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Workplace Accidents from a Psychological Perspective

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Abstract

This paper aims to shed light on the phenomenon of workplace accidents from a psychological perspective. It begins by presenting various definitions related to the concept of workplace accidents, followed by an examination of the significance of studying them from a psychological standpoint. The paper then reviews the different classifications of workplace accidents based on type, consequences, severity, causes, preventability, resulting impacts, location of occurrence, site of injury, and the victim's age. Furthermore, the article explores the personal and environmental variables within the work environment that are associated with accident occurrence. Finally, it concludes by discussing the most prominent explanatory theories of workplace accidents.

Keywords: Workplace accidents, Psychology of workplace accidents, Personal variables, Work environment.

Introduction:

The phenomenon of accidents is considered one of the most significant and costly problems in industry, given the exorbitant costs and substantial losses it generates on multiple levels, in addition to the injuries and hazards inflicted upon the worker.

In this paper, we will address the importance of the topic of workplace accidents. We will present the most prominent definitions formulated by researchers and practitioners in the field of industrial safety. Furthermore, we will clarify the classification of workplace accidents, identify their causes, and outline the key variables associated with them along with their explanatory theories. Finally, we will touch upon the impacts and consequences of workplace accidents.

1. The Concept of Workplace Accidents:

The strategy for treating and studying this problem requires, first and foremost, clarifying the meaning and significance of a "workplace accident." Authors generally agree on a definition stating that:

A workplace accident is an injury sustained by a worker, leading to the disruption of the ongoing activity and resulting in both material and psychological losses for both the worker and the organization alike.

Jizly and Brown define it as: anything that occurs unexpectedly, resulting in harm to people and damage to property. Abbas Mahmoud Awad (1985) defines an accident as: an undesirable event that occurs unexpectedly, which may result in a minor or severe injury, or damage to objects, and sometimes may result in no consequences at all. Wisly defines it as: the failure to meet the explicit or implicit expectation of safety during work (Al-Issawi, 1978).

Meanwhile, Mohammed Al-Shakarji defines it as: an incident arising directly from the work, its conditions, equipment, and machinery, or from the workers themselves due to poor performance or lack of readiness. It may also result from a psychological disorder or maladjustment experienced by the worker in some aspect of their personality, whether this feeling is caused by an internal cue that throws the worker off balance or an external cue that hinders their adaptation (Hudaibi, 2008). Bisser (n.d.) defines an accident as: an injury or harmful event affecting the workers' health, occurring

suddenly due to external causes, associated with the performance of paid work, and which may be followed by disability or death.

The National Institute of Hygiene and Safety (Institut National d'Hygiène et de Sécurité, 1985) defines an accident in its broad sense as: anything that happens unexpectedly, typically resulting in harm to individuals or damage to objects; if it results in an individual being harmed, it is termed an "injury." According to Eric Vatteville, an accident is an unexpected or unplanned event, sometimes resulting from the workplace where the worker is present, and causing physical harm that may lead to death.

As for the definition of a workplace accident according to the National Fund for Social Insurance of Salaried Workers (CNAS), it is considered to be:

- An accident that results in bodily harm, provided it occurs at the workplace and during the designated working hours.
- An incident occurring during the commute that the worker makes to and from work, on the route connecting their residence and the workplace or similar locations (such as the place they usually frequent for meals).
- An incident occurring during a work mission.

An observer reflecting on these definitions will clearly notice that a workplace accident is associated with the following elements:

a) Suddenness (Unpredictability): Workplace accidents are often emergent and unexpected, making them difficult to predict.

b) Disruption (Cessation): The accident causes a halt and cessation of production and all activities exerted by the worker.

c) Injury: Workplace accidents may lead to material and psychological losses, as well as human casualties.

2. The Importance of Studying the Psychology of Accidents:

The importance of studying the psychology of workplace accidents and occupational injuries lies in the following considerations:

Accidents are among the most serious phenomena facing officials in various spheres of life, and their severity increases with the development and complexity of societal conditions. Theorists in this field point out that accidents are inherent characteristics of an industrial society; hence, their occurrence is inevitable.

