

THE RELATIONSHIP BETWEEN BLUE COLLAR EMPLOYEE FATIGUE, LEVEL OF SUBSTANCE USE, ABSENTEEISM BASED ON THE DEMOGRAPHICAL INFORMATION OF EMPLOYEES

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—Abstract —

A major concern for and challenge to the mining industry are the increasing perceptions of employee fatigue at all levels of the organisational structure. There is no debating the fact that the South African economy is dependent on the mining industry. It is compulsory, by legislation that mines in South Africa report yearly on employee fatigue. The emergence of fatigue in South African mines has become inevitable with the current legislation for the mining industry. Furthermore, employees with high levels of alcohol consumption are problematic, and these employees might use short-term absenteeism as a coping mechanism to escape their issues with alcohol. The primary objective of this research was to determine the relationship between employee fatigue, level of substance use, absenteeism and the demographical information of employees. The study also focuses on which group of employees, white- or blue-collar employees, have a higher level of substance use, and which group of employees have a higher level of human fatigue in the mining industry. A cross-sectional survey design was used. The data were analysed using the Statistical Program for Social Sciences (SPSS) 24.0. The questionnaire used consists of a biographical questionnaire, Ergomax Questionnaire to measure fatigue, Substance Use Measurement Scale and a Absenteeism Scale. The sample was 386 employees of a mining company in South Africa. In order to prevent employee fatigue, it is important that the relationship between employee fatigue and accompanying demographical information of these employees be understood.

Key Words: Employee fatigue, Substance use, Absenteeism, Blue-collar, White-collar, Mining industry

JEL Classification: L20

1. INTRODUCTION

One of the growing problems in our modern society is fatigue (Caldwell, Caldwell, & Schimdt, 2008; Asare et al., 2013). Internationally, interest in the causes and outcomes of work fatigue can be seen in the large collection of multidisciplinary literature that links employees' work-related fatigue and personal outcomes to working conditions and works attitudes of an employee (Frone & Tidwell, 2015). However, national research concerning the causes and outcomes of work fatigue is limited. It is emphasised by Ahmed, Babski-Reeves, DuBien, Webb, and Strawderman (2016) that the experience of fatigue, and the negative consequences thereof, has increased in recent decades but there is still a lack of clear understanding of fatigue in the workplace. Useche, Ortiz and Cendales (2017) emphasise that negative behavioural changes such as drinking, smoking, unhealthy diet and counterproductive work behaviour can be linked to the employee's working conditions.

The mining industry is characterised by long working hours with employees working and living away from their residence and family for long periods of time (Asare et al., 2013). One of the primary factors that significantly affect an employee's fatigue is the amount of time spent at the workplace and the duration of work-tasks (Ahmed, Babski-Reeves, DuBien, Webb & Strawderman, 2016). Overworked employees are at an increased risk of accidents due to sleep deprivation that results in fatigue and this, in turn, has an impact on their health and performance at work (Asare et al., 2013).

Ahmed, Babski-Reeves, DuBien, Webb, & Strawderman (2016) mention that despite consistent growth in mentally demanding jobs only a few studies have been reported on how these stressful jobs could increase an employee's fatigue. It is important to focus on the blue- and white-collar employees' work fatigue. Previous research only focuses on substance use and not levels of substance use. Consequently, existing studies mention blue- and white-collar employees but do not focus on the semi-skilled blue-collar, skilled blue-collar, low-level white-

collar and intermediate white-collar employees as identified according to some of the mining companies in South Africa. Therefore, in this study, the focus will be given to the relationship between employee fatigue and levels of substance use of semi-skilled blue-collar, skilled blue-collar, low-level white-collar and intermediate white-collar employees. Fatigue studies suggest that the demographics of an employee could play a role in the experience of fatigue (Di Milia, Smolensky, Costa, Howarth, Ohayon, & Phillip, 2011). However, a few studies have addressed the link between fatigue and both individual and work outcomes. This study addresses the gap in current literature by examining the relationship between human-related fatigue, substance use, absenteeism and demographical variables. In this study, the researcher used the factors of fatigue according to the division of the Code of Good Practice within the Government Gazette of Mine Health and Safety Act 1996 No. R 1025. The code divided fatigue into six different factors: individual human factors, non-work factors, environment conditions, work-related factors, work scheduling and planning and night shift work that influence employee fatigue. In this study, the researchers only focus on fatigue by looking at the individual human factors.

