

Working at heights

A psychological perspective

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Abstract

Humans appear to have an in-built fear of high places and falling, the determinants of which may be physiological, psychological or both. This fear of heights is obviously well founded, as testified to by the fact that falls from heights are one of the most common causes of workplace accidents and fatalities. Despite the fact that fear and anxiety are known to exert detrimental effects on task performance, most accident investigations show that falling accidents involve either negative situational features (eg missing leading edge protection, tripping hazards, openings in floors and so on) or carelessness by the injured person. Rarely, if ever, is consideration given to the role in falling accidents of the psychological problems due to a fear of heights. This paper explores the available psychological evidence surrounding the fear of heights, and the implications it may have for various facets of work-related performance and accident causation.

Key words

Accidents, acrophobia, anxiety, fear, heights, psychology.

Introduction

One of the strongest fears among humans is that of high places and falling. The determinants of this fear fall into two broad categories: physiological and psychological, which interact with one another. Physiological determinants are concerned with the body's reactions (eg sweating, shaking) to fearful emotions (eg anxiety) and with the activa-

tion of physical responses (eg face and deal with a perceived danger, or flee). Psychological factors are concerned with internal factors (eg perceptions of risk) and external factors (eg hazardous situations) that evoke fear. The parachutist waiting to jump from an aeroplane, or the steel erector working on a high rise office block, are extreme examples of fearful situations. No less fearful to some, however, is the mere act of looking down from a window in a tall building, over the edge of a cliff, balancing on a ladder when painting a house, or preparing to jump from a diving board into a swimming pool. It is this fear, often unrecognised, that gives rise to a multitude of psychological problems when working at heights.

The extent of accidents involving falls

When discussing the problems of safety on building sites in Scotland, Sheel (1983) indicated that the main causes of fatal accidents were falls, falling objects and involvement with machinery and transport. Importantly, the main trades affected by these fatal occurrences were roofers, scaffolders, demolition workers, painters and steel erectors, each of which involves working at heights. This picture is repeated in studies from other countries (Nundo & Nesti 1990, Ore 1993, Pines & Halfon 1987). During 1993-6 in Ireland, the Health and Safety Authority accident statistics for the construction industry revealed that over 40 per cent of fatalities were caused by falls from heights, falls through roofs and falls through open gaps in flooring (*Health and Safety Review* 1997). Recent United Kingdom figures show that 13,158 employees were involved in falling accidents, 50 of which were fatal. This latter figure represents

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approximately 24 per cent of all fatalities to employees for the financial year 1995-6 (Health and Safety Executive Library personal communication 1997).

Fear

Although fear is the emotion that people dread the most, it is very common. Highly potent, fear is known to exert a strong influence on people's perceptions, thoughts and actions (Izard 1991). When fearful, a person's attention tends to be sharply and narrowly focused on the object or situation that signals danger, to the exclusion of all other features (Easterbrook 1959). Nonetheless, the effects of fear serve an adaptive function, in that fear's primary function is to organise and motivate escape from danger. As long as fear is kept under control, its efficiency and power serve to protect in the face of danger by causing the conduct of careful ongoing risk assessments of the situation. It is a response that is essential to wellbeing. Conversely, when a person believes that there is no escaping the situation, the influence that fear exerts on the nervous system and internal organs may add to the feelings of danger and may also simultaneously create feelings of extreme anxiety or stress.

Although conceptually distinct entities, fear and anxiety are closely related emotions. Whereas fear consists of certain bodily

changes, expressive behaviours and feelings that result from the apprehension of threat or danger (Izard 1991), anxiety refers to a more general state of emotion that consists of "unpleasant, consciously perceived feelings of tension and apprehension, with associated activation or arousal of the autonomic nervous system" (Spielberger 1972). Thus, both fear and anxiety comprise physiological and psychological components.

