Fine Motor Skills and Accident Proneness of Garments Workers in Bangladesh

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ABSTRACT

Researchers have long recognized that some people are more involved in experiencing stress and accident than others in terms of accident (Newbold, 1926). Our present study was aimed at investigating the relationship between fine motor skills and accident proneness of the garments workers. Crawford Small Part Dexterity Test (CSPDT) and Accident Proneness Scale (Roy, Hassan & Hossain, 2013) were administered conveniently on 120 garments workers (62 male & 58 female). Findings revealed that fine motor skills could significantly predict accident proneness of garments workers. Around 73% variation of accident proneness can be explained by speed and accuracy of fine motor skills and total experience of the workers. Furthermore, standardized beta (βs) revealed that CSPDT (time), which measures the speed of fine motor skills (β= -.473, $P < .001$) became the strongest predictor of accident proneness when the variance explained by all other variables in the model was controlled for. It can be recommended that proper personnel selection can minimize accident in garments sector which can save life and property as well.

Keywords: *Fine motor skills, Accident proneness, CSPDT*

INTRODUCTION

Accident in an organization is one of the most undesirable phenomenons all over the world. The consequences of accidents in workplace are numerous which include damages of resources and cost of lives of many workers. For example, in 1991 a major disaster occurred in U.S. at triangle Shirtwaist factory, which cost the life of 100 garments workers (Greenwald & Richard, 2005). In Bangladesh accidents in workplace are more frequent and devastating, for which Bangladesh has been criticized severely worldwide. Recently one of those unfortunate phenomenons in Bangladesh was fire at Nimtoli of old Dhaka which cost 117 people burnt alive in June 2010. Another accident took place in *Tazreen Fashion*, Dhaka in 2012 which caused at least 112 workers either burnt to death or died while trying to escape the blaze. These are the short picture of loss of lives. Yet the losses of resources are not few. Sometimes accidents create threats for human and animal kingdom also by large rate of environmental pollution. For Example, in 2005 devastating Texas City Refinery explosion cost lives of many workers as well as light hydrocarbons concentrated at ground level

throughout a large surrounding area which caused long lasting environmental pollution (Baldwin & Lisa, 2008). Furthermore, economic loss cannot also be over looked. A little mistake costs huge loss in assembly line of work. Thus accidents reduce production rate, lessen the quality of product and the reputation of industry also.

Regarding these issues researchers have long recognized that some individuals are more involved in experiencing stress and accident (Farmer & Chamber, 1929). Newbold (1926) found that a small number of workers contributed more in accidents and concluded this finding as stable personality characteristics. Forbes and Kraft (1941) found that, while high accident potential raises the chances of accidents for all drivers, the difference between the rates of the accident-free and the accident-prone group still remains. Environmental surrounding and genetics both are believed to have influential impact on development and execution of motor skills. The environment in which a child is reared has an important impact on their motor development, while each milieu requires specific demand on the motor competencies and physical activities of children. Researchers have already been detected that stress is an important predictor that is responsible for distracting cognitive and physical performance, such as-tunnel vision, auditory exclusion, loss of fine and complex motor skills, unexplainable accidental discharges and bizarre behavior have been found frequently (Siddle, 1995).

Nowadays, with the rapid development of science and technology, jobs are getting more stratified and mechanized hence stressful too. Those jobs demand high authority on eye-hand coordination, high levels of acuity or accuracy as well as a higher level of cognitive processing. To ensure the optimum level of these skills, the Parasympathetic Nervous System (PNS) must be overruled by the Sympathetic Nervous System (SNS). Unfortunately, activation of SNS is involuntary and inhibits the activity of PNS inexorably. The dominance of SNS is disastrous to vision, cognitive processing as well as for fine or complex motor skill performance (Kolb & Whishaw, 2009). The release of stress hormones results on increasing arterial pressure and blood flow to large muscle mass, which results in enhanced gross motor skills and strength capabilities, vasoconstriction of minor blood vessels at the end of the appendages, numerous changes to eye physiology and cessation of digestive process. During high stress occasion interaction is most commonly associated with accidental discharges. Researchers claim that, when SNS is activated, an agent will become more vulnerable to a startle response accidental discharge (Cannon, 1915).

