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# Does Fatigue Correlate to Age, Educational Qualification, and Income?

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### Abstract

The present study was aimed to investigate correlation among age, educational qualification, income and fatigue of the garments factory workers. 200 garments factory workers were purposively selected from a various part of the Dhaka city. In order to measure the fatigue of the respondent's An Adapted Bangla version of the feeling and symptom of fatigue scale was administered to them. Three hypotheses were considered to test: (1). age would be positively correlated to the fatigue, (2). educational qualification would be negatively correlated to the fatigue, and (3). income would be negatively correlated to the fatigue. Data were analyzed by applying Pearson product correlation method. Results show that fatigue of the employees is negatively correlated (age  $r = -0.33$ ,  $p < .01$ ; educational qualification  $r = -0.20$ ,  $p < .05$ ) with their age, and educational qualification. The results confirm the second hypothesis. But in case of the first hypothesis we get, a reverse result that means, a significantly negative relationship between age and employee fatigue. The results also indicate that there is no significant relationship between income and employee fatigue which does not confirm the third hypothesis.

**Keywords:** Age; Educational Qualification; Income; Fatigue.

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### Introduction

Fatigue is a common phenomenon for everyone, regardless of the type of occupation and cultural influences and is at least directly perceived, personal, and cumulative. It is reflected by a decrement of performance as a result of having worked for a considerable length of time (Okogbaa et al., 1994). Fatigue develops gradually and insidiously. It leads to loss of concentration, impaired judgment and irrational behavior (Marine Department Notice, 2003) and can be briefly divided into mental and physical aspects. Mental fatigue is accompanied by a sense of weariness, reduced alertness, and reduced mental performance, whereas physical fatigue is accompanied by the reduction of performance in the muscular system (Hong Kong Polytechnic University, 2003).

According to Oxford Advanced Learner's Dictionary (8<sup>th</sup> edition) "Fatigue is a feeling of being extremely tired because of hard work or exercise". As seen by Viteles (1932), "Fatigue may be described as a diminishing of one's working capacity". According to Maier (1970), "Fatigue is caused by length or intensity of some activity in a gainful occupation". According to Dill (1933) "Fatigue is not an entity but merely a convenient word to describe a variety of phenomena". Muscio (1921) defines fatigue as "a condition caused by activity in which output produced by that activity tends to be relatively poor and the degree of fatigue tends to vary directly with the poorness of output". The Australian Civil Aviation Authority (CASA) defines fatigue in its Civil Aviation Orders (2004) as "exhaustion of the mind or body resulting from labor or exertion and/or a lack of sleep". The above definition of fatigue is closely based on that of Job and Dalziel (2001) and is consistent with many other published definitions. These authors defined fatigue as follows: "Fatigue refers to the state of an organism's muscles, viscera, or central nervous system, in which prior physical activity and/or mental processing, in the absence of sufficient rest, results in insufficient cellular capacity or system wide energy to maintain the original level of activity and/or processing by using normal resources." After studying a number of definitions, Ash (1914), Simonson (1971), Dill (1942) Poffenberger (1942), and Barlett (1953) say that fatigue occurs for short time if someone works for long time.

Linsey Marinn Barker (2009) mentioned that, "mental fatigue affected a measure of mental performance, and physical fatigue had a negative effect on measures of physical and mental performance. A multidimensional view of fatigue that considers direct and crossover effects between mental and physical dimensions of fatigue and performance is relevant when quantifying effects of fatigue on performance". Kogi et. al. (1970), Satio et. al. (1970), Hashimoto et. al. (1971), Yoshitake (1948 & 1971), and Khaleque (1981) identified some physical and mental symptoms of fatigue. They are as following:

The symptoms of fatigue are as following; 1. Feeling tired in whole body; 2. Heaviness in head; 3. Feeling sleepy; 4. Feeling strained in eyes; 5. Body sweating; 6. Want to lie down; 7. Feeling pain in waist, hand, leg, and other parts of the body; 8. Breathing fast; 9. Feeling unable to stand.