This social issue—in light of data from the World Health Organization (WHO)—has begun to intensify in developing countries, such as nations in Africa and Asia, as corroborated by international statistics. Additionally, there are indirect losses resulting from workplace accidents, manifested in lost production due to work stoppage, whether as a result of transporting the injured person from the accident scene or due to workers gathering to observe the incident or assist the victim.

There are also financial expenditures lost due to training a replacement for the injured worker, machine breakdowns, or purchasing replacement machinery. This is in addition to the loss of raw materials or the reduced productivity of the injured worker upon returning to work, not to mention the damaged reputation that afflicts the factory or organization as a result of these accidents. These considerations, among many others, highlight the importance of studying accidents and explain the reasons behind the interest shown by researchers and Industrial-Organizational (I/O) psychologists (Taha, 2012).

3. Classification of Workplace Accidents:

Classifying any phenomenon, regardless of its type, is done for the purposes of comparison, conducting research and studies, and facilitating its management and handling. For instance, it is by no means possible to compare traffic accidents with accidents in workers' workshops and employees' offices, or airplane accidents with those involving ships and vessels. In any case, the classification of accidents can be approached through several methods:

- **Classification by type:** They are divided into land, air, and maritime accidents.
- **Classification by consequences:** They can be divided into accidents that damage machinery or products, and others that inflict various injuries on individuals, such as burns, fractures, loss of senses or limbs, deformities, and potentially leading to death.
- **Classification by severity:** There are accidents that result in minor injuries, bruises, or superficial scratches; accidents leading to permanent or temporary disability; and other accidents requiring rapid first aid.
- **Classification by causes:** There are accidents primarily attributed to human factors, such as a worker's negligence, mind wandering, apathy, low intelligence, or lack of experience; these factors account for 80% of the causes of workplace accidents. Conversely, there are physical and mechanical factors, such as sudden explosions and falling machinery, which account for 10% to 20%. Since the proportion of human factors leading to accidents is remarkably high, this underscores the significance and critical nature of the human element, and its preponderance in the occurrence of workplace accidents and occupational injuries.
- **Classification by preventability:** There are unavoidable accidents, such as sudden breakdowns in newly operated machinery, during their validity testing, or after restarting them following a malfunction. Conversely, there are other accidents that are preventable (Al-Issawi, 1990).

They can also be classified into accidents that result in injuries and damages, and those that result in nothing. For example, a hammer falling from the hand of a worker working at a height is considered an accident regardless of whether it caused harm or not (Hudaibi, 2008).

Meanwhile, others classify workplace accidents as follows:

- **By the resulting impacts:** Here, a distinction must be made between:
 - Minor accidents that do not result in injury but cause losses in material property.
 - Accidents resulting in a temporary work stoppage.
 - Severe injury accidents resulting in permanent impairments and amputations of limbs (total disability, partial disability).
 - Accidents leading to death, whether immediately upon occurrence or after a certain period of time (Hanafi, 2002).
- **By the location of occurrence (workplace):** Here, the frequency of accidents is studied according to the following business sectors (construction, freelance professions, metal industries, craft industries, chemical industries, and the supply sector). It is observed that in all the aforementioned sectors, the frequency or rate of occupational accidents is higher in workshops than in warehouses or ateliers, although the latter rate is no less significant than that observed in workshops (CNAS, 1999).
- **By the site of injury:** According to this criterion, the National Social Security Fund in Algeria in 2003 determined the classification and number of accidents based on the site of injury as follows:

Table 1: Distribution of Accidents in Algeria by Site of Injury

Site of Injury	Number of Accidents
Head	1954
Eyes	1110
Upper Limbs	2729
Hands	9252
Trunk	3129
Lower Limbs	3440
Feet / Legs	5160
Multiple Sites	1358
Internal Organs	112
Unspecified	827
Total	29071

source: (cnas.org.dz/etats/stat-nat.htm)

- **By the Victim's Age:** The frequency of accidents according to this classification indicates an increase in the (25-39 years) age group, followed by a gradual decrease in the (40-55 years and above) age group. Furthermore, the rate of workplace accidents varies from 1% for trainees (apprentices) to 32.5% for specialized workers (CNAS, 1999). Meanwhile, it is estimated at 20% for executives (management staff) and only 10% for senior technicians (Mjahdi, 2012).