The Code of Good Practice: Government Gazette of Mine Health and Safety Act 1996 No. R 1025 explain that individual human factors as characteristics such as gender, alcohol use, health conditions and general factors such as age, tenure, body weight and height. The terms human factors and ergonomics are used interchangeably by some, whereas others differentiate the two terms” (Handyside & Suresh, 2010, p. 123). It is, therefore, crucial to distinguish between the human factor and human error. The human factor “describes accident causality when the cause is attributed to the characteristics or behaviour of an individual or organisation, rather than structural or mechanical failure or some environmental or other contextual factors that are outside our control” (DeCola & Fletcher, 2006, p. 10).

Beaulieu (2005) states that another important individual human factor associated with fatigue is alcohol use, as a legally intoxicated person and a tired employee exhibit the same levels of performance impairments. Furthermore, sleep is profoundly impacted by alcohol as it is a powerful somnogen; severe alcohol consumption lessens the time to fall asleep, however, it affects the quality of sleep in the second half of the night. Insomnia was also found to be a direct result of

withdrawal in alcoholics (Thakkar, Sharma, & Sahota, 2015). This results in economic and social consequences such as reduced productivity, higher accidents and occupational disease rates, absenteeism, higher staff turnover and increased employee compensation rates, liability rates, and vehicle insurance (Beaulieu, 2005).

The primary objective of this research was to determine the relationship between employee fatigue (human-related factors), level of substance use, absenteeism and the demographical information of employees.

2. LITERATURE REVIEW

2.1. Relationship between employee fatigue (Human-related factors), demographical variables and substance use

The relationship between workplace absenteeism and alcohol use remains confusing for researchers. Many researchers specialising in absence research have concluded that no other individual and workplace factor have a more compound effect on absenteeism as that of employee alcohol use (Gmel & Rehm, 2003; Harrison & Martocchio, 1998). Fundamental to this difficulty are two main problems. Harrison and Martocchio (1998) state the first problem to be the supposed nature of the alcohol– absenteeism relationship, specifically the amount of alcohol consumed as opposed to the way it is consumed. Most previous researchers grounded their studies on the reasoning that the quantity and frequency of the consumption of alcohol are connected to absenteeism by the amplified danger of chronic health complications and injury associated with higher levels of drinking. McFarlin and Fals-Stewart (2002) found evidence that the alcohol–absenteeism relationship may be ruled by a temporary or severe impairment mechanism. Regardless of these findings, research has mostly abandoned the likelihood that the amount of alcohol consumed is a predictor of absenteeism.

Bacharach, Bamberger, and Biron (2010) researched the work-related consequences of alcohol use and offer that literature specifies that alcohol consumption can form adverse consequences related to work. A positive correlation can be made between moderate consumption of alcohol and employee absence while high consumption of alcohol has been linked to absenteeism and various other aspects such as accidents, lower scores on technical performance,

productivity, and higher health care costs. There is an increased possibility and length of absence from the workplace due to this opposing impact on employee health. It is evident that extreme drinking over time has increased the risk for a variety of chronic health problems, which in turn, can be directly related to the level of absence by an employee.

In a study conducted by Jones, Hocine, Salomon, Dab and Temime (2015), focusing on demographical (age, sex and years of experience in the profession) and occupational predictors for fatigue and stress, it is found that females were meaningfully more probable than males to report a current state of tiredness. Furthermore, the average age of a mine's workforce may differ significantly from other mines as it is impacted by the location and age of a mine itself. The impact of age on work capability is questioned once the average age reaches 40 years as physical capability is reduced when age increases. A decrease in physical and mental capability is determined in many mine employees over the age of 45 years, this is particularly true when new or unfamiliar requirements are placed on them (McPhee, 2004; Parker, Worringham, Greig, & Wood, 2006; Stedmon, Howells, Wilson, & Dianat, 2012).