### **1.1 Mental Symptoms of Fatigue**

1. Inaffinity in thinking
2. Decrease in attention, concentration, and motivation
3. Inability in to be patient
4. Decrease in self-animation, automation, and caution
5. Decrease in eagerness, reinforcement, and excitement
6. Increasing error
7. Lack of supposition in work
8. Decrease of production

### **1.2 Causes of Fatigue**

Long working hour: due to long working hours worker becomes tired which causes decrease in the production. When the hours of work are less the production is always high. Rest: continuous work reduces the efficiency to work and increase fatigue. The solution of this problem is by letting the workers rest for sometimes so that they can re-energize. Temperature: when temperature is either too hot or too cold it starts affecting the mental as well as physical conditions of the workers. Illumination: due to the improper lighting workers become tired this leads to eye strain. Noise: High noise produced by the machinery disturbs the mental conditions of the workers which results in the reduction in ability to work. A worker finds it difficult to work in such situation. Unhealthy conditions: Fatigue is related to health. Bad health conditions are responsible for fatigue. Improper ventilation, disturbing smell, less medical facilities, excessive humidity, emotional stresses and strains have a bad influence upon the health of a worker.

### **1.3 Operational Definition**

#### **1.3.1 Age**

According to Oxford Advanced Learner's Dictionary (8<sup>th</sup> edition), "Age is, the number of years that a person has lived or things has existed". To this study we uses only the chronological age of the participants.

#### **1.3.2 Educational qualification**

An official record of educational achievement awarded on the successful completion of a course of training or passing of an exam.

#### **1.3.3 Income**

The amount of money or its equivalent received during a period of time in exchange for labor or services, from the sale of goods or property, or as profit from financial investments.

Additionally, the data indicated that age was negatively correlated with normal work hours, such that on average, older workers worked fewer hours per week. Thus any relationship between chronic (or long term) health effects may be confounded by age and in many cases, these chronic health outcomes required long induction and latency times to emerge. Ideally any examination of the impact of long hours on health needs to control for both age and years of experience, which typically are highly correlated.

### **1.4 Literature Review**

Fatigue research has not yet produced a significant body of evidence based data that clearly delineates the relationship between work patterns, job/task demands, sleep duration and worker performance (Dawson, D. and Zee, P. 2005). During 2005-06, research on work-related fatigue has been focused on the transport and health sectors, due to the potential for significant impacts on the health and safety of workers and for major public safety consequences. Fatigue research has also been conducted in the construction and manufacturing industries, in response to the extensive use of extended hours and shift arrangements. It is difficult to apply a broad based approach to fatigue management in the workplace. There is need to take into account the nature of the work performed, the skills and capacities required to perform the work, the effects of fatigue on performance and the potential consequences of performance decrements. Fatigue research has not yet produced a significant body of evidence based data that clearly delineates the relationship between work patterns, job/task demands, sleep duration and worker performance. Many studies are poorly designed and controlled and use poorly defined measures. This results in difficulty in drawing conclusions from the existing literature that could serve as a guide to policy advice.

Age-Related Differences in Muscle Fatigue Vary by: A Meta-analysis by Keith G. Avin, Laura A. Frey Law, 2011, older adults were able to sustain relative-intensity tasks significantly longer or with less force decay than younger adults. According to Blum and Naylor, Crowden (1932) classifies muscular work in industry into three general types. 1. Heavy muscular work: too strenuous for a steady, continuous rate of work to be maintained, for example, loading trucks, constructing building and roads, and work in coal mines. , 2. Moderately heavy work: continuous work in which the rate of expenditure of efforts is must lower them in the first type and is somewhat balanced by the rate of recovery. For example, machine tending and many other kinds of factory works. 3. Light speed work: It is involved in a relatively small expenditure of energy but which often requires a postural strain that causes unnecessary fatigue. Office work is a typical example of this type.

Crowden found that in a 50 yard barrow run the worker spends approximately eight percent of this energy in raising the handles, 22 percent in attaining a wheeling speed and in stopping and the remaining 70 percent in the run itself. This study shows the tremendous inefficiencies that would results from interfering with the run once it is started. Bedale (1924) found that carrying a load with a yoke as a