4. Causes of Occupational Accidents:

The causes of accidents vary across different industrial fields. However, statistics and studies in this domain confirm that regardless of the type of activity performed, the most frequently occurring accidents arise from several factors, primarily categorized into two main causes:

a) Unsafe Conditions in the Work Environment: This includes physical environmental factors that facilitate or increase the probability of an accident. Examples include the irregular placement of machinery, poor lighting, unguarded or unmonitored moving machinery, as well as wet and greasy floors that facilitate slips and free falls.

b) Unsafe Acts or Behaviors: These consist of behavioral patterns that lead to accidents or a failure in task performance resulting in an accident. Examples include moving a machine or colliding with it, causing it to fall on the worker and injure them, or falling onto another machine and destroying it (Hamdi, 1990).

Unsafe conditions may interact with unsafe acts in the work environment in ways that precipitate an accident. An accident can result from a combination of several unsafe conditions or several unsafe behaviors (Dowidar, 2003).

Analyzing the nature of workplace accident causes from a human factors perspective is highly beneficial in understanding accidents. It addresses elements that can explain why an unsafe act was committed. If we can isolate the human element responsible for the hazardous action, we become capable of taking positive steps to prevent its recurrence. Consequently, if the causative human factor is a lack of knowledge on how to perform the job, it can be eliminated through training. If the cause is poor visual acuity, the situation can be remedied by prescribing medical glasses. However, if the human element is uncorrectable, the worker can be reassigned to a less hazardous or demanding position (Al-Issawi, 2000).

5. Variables Associated with Accidents:

The causes of workplace accidents and occupational injuries are numerous and can only be comprehensively addressed after scientific analysis and classification. This can be elucidated as follows:

A. Personal Variables Associated with Accidents:

Numerous personal variables contribute to workplace accidents, either directly or indirectly. Generally, these variables can be summarized as follows:

- **Intelligence:** Common assumption suggests that an unintelligent person is more prone to accidents than an intelligent one; however, scientific studies do not yield results that justify this generalization. Farmer and Chambers investigated this issue and found no correlation between intelligence scores and accident frequency among shipyard workers. They suggested that intelligence is linked to accidents involving errors in judgment, rather than those involving manual skills. While this proposition may explain the lack of correlation in their study, it still requires further empirical support (Al-Issawi, 2000). Other studies, however, assert that accident rates are higher among workers with below-average intelligence compared to those with average intelligence. Intelligence may be crucial in some jobs but not in all professions; thus, industrial safety program designers must determine the minimum intelligence threshold required for each occupation (Dowidar, 2003).
- **Motivation:** No work or production occurs without preceding motivation. For human behavior, motivation acts as the energy that drives the machine. An individual's performance and productivity vary according to their motivation level. A lack of motivation while working can implicate a worker in accidents. Kerr's study indicates an increase in workplace accidents in departments characterized by compound tasks and fewer promotion opportunities. Furthermore, low work motivation and management's failure to stimulate it can increase an individual's tension, leading to accidents (Hamdi, 1990).
- **Visual Acuity:** The degree and soundness of visual acuity is a contributing factor to accident exposure. In a study conducted by Tiffin and Kephart on vision and accidents, visual capabilities were measured across 12 jobs, followed by assessing the visual abilities of workers in those roles to determine the alignment between the worker's actual ability and the job's requirement. Results revealed that accident rates decreased among workers possessing adequate visual acuity for the first 11 jobs. In the 12th job (comprising unskilled workers), no significant difference in accident rates was found.
- **Muscular (Motor) Coordination:** Some researchers have isolated motor coordination as a factor influencing accident susceptibility. It seems reasonable to assume that a slow response rate affects accident frequency. However, speed of response alone has not shown a significant correlation with industrial accident frequency; rather, more complex responses appear crucial. Farmer and Chambers used a test battery comprising a dotting test, a reaction time tool, and a test requiring subjects to alter their muscular performance according to changing signals. When dividing 500 workers into groups, they found that the lowest-performing group experienced 48% more accidents than the superior group. Moreover, the accident rate in the bottom quartile was 51% higher than in the other three quartiles. This implies that excluding the bottom 25% of workers would significantly reduce accidents. Consequently, a correlation exists between lack of skill, slow response, sensory deficits, and accident occurrence. Individuals with weak sensorimotor skills struggle to avoid accident-prone situations; they may not be negligent or impulsive, yet they remain vulnerable to accidents (Hudaibi, 2008).
- **Emotional and Affective State:** Much research underscores a relationship between personality traits and accident susceptibility, specifically highlighting the role of emotional states. Hersey's research concluded that intense emotional states (such as grief, anger, etc.) diminish cognitive functioning and hinder successful coping with stressful situations, thereby increasing accident likelihood. Excessive elation (Euphoria) and being easily excitable also lead to accidents (Hamdi, 1990).
- **Experience:** Undoubtedly, a worker's experience in their specific job helps them avoid accidents. Highly experienced employees possess a greater capacity to avoid hazards. Accident rates inversely correlate with job experience. While job proficiency can be acquired through mere practice, relying solely on trial and error is risky; proper guidance and training are essential. Effective training not only boosts productivity but also reduces accident rates. A study on steel plant workers found that new employees who attended an industrial safety and accident prevention program committed fewer accidents in their initial workdays compared to untrained peers (Hudaibi, 2008).
- **Age:** A recent study investigating whether the decline in accident rates is due to accrued experience or advancing age found that age has a more substantial impact. Older, more mature workers are less prone to committing accidents. Conversely, other research indicates that accident rates increase with age for some workers, as they may become complacent and overly familiar with risks acquired over their long tenure (Hudaibi, 2008).
- **Fatigue:** Although fatigue contributes to accidents, the exact threshold at which a worker will inevitably commit an accident cannot be absolutely determined. However, it is certain that severe fatigue significantly increases the probability of accidents.

B. Environmental Variables in the Work Environment:

While accidents may stem from personal factors (e.g., experience, fatigue, substance abuse, intelligence, motor coordination), they are also heavily influenced by surrounding environmental conditions:

- **Lighting:** Good lighting is not merely concentrating a large amount of light on a specific area, but providing an appropriate amount of light with optimal distribution. Proper distribution avoids dark spaces, shadows, or glaring areas, preventing eye strain caused by constant visual accommodation to varying light levels (Al-Shanawani, 1998).

- **Temperature:** If a production process generates high heat, part of it can be redirected to heat other factory areas. Similarly, if a process requires cold water to cool running machines, this water—once heated—can be utilized for factory heating (Atef, 1988).
- **Dust and Dirt:** Airborne dust can be mitigated using various filtration systems (paper, fiber, or metal filters). Industrial dust can be managed by confining it in enclosed spaces to prevent dispersion, then collecting it using cloth filters or passing the dust-laden air through water sprays.
- **Noise:** Noise effects manifest in workers' speed, nervous tension, and reluctance to work. For instance, continuous machine vibrations can cause arterial constriction and muscle atrophy in the hands, occasionally resulting in occupational paralysis (Dowidar, 1996).

Therefore, neglecting any of these aforementioned elements can lead to workplace accidents of varying severities and must be carefully managed.

6. Consequences of Workplace Accidents:

Workplace accidents and occupational injuries yield numerous and diverse consequences at the individual, collective, and organizational levels. These can be summarized as follows:

1. Work stoppage due to the accident or injury.
2. Work interruption by the injured worker's colleagues to investigate the incident or provide first aid.
3. An increase in lost working hours.
4. Negative psychological impacts and a loss of the sense of security.
5. Disruption of production.
6. The organization bearing compensation costs for accidents and paying full wages during the treatment period.
7. Breakdown of the machinery operated by the victim, consequently halting subsequent production stages.