2.2. Relationship between blue-collar and white-collar employees: fatigue (human-related factors) and absenteeism

Taylor (1979) found that white-collar occupations indicate lower absenteeism rates than blue-collar occupations and skilled employees are less absent than semi-skilled employees within blue-collar occupations. Furthermore, Ault, Ekelund, Jackson, Saba, and Saurman (1991), as well as Aaviksoo et al. (2003), explain that blue-collar employees have higher absenteeism rates than white-collar employees. When considering occupational factors, Valirad, Ghaffari, Abdi, Attarchi, Mircheraghi, and Mohammadi (2015) discover, in a study focusing on sickness absence, the most important risk factors for absenteeism is shift work. This emphasizes the fact that white-collar employees rarely come into contact with hazards found in the manufacturing sector and, therefore, are less absent from work. Frequent bending-twisting, heavy lifting and hard physical work are the main physical factors found to affect the incidence of absence due to illness.

Janssen et al.'s (2003) study establishes that there is a relationship between fatigue and sickness absence, and after investigating this relationship further, it is clear

that fatigue is particularly strongly related to long-term sickness absence. It is further noted that the risk of fatigue for a quick commencement of short-term sickness absence episodes is also found to be significant. Metzner and Mann (1953) conducted a study focusing on the relationship between absenteeism and blue-collar and white-collar employees. In a study where white-collar employees' fatigue as a predictive risk indicator for long-term sickness absence is investigated, the findings show that fatigue in white-collar males is potentially associated with medically certified (mental) sickness absence (Roelen et al., 2014).

3. RESEARCH DESIGN

3.1 Research approach

A quantitative cross-sectional survey design was used. This method was utilised to describe the information on the studied population (people or firm) collected at a single point in time (Babbie & Mouton, 2008; Hardy & Bryman, 2004). This design can be used to evaluate interrelationships among variables within a population (Shaughnessy & Zechmeister, 1997). It further explains that this design is also ideal to describe and predict functions associated with correlative research.

3.2 Participants

The total sample size consists of 386 employees of a mining company in South Africa and is comprised of the following type of employees: semi-skilled blue-collar (support worker, engineering assistant, security guard, change house cleaner); skilled blue-collar (multi-operators, senior engineering operation, storeman, training clerk); low-level white-collar (supervisors, artisans, training co-ordinator, HR officers); intermediate white-collar (HSE manager, planning manager, mine overseer, HR practitioner, senior geologist and SLC drill and blast engineer); and management (mine engineer, mine manager). The lowest level employees have a level of literacy adequate for a valid completion of the questionnaires. Descriptive statistics of the sample are provided in Table 1. The majority of employees (27.2%) are between 30 and 39 years. More males (82.9%) than females (16.8%) participated in the study. A total of 3.6% of the participants

are on an intermediate white-collar level. Low-level white-collar employees comprise 33.4% of the participants.

Table 1: Characteristics of participants

Item	Category	Frequency	Percentage
Age	19-29 (1)	129	33.4
	30-39 (2)	105	27.2
	40-49 (3)	75	19.4
	50+ (5)	58	15
	Missing Response	19	4.9
Gender	Male (1)	320	82.9
	Female (2)	65	16.8
	Missing Response	1	0.3
Classification of job	Semi-skilled blue collar (1)	157	40.7
	Skilled blue collar (2)	65	16.8
	Low-level white collar (3)	129	33.4
	Intermediate white collar (4)	14	3.6
	Management (5)	1	0.3
	Missing	8	2.1
	Tenure	Less than 1 year (1)	75
	2 - 5 years (2)	101	26.2
	6 - 10 years (3)	76	19.7
	11 – 20 years (4)	37	9.6
	Longer than 21 years (5)	45	11.7
	Missing Responses	52	13.5

3.3 Measuring instruments

The survey questionnaire consists of different sections that include Section A - The biographical information of the individuals, such as job title, gender, age, tenure, and job classification (Patterson band – blue- and white-collar employees). Section B of the questionnaire includes the Fatigue Measurement Instrument (Ergomax, 2013). Typical questions in the Ergomax (2013) measuring tool for individual human factors include health conditions of an employee where the answers constitute a dichotomous “yes” or “no”. Section C includes Substance Use Measurement to determine employee substance use and the original questionnaire was developed by Surujlal, Nolen and Ubane (2012). This questionnaire was later validated and shortened by Surujlal and Keyser (2014) to align it with the industrial sector. The behaviour questionnaire on absenteeism consists of four items as developed by the Isaksson et al. (2003) and Psycones (2006) project. typical questions on this questionnaire range from “How often have you been absent from work due to your state of health over the last 12 months?” to “How often have you gone to work despite feeling that you really should have stayed away due to your state of health over the last 12 months?”