milk-maid does is the most economical method from the point of view of expenditure of bodily energy. Any method of carrying weights which requires postural strain and displacement of the body when walking is more costly. The United States Public Health Service (1941) conducted a very important and valuable investigation on the relationship between fatigue and hours of work of 880 interstate truck driver in three cities. The 16 factors which were considered as contributing to fatigue in truck drivers were the following: 1. Performance of skilled operation requiring a high degree of alertness and attention; 2. Nervous strain due to driving under adverse conditions; 3. Muscular exertion in loading and unloading, in the repair and maintenance of vehicles; 4. General irregularity of habits as a result of long distance drives; 5. Failure to obtain satisfactory rest or sleep during rest periods or when off duty; 6. Physical conditions; 7. Constant use of eye, frequently under unfavorably conditions, such as glare, etc; 8. Social Factors in the environment or occupational tradition, possibly promoted by enforced absence from home; 9. Monotony inducing drowsiness; 10. The consumption of coffee and alcohol; 11. Exposure to all types of weather conditions; 12. Exposure to toxic fumes and gases; 13. Economic insecurity, i.e, fear of losing one's job, especially in the case of older men; 14. Noises; 15. Vibration; 17. Sedentary occupation. From the findings of this study the investigators comment "It appears that a reasonable limitation of hours of services of interstate truck driver will reduce the number of drivers on the road with loco functional efficiency. This, it might reasonably be inferred, would act in the interest of high way safety. In Australia and overseas addressing work-related fatigue, for the period January 2005 to July 2006. It provides an overview of recent developments in research and examines national and international approaches.

Searches for academic papers were conducted on a number of databases and search engines (confined to between 2005 and 2006, using various search terms including "workplace fatigue" and "fatigue"). Search engines included OSHROM, Scirus, EBSCO, ProQuest, Google and Google Scholar.

There has been significant development in responses to fatigue management during this period, particularly in the context of regulation.

Legislative responses have occurred mainly in the transport and health sectors. Consequently, an additional paper has been developed as an addition to this paper (the Work-Related Fatigue Summary of Recent Regulatory Developments paper).

### **1.5 Rationale of the Present Study**

Considering the above discussion it is clear that a person who is fully involved in his work may feel fatigue after working a long time. Again the person who feels fatigue with his / her job can't perform better. For this point of view, it would be very wise to find out the relationship between fatigue and age, educational qualification and income of the job holders of garments sector of Dhaka city to attain the goal for better production. So the findings of the recent study would be enlightening the storehouse of knowledge in the garments sector of Bangladesh. This study would be also helpful for proper utilization of the manpower, especially garments sector.

### **1.6 Objectives**

The main objective of the present study was to investigate the relationship of age, educational qualification and income with fatigue of the garments employees in Dhaka city. The specific objectives were to investigate:

1. Whether there is any relationship between age and fatigue.
2. Whether there is any relationship between educational qualification and fatigue.
3. Whether there is any relationship between income and fatigue.

### **1.7 Hypotheses**

In the light of above literatures and objectives, the following hypothesis were formulated:

**H1:** Age would be positively correlated to the fatigue.

**H2:** Educational qualification would be negatively correlated to the fatigue.  
**H3:** Income would be negatively correlated to the fatigue.

## **Method**

### **2.1 Respondents**

The sample consisted of 200 garments workers, with 155 men and 45 women, who were purposively selected from various garments factories of Dhaka city, partly from Savar, Mirpur, Azimpur, Mohammadpur, and Old Dhaka. No restriction on age, gender, health, or socio-economic on the selection of the respondents status were placed for participating in this study. Mean age of the respondents was 27.77 years (range from 16 to 57 years) and standard deviation was 6.587 years. The average income of the participants was BDT 17346.40 and standard deviation was BDT 10575.272. The lowest and highest salary of the participants was BDT 4000.00 and BDT 50000.00 respectively.

### **2.2 Target Populations**

The target population was only the people who are involved in garments section, like general manager, supervisor, line-man, and operator and so on.

### **2.3 Design of the Study**

A cross-sectional survey design was used in the present study. This design indicates that all data were collected at a single point of time.

### **2.4 Measuring Instruments**

1. **Personal information Form (PIF).** Personal information of the participants, such as age, educational qualification, salary, total monthly income, over time hours etc were collected through this paper.

2. **Feeling and symptoms of fatigue scale.** The scale for fatigue was made by Yoshitake (1971) for Industrial Fatigue Research Committee of Industrial Health Association of Japan. To measure the garments workers' fatigue, Bengali version of 30 items Feeling and symptoms of fatigue scale was used (Khaleque. A., 1995). This scale contains 8 mental and 22 physical symptoms of fatigue. For each items, score 1 indicates, "strongly disagree", score 2 indicates "disagree", score 3 indicates "uncertain", score 4 indicates "agree" and 5 indicates "strongly agree". Sum of score of all items was total score of the scale for an individual. The lowest possible score is 30, highest possible score is 150, and possible neutral score is 90. High score indicates more fatigue in the job during working. The reliability and validity of the scale is very high.