The work of Bandura (1986) shows that behaviour is affected both by internal psychological characteristics and by the situation. Reflected in his model of reciprocal determinism (see Fig. 1), behavioural, personal and situational factors are continuously interacting with one another. Accordingly, people's psychological qualities and the situation they are in interact to influence behaviour. In turn, behaviour may influence a situation, and/or the person's internal psychological processes.

The effects of fear and anxiety on task performance

In accordance with Bandura's model of reciprocal determinism, both fear and anxiety (emotion) interact with and affect task performance (behaviour) in a number of meaningful ways (Eysenck 1983). Briefly, fear and anxiety lead to:

- (i) increased task-irrelevant cognitive

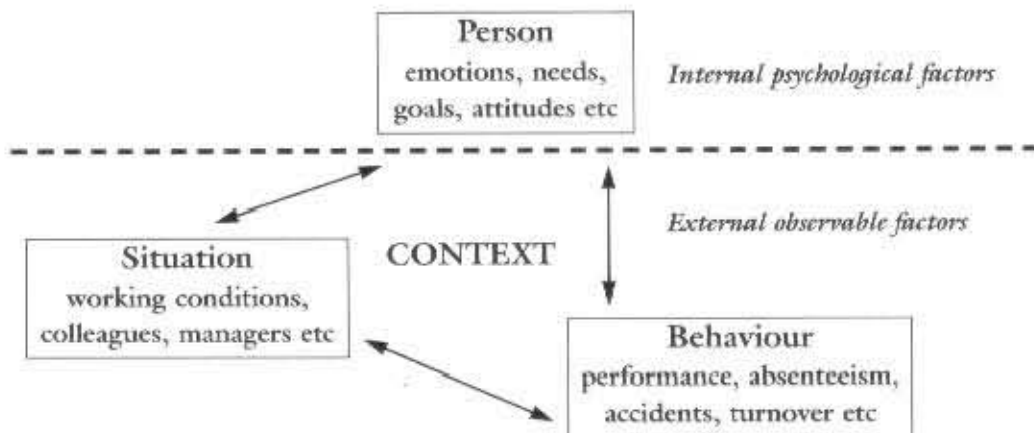


Figure 1 Bandura's model of reciprocal determinism (1986)

- activity (ie worrying about being in a height situation rather than concentrating on the task in hand);
- (ii) increased concentration during task performance most of the time (ie perceived task difficulty increases, requiring greater compensatory efforts just to perform at a 'normal' level);
 - (iii) reduced capacity of the working memory (ie worrying about being in a height situation takes up the limited amount of task-relevant cognitive processing capacity);
 - (iv) detrimental interactions with task difficulty, with adverse effects of anxiety growing as task difficulty increases (ie the more complex or difficult a task, the more fear or anxiety will intervene in task performance to make the task appear more difficult than it actually is, which then increases the person's anxiety, and so on); and
 - (v) detrimental effects being exerted on secondary, rather than main or primary tasks (ie a person concentrating on a primary task at a height will not attend to the presence of negative situational features such as a missing guard rail or the presence of tripping hazards).

In summary, when a person is fearful or anxious a significant deterioration in the efficiency of that person's task performance can be expected, especially in tasks which involve sensory-motor skills or divided attention. Significantly, fear or anxiety caused by the immediate situation will exert greater detrimental effects on performance than a person's tendency to be anxious in other situations. From the psychological evidence outlined above, it appears that fear and anxiety may be a contributory cause to a significant proportion of accidents involving falls from heights.

Fear of heights

The degree to which a person may fear heights can range from fearfulness to acrophobia (an irrational fear of and compelling desire to avoid situations involving heights). A commonly held view is that a fear of heights is a learnt response (Di Nardo *et al.* 1988, Rimm *et al.* 1977) stemming from a traumatic event or experience. Others suggest that a fear of heights may be 'in-born' (Menzies & Clarke 1993, 1995a). The seminal work of Walk & Gibson with infants (1961) supports the view that a fear of heights may always have been present in height-fearful people.