Therefore, it is evident that, accident is related with many kinds of motor skills. The development of large muscles in the child's body indicates the gross motor development. Conversely, coordination of small muscles movements, such as fingers, eyes indicates fine motor skills. Finally, skills that involve a series of muscle groups in movements, eye-hand coordination, tracking, timing and precision are called complex motor skills. Even though normal people attain the same mature human behaviors,

the rate and level of achievement may vary. Environmental surrounding and genetics both are believed to have influential impact on development and execution of motor skills (Chow, 2001; Filers, 2009).

In the late 1800's researchers found that when stress increased, person lost the ability to perform complex task accurately (precision shooting) and quickly (reloding). Interestingly scientists found that SNS activation triggered the detorioration of fine and complex motor skills but not the gross motor skills.

On the basis of the above-mentioned literature and theoretical background, we think that stressful situations provoke the deterioration of fine-motor skills. As the literature suggests, theoretically, deterioration of fine-motor skills might have a negative impact on accident proneness of the workers. Hence, it might increase the chances of accidents in the organization. Therefore, the aim of the present study was to test whether fine-motor skills have any relationship with the accident proneness of the garments workers in Bangladesh. We hypothesized that poor fine-motor skills leads to high level of accident proneness in the garments workers of Bangladesh.

METHODS

Subjects

One hundred and twenty garments workers were selected following convenient sampling technique from Sun Garments, Dhaka, Bangladesh. Among them 62 were female and rest of the participants were male. The participants were ranged from 18 to 40 years of age.

Measures

To collect the data following instruments were used.

1. *Personal Information Form (PIF).* A personal information form containing information regarding the age, gender, experience, education, division of work etc. was used to collect the personal and demographic data.
2. *Accident Proneness Scale (Roy, Hassan, & Hossain, 2013)*. To collect the data regarding the degree of accident proneness of the workers we used the Accident Proneness Scale (APS) developed by Roy, Hassan, & Hossain (2013). The APS contained 33 items where 16 were positive items and the remaining items were negative. Among them 27 items comprised of 5 alternatives and the other 6 items were comprised of 3 alternatives. The score of a worker ranged from 33 to 153 where higher score indicates lower level of accident proneness. APS was found to be reliable (Cronbach α

= 0.91) and valid (Face validity, Subject Matter Expert's opinion, Item analysis).

3. *Crawford Small Part Dexterity Test (CSPDT).* We used CSPDT to measure the fine-motor skills level of the garments workers. It consists of a wooden board, about 10"× 1'' with separate wells for the pins, collars and screws. There was a metal plate which fits over a portion of the board. The plate contains 7 rows of small holes for the pins and 7 rows of threaded holes for the screws. The CSPDT consists of two parts namely, Pin and Collars, and Screws. It was not a time-bound test. Time was recorded as a measure of the participant's performance. Along with the time, few issues were also considered as mistake. Those were,
    a. Falling of screw driver, tweezers, pins, or collars from hand
    b. Placing pin or collar improperly
    c. Starting work from the left to right rather than right to left
    d. The CSPDT was found to be highly reliable under both work limit and time limit conditions. It was also found to be highly valid. This test was used as a measure of fine-motor skills in different studies such as, Burger (1985) Yancosek & Howell (2009).

Procedure

We administered the Personal Information Form (PIF), Accident Proneness Scale (APS), and Crawford Small Part Dexterity Test (CSPDT) individually to the participants. We instructed the participants properly and made necessary clarifications regarding their gray areas. As the survey and the experiment were took place in the garments, the authority allowed us a quiet and calm room to do our tasks. We took the participants in that room one by one.

We collected the data in two phases. In the first phase we administered the PIF and APS. Since most of the workers were not literate equally to complete the questionnaire .To minimize the variation all questions were explained verbally and requested them to put tick (√) on the most appropriate options that best fits with them. They were also requested not to omit any item with the assurance of keeping all the information confidential.

In the second phase we administered the Crawford Small Part Dexterity Test (CSPDT). In the Pin and Collar part, the participants were told to use tweezers to insert small pins into close-fitting holes in a plate and to place small collars over the protruding pins. In Screw part, the participants were told to place small screws into threaded holes in the plate and screw them down with a screwdriver until they strike the metal tray

below. After finishing all the tasks, we thanked the participants and said goodbye. It took around 30-35 minutes to administer all the instruments.

RESULTS

The results of present study are illustrated below showing the relation between accident proneness and fine-motor skills.