Kogi et. al. 1970, Saito et. al. 1970, found proof of reliability and validity in Feeling and Symptoms of Fatigue Scale. Yoshitake (1971) found meaningful coefficient of this scale. Kashiwagi (1975), found Factorial Validity Coefficient that ranges from 0.50 to 0.91 in this scale.

Our test-retest reliability and validity in Alpha test of present scale is 0.92 and 0.91.

### **2.5 Procedure of Data Collection**

For collecting data went to different garments of the Dhaka city. We took the permission for collecting data through acknowledging the authority about our purpose of data collection. We selected them randomly especially who was free on the mean time.

At the beginning the respondents were requested to fill up the personal information carefully and then they asked to answer the questions without wasting time. The respondents had completed their task according to the instruction. Then the questionnaires were collected from them. In this way data were collected from other employees.

**Results**

In order to analyze the data Pearson Correlation was applied on the obtained scores. The obtained results are presented in Table 1 and 2.

**Table1 Mean and Standard Deviation of Age, Educational Qualification, and Income**

Variables	Mean	Standard Deviation
Age	27.77	6.59
Educational Qualification	9.98	3.54
Income	17346.40	10575.27

As shown in the Table 1, the mean and standard deviation of the participant’s age = 27.77 and 6.59; educational qualification = 9.98 and 3.54; and income = 17346.40 and 10575.27 respectively.

*Correlation Matrix among the dependent and independent variables* is shown in Table 2. To consider the effect of each independent variable on fatigue a correlation analysis is performed.

**Table 2 Correlation Matrix**

Variables	1	2	3	4
1. Age	1			
2. Educational Qualification	.33**	1		
3. Income	0.45	0.95	1	
4. Fatigue	-0.33**	-0.20*	-0.09	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at 0.05 level

Results indicate that the correlation co-efficient of the fatigue with age,  $r = -0.33$ , which is significantly and negatively correlated; educational qualification,  $r = -0.20$ , which is also negatively and significantly correlated; and income,  $r = -0.09$ . But there is no correlation between income and employee fatigue.

**Discussion**

The present study was planned to investigate the relationship among age, educational qualification, income and fatigue. Three hypotheses were formulated to test in the present study. First hypothesis stated that significant positive relationship will be found between age and employee fatigue. Result reported in Table 2 indicate that there is a significant negative correlation between age and fatigue. The results do not confirm the first hypothesis. The age ranged 16 to 40 years encompasses 191 participants out of 200. As we know, the young people are more energetic and devoted to their work because they expect promotion. And after 10/15 years of experience, the workers know various type of techniques about how to complete work using shortcut way. So they can work without or with less fatigue. On the other hand, familial matters, such as quarrel, financial crisis, conflict with family members and so on, play important role in mental fatigue that consequences fatigue in working. But young people are rarely involved in familial matters and they do not get pressure outside and inside the work environment those contribute to fatigue.

The second hypothesis of the study was significant negative relationship will be found between educational qualification and fatigue. Results reported in Table 2 indicate that there is a significant negative correlation between fatigue and educational qualification. Here the results confirm the second hypothesis. In our study there was a number of higher educated participants, there was almost 91 graduate participants, and 59 participants was provided that they have completed their education from Higher Secondary to Honors degree . Most of the graduates take part in desk oriented job. They do not need to stand for long hours, even the required physical exertion needed to complete a task is comparatively low. They also know the techniques how to reduce fatigue and get to be fatigue free. Since they are more educated they follow some preventive measures reducing working fatigue.

The third hypothesis of the study was significant negative relationship will be found between income and fatigue. Results reported in the Table 2 indicate that there is no significant negative correlation between income and fatigue. The mean of income of the participants was BDT 17346.40. The income range BDT 15000 to BDT 40000 consisted 108 participants, and 92 participant's income was below BDT 14000. Health play vital role to be or not be fatigued. With high income an individual can take good food and better medical facilities. Those ensure physical fitness and physical fitness ensures less fatigue. Thorenson, Bono, Judge and Patton (2001) found that there is a positive correlation between income and job satisfaction but not in fatigue. So here it will be mentioned that may be the participants of the present study are satisfied with their job. Because of, they do not feel fatigue during working time.

#### *Limitations of the Study*

The research was carried out on a very small sample. The study was also carried out within a very limited time frame. In this research, it is not possible to control others demographic variables. The sample of the present study has been drawn by purposive sampling method. In addition to, we did not find the causal relationship between age, educational qualification, income and fatigue. So, controlling the above limitations further study may be conducted on larger sample.

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