Research (Baker *et al.* 1973, Marshall *et al.* 1992, Rachman 1990) suggests that there are two beliefs involved in acrophobia: 'irrational' (a compelling desire to avoid) and 'catastrophic' (a tendency to imagine the worst), and of these the latter appears to be most common. When placed in height situations, many acrophobics believe that, for example, the structure will collapse, a high wind will suddenly spring up and blow them off the structure, or they will be knocked off accidentally by someone else. Despite these fear beliefs, many height-fearful persons are able to enter height situations (indeed it is often difficult to avoid them in the workplace) either by forcefully instructing themselves that they can cope or by engaging in 'distraction' strategies by focusing attention on some other aspect of the situation to reduce awareness of their fear. Common height situations found in the workplace include:

- (i) using fire escapes;
- (ii) steel erectors walking on girders;
- (iii) working on scaffolds;
- (iv) open grid flooring in plants or factories;
- (v) working/walking on bridges;
- (vi) working in tower cranes on building sites;

- (vii) climbing/working off ladders;
- (viii) looking out of windows of tall buildings;
- (ix) open staircases;
- (x) working on roofs; and
- (xi) using access cradles.

Using the taxonomy of belief categories (anxiety, evaluative and catastrophic) developed by Marshall *et al.* (1992), typical beliefs expressed by height-fearful people include:

Anxiety

- (i) I can't do this;
- (ii) I feel dizzy;
- (iii) I feel sick;
- (iv) I feel shaky and my hands are sweaty;
- (v) I can't look down;
- (vi) my heart is racing; and
- (vii) I feel terrified.

Evaluative

- (i) people will know I am anxious and think I am silly;
- (ii) I will make a fool of myself;
- (iii) I would go mad; and
- (iv) I would scream.

Catastrophic

- (i) I would come to harm;
- (ii) I would be paralysed;
- (iii) I might have a heart attack;
- (iv) I might fall; and
- (v) I might jump.

Self-efficacy

Of direct relevance to both 'irrational' and 'catastrophic' beliefs is the concept of self-efficacy. Derived from Bandura's Social Learning Theory (Bandura 1977, 1986), self-efficacy is a psychological construct that is defined as a judgment of 'how well one can successfully execute courses of action required to deal with prospective situations'. Self-efficacy, therefore, is concerned with people's judgments about their capacity to perform at a certain level, while taking into account all other relevant factors such as ability, effort, adaptability, attributions and

situational factors (Moe & Zeiss 1982). As shown in Fig. 2, efficacy and outcome expectations are differentiated. People who feel capable of performing a particular set of activities in the belief that it will produce certain outcomes, are much more likely to engage in those activities than people who are either doubtful of their ability or doubtful of achieving the expected outcomes. Thus, expectations of personal mastery affect both the initiation and persistence of coping behaviours in various situations (Bandura 1977), a notion that has received wide support in the academic literature. Sadri & Robertson (1993), for example, in a review of the available work-related research evidence, showed that self-efficacy correlated with work-related behaviour across a wide range of activities and occupational areas.

Person → Behaviour → Outcome



Figure 2 Differentiation of efficacy and outcome expectations (Bandura 1977)

Self-efficacy has also been shown to be important in the treatment of height-fearful people. Williams *et al.* (1985) compared two approaches to phobia treatment. Thirty-eight height phobics (aged 22–68 years) were assigned randomly to one of three treatment conditions: guided mastery treatment based on self-efficacy theory; performance desensitisation treatment; and no treatment. Although people in the desensitisation condition received longer exposure to threats than those in the guided mastery condition, guided mastery treatment proved to be significantly more effective than desensitisation treatment in restoring people's behavioural functioning, in raising their perceptions of

self-efficacy and in reducing their anticipated anxiety and thoughts of danger. Of great practical importance is that perceived self-efficacy predicted the therapeutic outcomes more accurately than did anxiety arousal, anticipated anxiety or perceived danger.