3.4 Data analysis

The data were analysed using the Statistical Program for Social Sciences (SPSS) 24.0. The individual characteristics of the participants as well as the data about individual human factors, non-work factors, environmental conditions, work-related factors, work scheduling and planning, and night shift work, were summarised using descriptive statistics. Pearson’s correlations were utilised to analyse the relationship between employee fatigue and level of substance use, absenteeism and the demographical information of participants. A t-test was conducted to compare which group of employees, white- or blue-collar employees, have a higher level of substance use and also to determine which group of employees have a higher level of human fatigue.

4. RESULTS

Since this study takes into consideration the classification of the job, Table 2 illustrates individual characteristics, human fatigue, (Individual Human Factors) and substance use of participant by the respective classifications of job (semi-blue collar, skilled blue-collar, low level white and intermediate white-collar

employees). These human fatigue factors are categories and defined as in the Code of Good Practice: Government Gazette of Mine Health and Safety Act 1996 No. R 1025.

Table 2: Individual characteristics of job category, human fatigue, and substance use variables of all participants

Variable	Semi-skilled blue-collar	Skilled blue-collar	Low-level white-collar	Intermediate white-collar
INDIVIDUAL HUMAN FACTORS				
Alcohol and substance use				
–				
YES				
Alcohol	61.8	46.2	61.2	71.4
Smoking	26.8	24.6	34.1	35.7
Other substances	-	-	0.8	-
All of the above	2.5	-	-	-
None of the above	26.8	41.5	32.6	21.4
Health conditions:				
Good				
Yes	82.8	69.2	82.2	78.6
No	17.2	30.8	17.8	21.4

From Table 2 it is clear that 71.4% of intermediate white-collar employees say they use alcohol and 41.5% of skilled workers say they do not use any alcohol or substances. The majority of employees in all job categories say they health is in a good state. 30.8% of skilled blue-collar workers say that their health is not in good condition.

Pearson's correlations were used to analyse the relationship between the classification of the job, demographical information of an employee, employee fatigue (Individual Human Factors), level of substance use and absenteeism. In Table 3, the Pearson correlation is shown between fatigue (individual human factors), level of substance use, absenteeism, and the demographical information of employees.

Table 3: Pearson correlations between the classification of the job, demographical information of employees, fatigue (individual human factors), level of substance use and absenteeism

Item	1	2	3	4	5	6	7	8	9
1. Classification of Job	1								
2. Gender	0.07	1							
3. Age	0.21**	-0.03	1						
4. Tenure	0.27**	-0.18**	0.62**	1					
5. Weight	0.31**	-0.20**	0.27**	0.14*	1				
6. Height	0.03	-0.03	-0.09	-0.11	0.10	0,10			
7. Use alcohol	0.05	0.13*	0.12*	0.07	-0.07	-0.06	1		
8. Smoking substances	-0.05	0.15**	0.02	0.02	0.02	0.05	0.25**	1	
9. Other Substances	-0.04	0.02	-0.09	0.03	-0.08	0.01	0.04	-0.03	1
10. Different Substance	0.10	-0.02	0.09	0.07	-0.02	,-c	-0.12*	-0.07	-0.01
11. No use of substances	-0.10	-0.15**	-0.11*	-0.11*	0.04	0.05	-0.81**	-0.44**	-0.04
12. Drink pattern	0.14	0.10	0.28**	0.25**	0.08	-0.00	0.44**	0.19*	0.13
13. Smoking tobacco	0.11	0.04	0.01	0.08	0.18*	0.13	0.22**	0.79**	-0.11
14. Absenteeism	-0.10	-0.01	-0.01	-0.02	-0.03	-0.09	-0.09	-0.15**	-0.03

* Statistically significant $p \leq 0,01$ † Correlation is practically significant $r > 0.30$ (medium effect)†† Correlation is practically significant $r \geq 0.50$ (large effect)