Costs of Workplace Accidents at the Organizational Level:

1. Costs of lost time resulting from the worker's injury (volume of hours off work).
2. Costs of lost time for other workers (those who stop working out of curiosity or to assist the victim).
3. Costs of lost time for supervisors and managers due to:
 - Assisting injured workers.
 - Conducting investigations to determine accident causes.
 - Making arrangements to resume work.
 - Finding and training a replacement worker.
4. Medical costs not covered by insurance.
5. Costs of replacing machinery and materials damaged in the accident.
6. Wages paid to injured workers during their absence and upon their return, even if they are no longer fit to perform the same tasks.
7. Fines incurred due to delayed fulfillment of the organization's commitments to clients.
8. Damage to the organization's reputation in the industrial and production market (locally, regionally, and internationally).

7. Explanatory Theories of Workplace Accidents:

The severity of workplace accidents and the resulting human and material losses have prompted the development of several theories to explain their causes. The most prominent scientific perspectives include:

A. Accident Proneness Theory:

This is one of the oldest and most widely known psychological theories explaining accidents. Individuals who repeatedly commit numerous accidents are termed "accident-prone." This is attributed to specific innate/genetic traits that predispose them to engage in hazardous behavior (accident susceptibility), potentially to satisfy certain internal motives (Al-Issawi, 2000). Some find this plausible as a small percentage of individuals often accounts for a high percentage of accidents. However, some workers may have high accident rates simply because they are exposed to more hazards than their peers (Hudaibi, 2008). Despite its popularity, empirical evidence for this theory is contradictory. The mere fact that a small group commits most accidents does not inherently validate the theory. The only reliable evidence for accident proneness relies on instances where accidents repeat at rates exceeding mere chance.

B. Freedom, Goals, and Alertness Theory:

According to this theory, an accident is a manifestation of poor work behavior resulting from an unsupportive psychological environment where the worker goes unrewarded. A psychologically and economically rich industrial climate fosters accident-free behavior. A healthy psychological climate—providing rewards for effort—must allow workers to set achievable short- and long-term goals. Workers should be capable of raising issues and formulating solutions, which cultivates alertness and production quality. Healthy psychological and economic conditions encourage vigilance, attention, and caution (Mjahdi, 2012).

However, while this theory astutely focuses on the inadequate psychological environment leading to poor human behavior, it neglects a fundamental aspect of accident causation: the physical environment, poor or complex machine design, machinery incompatible with worker capabilities, and lack of operational training.

C. Stress and Adaptation Theory:

Similar to the previous theory, this approach emphasizes the work environment and climate as primary determinants of occupational accidents. Under this theory, a worker subjected to stress and tension is more vulnerable to accidents than one free from such pressures. At first glance, it may seem identical to the Accident Proneness Theory; however, they differ significantly. Accident Proneness implies a permanent, inherent flaw in the individual's constitution, whereas Stress and Adaptation Theory focuses on standard adaptation to temporary stressors, such as high temperatures, illness, or stress resulting from excessive alcohol consumption (Hudaibi, 2008).

Willard Kerr noted that the Accident Proneness Theory and the Stress and Adaptation Theory are complementary rather than contradictory. In his view, the distribution of accident rates in industrial settings is delineated according to the following theories:

Table 2: *Illustrates the distribution of accident rates in industrial domains according to theories.*

Theory	Percentage
Accident Proneness Theory	1% – 15%
Alertness Theory	30% – 40%
Stress and Adaptation Theory	45% – 60%

Source: (Hudaibi, 2008)

By comparing the percentages, it becomes evident that the factors inherent in the Stress and Adaptation Theory are responsible for the majority of accidents and injuries. Notably, in its explanation of accidents, this theory heavily focuses on an industrial climate fraught with stressors, tension, and high-pressure situations. However, it concomitantly neglects the role of other crucial factors (particularly psychosocial ones). Psychological studies highlight the significance of social variables within the work environment, emphasizing the necessity of fostering these relationships to benefit both workers and management. This not only mitigates their personal issues but also reduces their involvement in accidents. It is insufficient for a work environment to merely be fully equipped with machinery and tools; the presence of robust social ties and cohesion among workgroup members is equally vital. A decline or weakness in this group homogeneity can lead to diminished productivity and an increased accident rate, as socially ostracized individuals are more susceptible to accidents (Hudaibi, 2008).