Perceptions of danger

Anxiety and psychological stress can result from the perception of potential danger, due to the presence of the perceived danger activating fear systems (Blanchard & Blanchard 1990, McNaughton 1993). However, in accordance with Bandura's model of reciprocal determinism, such a situation may not induce anxiety in a person if that person does not perceive the situation to be dangerous (Lazarus 1966). Menzies & Clarke (1995b) aptly demonstrated this in a study whereby ratings concerned with the likelihood of falling and the severity of resulting injuries were greater for height-fearful than for non-fearful people, prior to being placed in a height situation. When actually placed in the height situation, height-fearful people's estimates of danger increased, while the estimates of the non-fearful did not alter.

Social factors

When groups of people are in a height-fearful situation, social factors such as the presence of a macho culture, fear of ridicule from colleagues or fear of losing a job may assume paramount importance. Strong support for this notion was provided by Haas (1977), who found in a study with steel erectors that they (and those in other dangerous occupations) had developed, through social interaction, collectively shared perspectives in order to control their own fear reactions and those of others in the workgroup. These workers reported that, because they are often dependent on the trustworthiness and competency of others, they would assess fellow workers and communicate the results to others, there-

by establishing reputations. Paradoxically, they also considered that they must continuously demonstrate their fearlessness and conceal their fear. Some deliberately took risks by volunteering for dangerous work in order to demonstrate their trustworthiness. Because it is important for such workers to know as much as possible about co-workers' trustworthiness, and whether a confident front might break down in crisis situations, workers commonly tested new employees to see if they kept their poise and maintained self control under stress. Workers in different occupations are often led by their perception of danger to develop similar mechanisms of control over their fellow workers and environment (Jermier *et al.* 1989). Again paradoxically, it is likely that employees who hide their fear of heights because of these social dynamics are likely to be the very people who actually fall when undertaking their tasks.

Given the above evidence, it may be possible to develop psychometric instruments, or other tests to measure the degree to which employees are height-fearful, prior to allocating them to jobs which involve working at heights or a risk of falling. The paucity of evidence in the academic literature suggests that such tests are not generally in use, although a limited amount of research has been conducted on these issues. Beer (1971) reported on the special suitability and fitness examinations carried out on building workers at risk of falling during work. He recommended that uncertainty and fear of falling, vertigo and subjective sensations such as nausea should be considered as indicators of a person's unsuitability for jobs involving the risk of falls. Beer also stressed the need for the development of specific methods of examination on the basis of labour characteristics so that test situations approaching practical conditions could be simulated. Work carried out in Yugoslavia by Milanovic & Radovancevic (1981) suggests that

screening of employees for eye diseases, acrophobia and hypertension prior to being allocated to jobs involving height situations may prove beneficial in reducing the number of accidents involving falls. It also appears to make sense for employers to explore explicitly the possibility that a person involved in a falling accident may have been fearful of heights.

Conclusions

A fear of high places and falling is very strong in humans. Judging by the number of workplace incidents involving falls from heights, it is a fear well founded. Fear is known to be an adaptive survival response. As long as people keep their fear under control it contributes to their wellbeing by keeping them out of danger. If a person does not feel in control of their fears, extreme anxiety and stress can result. Fear and anxiety are known to be detrimental to task performance in a number of ways, particularly in relation to those requiring motor-skills or divided attention. Moreover, the 'catastrophic' beliefs ('I would come to harm') held by those fearful of working at heights are more likely to predict that person's actual behaviour in a height situation than their 'irrational' beliefs (a compelling desire to avoid heights). However, the responses of height-fearful people are affected by their perceived self-efficacy (confidence in their abilities) in dealing with a height situation. Social dynamics also play a large part in people hiding their fears and anxieties from their colleagues. It seems reasonable, therefore, to explore the extent to which a fear of heights, compounded by social and organisational factors, is responsible for workplace fall fatalities.

1. It is suggested that a means of discovering those who are fearful of height situations is warranted, so that the presence of fear can be established before people are allocated to tasks involving heights and risk of falls.

2. Investigations of accidents involving falls should, where possible, explicitly explore the possibility that the accident victim might be a height-fearful person.

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