A statically positive relationship exists between job classification (skilled/semi-skilled) and age and tenure, but a practically significant relationship exists between the classification of job and weight of an employee. A negative statistically significant relationship exists between gender, tenure, weight, alcohol

use and smoking substances of an employee and a negative relationship with no substance use. A positive high practically significant relationship exists between age and tenure of an employee. A positive statistical relationship exists between age, alcohol use, no use of substances and levels of substance use of employees. A positive relationship exists between tenure, weights of an employee and levels of substance use and a negative statistically relationship exists with no use of the substance. A positive statistically significant relationship exists between alcohol use, smoking, substances and smoking tobacco is observable and a positive, practically significant relationship with medium levels of substance use, while a large negative effect exists with no use of substances. A negative, statistically significant relationship exists between smoking substances and absenteeism, but a high positive practical significant relationship exists between smoking substances, no use of substances, and a negative, practical relationship with a medium effect exists between alcohol use and levels of substance use of an employee. A negative, practical significance exists between no use of substances, levels of substance use and smoking tobacco. A negative practical relationship exists between smoking tobacco and absenteeism.

Next, MANOVA was performed to determine whether or not white- or blue-collar employees have a higher level of substance use.

Table 4 MANOVA - Differences of levels of substance use (frequency and quantity of consumption) among the classification of job

Variable	Wilks' Lambda	F	Df	P	η^2
Classification of job	0.09	1.84	8.0	0.07	0.06

$\eta^2 > 0.25$ = large effect

* Statistically significant difference: $p < 0.05$

As seen in Table 4, no significant difference was found between white- or blue-collar employees' level of substance use. These findings are not supported by the findings of Lindberg, Carter, Gislason, and Janson (2001) who state that blue-collar employees smoke more and are more dependent on alcohol when compared to white-collar employees. Walker and Bridgman (2013) further state that differences in alcohol consumption are connected to the position of an employee

in the organisational structure, as well as working conditions. With regards to occupational level managers, blue- and white- collar employees, farmers, and fishers appear to have more alcohol-related difficulties than other employees (Marchand, 2011).

5. CONCLUSION AND RECOMMENDATIONS

The objective of this study was to investigate the relationship, or lack thereof, between fatigue and substance use, as well as if a relationship between fatigue, absenteeism and demographical information of employees exists. From the aetiology of fatigue, it is clear that the concept is multi-dimensional and exists inside and outside the workplace (Tang, Li & Huang, 2016). Furthermore, it is clear from existing literature that national level reports are available on employee fatigue as required by the Code of Good Practice, but these reports do not focus on the relationship between the employee fatigue and levels of substance use. The results indicated that with regards to individual human factors, a positive statistical relationship exists between age, alcohol use, no use of substances and levels of substance use of employees. Such a notion, as previously mentioned, is supported by the SAMHSA (2016) reporting that the mining industry employees engage more in alcohol use as compared to the construction industry. There is no debating the fact that the South African economy is dependent on the mining industry. Further studies must be done to start to fill the lack in the current literature relating to the relationship between employee fatigue, substance use and absenteeism. This research will allow the much-needed research and information to reach both the organisation and the employees that need assistance.

The impact of fatigue is seen not only in its effect on the outside and within the lives of employees in the mining industry. As seen from investigations, fatigue can be fatal to employees such as in the case of Uranium' Ezulwini mine where a fatal accident took place after a rock fall, resulting in the death of one employee; and at Harmony Gold's Kusasalehu, an employee disappeared after a seismic event. Mr David Msiza, the chief inspector of mines in South Africa's Department of Mineral Resources at the time, found that inadequate living conditions, fatigue and poor nutrition were the causes of the fatalities (Matomela, 2011).

The South African mining industry has seen numerous high-profile accidents where fatigue had either a fundamental or contributing role (Schutte, 2010) and,

therefore, it is important to encourage further research to allow for the management of fatigue from a more inclusive approach. It is recommended that employers develop and implement a fatigue risk management plan in consultation with employees that focuses on promoting a healthy work environment through annual measurements of employee fatigue; a fatigue management training program for employees, not just on an ad hoc basis but rather on an ongoing basis; information sharing sessions or pamphlets; and lastly, creating an employee assistance program that promotes the management of fatigue in the workplace by making employees more aware of consequences if they experience fatigue.

Lastly, it is strongly recommended that the Government Department of Mineral Resources (DMR) employ very strict penalties on mines that do not comply with the Code of Good Practice.

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