate risk communication. (Sheeran and Silverman, 2003).

### Recommendations

The key messages for a publicity campaign, supported by the literature, should concentrate on:

- Good housekeeping
- Top management commitment
- Supervisor commitment
- Fair and consistent reward systems

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