Table 1: Regression Model Summary

R	*R*-square	Adjusted *R*-square	Standard Error	*F*	*Sig.*
.864	.747	.731	8.98	47.144	.000

The regression model shows that speed in fine-motor skills (CSPDT pin and collar, CSPDT screw), accuracy in fine-motor skills (CSPDT pin and collar, CSPDT screw), age, educational qualification, and total work experience can explain around 73% variance in accident proneness of the garments workers. The model has found to be significant with an alpha (α) level of 0.001.

Table 2: Regression Coefficient of speed and accuracy of fine motor skills (by CSPDT) and total experience on accident proneness

	Unstandardized Coefficients		Standardized Coefficients	*t*	*Sig.*
t	β	Std. Error	B		
Constant	203.838	10.272		19.843	.000
Speed in fine-motor skills (CSPDT Screw time)	-.066	.018	-.192	-3.552	.001
Speed in fine-motor skills (CSPDT pin and collar time)	-.179	.026	-.473	-7.006	.000
Accuracy in fine-motor skills (CSPDT screw error)	-2.407	.670	-.202	-3.594	.000
Accuracy in fine-motor skills (CSPDT pin and collar error)	-2.065	.595	-.235	-3.473	.001
Total experiences	-.081	.040	-.121	-2.042	.043
Age	.558	.230	.139	2.433	.017
Educational qualification	-.481	.333	-.070	-1.442	.152

Standardized beta (β) coefficient is an expression of changes in unit that occur in dependent variable due to one standard deviation change in independent variable. Standardized betas (ß*s)* of table 2 reveals that speed in fine-motor skills (CSPDT screw, ß = -.192, $p < 0.01$), speed in fine-motor skills (CSPDT pin and collar, ß = -.473, $p < .01$), accuracy in fine-motor skills (CSPDT screw, ß = -.202, $p < .01$), accuracy in fine-motor skills (CSPDT pin and collar, ß = -.235, $p < .01$), total experiences (ß = -.121, $p < .05$), and age (ß = .139, $p < .05$) were found to be significant predictors of accident proneness among the garments workers. However, educational qualification (ß = -.070, $p > .05$) was found to be a non-significant predictors of accident proneness among the garments workers.

DISCUSSION

Our results confirm that fine-motor skills can significantly predict the accident proneness among the garments workers in Bangladesh. Specifically, speed in fine-motor skills and accuracy in fine-motor skills can significantly predict the potential accident among the garments workers. These results underline that when tasks like sewing or finishing in garments demand higher level of cognitive processing. This in turn activates the SNS whose dominance is disastrous to vision, cognitive processing and fine-motor skill performance. These obviously deteriorate the fine-motor skills which may lead a worker to accidents. Our results are concordant with the findings of Cannon (1915), Siddle (1995), Forbes and Kraft (1941).

Our findings also revealed that accident proneness decreases as total work experiences increases in the garments sector. It might be due to the awareness of the accident related issues over the time of the working life. We have found this finding concordant with the findings of Ali, Nouri, and Fam (2005). Moreover, as the workers gain more experiences they get more training related to their occupation. Getting more training related to their occupation decreases the potentialities to accident in the garments sector (Dembe, 2001).

However, age has found to be positively related to accident proneness in our study. This finding is contradictory with the experiences related findings (Ali, Nouri, & Fam,. 2005). Logically, an experience increases as age increases. But one thing can play a role here and that is age during the onset of work. It might happen that there are several workers who start working at an augmented age. In such cases, although the worker is aged but s/he gathers a few experiences related to his/her occupation.

Furthermore, in our study respondents are not illiterate. Their education level ranges from class III to XI. Hence educational qualification has found to be a non-significant predictor of accident proneness in our study. This might be due to insignificant variation in the educational qualification. Many of the workers had little education like primary education. Only few of the workers passed grade VIII. We think if we could take sample with wider educational range then we could have a confident

finding regarding the relationship between accident proneness and educational qualification.

In conclusion, we can say that a fine-motor skill is a significant predictor of potential accidents among the garments workers. Our findings are theoretically and empirically concordant with the previous research findings. We absolutely acknowledge that there are few limitations of the current study. One of the most significant of them is not taking the record of actual accidents by the garments workers as dependent variable. It would have been a nice study if we could take actual accidents record. However, most of the garments do not allow us to collect such data during their productive hour. But of course we have a plan to continue this research taking the actual accident records as dependent variable. We strongly appreciate if any group of researcher extends their intelligentsia in this purpose.

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