D. Fatalistic Theory:

This theory posits that people fall into two categories: those who enjoy happiness and well-being, and those destined for perpetual gloom and misery. Consequently, some individuals possess an "immunity" against accidents, while others lack it, making their probability of exposure and involvement in workplace accidents significantly higher. For those who constantly suffer accidents, this theory attributes such recurrence to pure chance and bad luck. It inherently denies that a human being is a conscious entity composed of a set of mental and physical capabilities, capable of thinking and adapting to various life situations, and therefore, their behavior is not merely tied to chance or luck. Furthermore, this theory disregards the physical and material causes of workplace accidents (Hamdi, 1990).

E. Experimental Psychology Theory:

Psychological experimental studies argue that accidents have observable and measurable physical causes. A worker's auditory or visual impairments can lead to accidents. Likewise, glaring lights, rugged paths, unaligned tires, malfunctioning brakes or machinery, the presence of fog or pitch darkness, or a worker's young age and lack of experience—among other experimental variables—can precipitate accidents. These are variables that can be easily observed, measured, regulated, and controlled (Hamdi, 1990).

F. Pure Chance Theory:

According to this theory, accidents can be attributed purely to chance. This implies that all individuals have an equal predisposition to be involved in accidents, and there are no specific personal factors that distinguish one person's susceptibility from another's (Hudaibi, 2008). Although this theory might seem somewhat plausible, entirely dismissing the personal factors that contribute to accidents is illogical.

Some studies suggest a "fair distribution" of accidents, meaning an individual who commits an accident is highly unlikely to commit another one for some time. The rationale is that a worker who has had an accident has "received their share," leaving the statistical probability of an accident to another worker who has not yet experienced one. The underlying psychological explanation for this is that the worker who experienced the accident has learned how to avoid future ones (Mjahdi, 2012).

G. Social Theory:

The social theory connects workplace accidents to the unfavorable social conditions experienced by the worker. A difficult social situation—stemming from problems related to housing, family, and the broader social environment—generates a state of continuous emotional turmoil and psychological disturbance. When these internal states interact with the physical and organizational conditions of the work environment, they become a catalyst for accidents. To address these root causes,

it is imperative to improve the socioeconomic status of the workers and resolve the various problems associated with this aspect of their lives (Hudaibi, 2008).

H. Functional Theory (Multiple Causation Theory):

Unlike its predecessors, this theory is characterized by its comprehensiveness and integration in explaining the phenomenon of workplace accidents. While all the previous theories attributed accidents to a single primary cause, the functional theory argues that the accident phenomenon stems from interconnected causes and factors. It cannot be reduced to a single variable but is rather the result of a complex combination of human and organizational factors. Among the most significant studies corroborating these findings is the research conducted by H.W. Heinrich, who concluded that human factors cause 88% of accidents, while environmental conditions account for approximately 12%. Meanwhile, a study conducted by the National Safety Council (NSC) in the United States concluded the following:

- 18% of accidents are due to technical factors.
- 19% of accidents are due to human factors.
- 63% of accidents are due to a combination of technical and human factors (Hudaibi, 2008).

Conclusion:

Based on the aforementioned discussion regarding workplace accidents—from their conceptual definitions to their multifaceted consequences—it can be concluded that they are a pervasive phenomenon. They cannot be entirely eradicated as long as the underlying causes persist, the potential victims (workers) are present, and the production process continues. Therefore, authorities and practitioners concerned with industrial safety must thoroughly study this phenomenon and strive to identify its root causes. Consequently, they must anticipate and provide the necessary preventive measures and awareness guidelines for their workers. This proactive approach is essential for preserving human resources, safeguarding equipment, and ultimately securing the future of the organization and maintaining its reputation among other enterprises.

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