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ABSTRACT

Pre-employment assessments must accurately simulate job tasks and demands and select appropriate personnel to be considered effective. This study focussed on the perception of NSW fire-fighters in relation to the validity of the NSW Fire Brigade's pre-employment assessment, the Physical Aptitude Test. A qualitative method was used to gain a precise understanding of fire fighters' opinions of the accuracy of the Physical Aptitude Test. Information letters and consent forms were sent to an urban fire station with interested participants replying via the university. Six participants, who met the inclusion criteria

were randomly selected for the study and in-depth, ethnographic, semi- structured interviews were conducted. The fire fighters believed in order for the Physical Aptitude Test to accurately simulate job demands and select the most capable fire fighters', it needed to be more physically demanding. However, participants believed that the “work-simulating” nature of the Physical Aptitude Test provided an accurate indication of the job tasks.

Key Words: Pre-employment assessments; work-simulated assessment; fitness screening; employee selection; work injuries.

1. INTRODUCTION

The New South Wales (NSW) Fire Brigade introduced a work-simulated pre-employment assessment (P.A.T) as the basis of selecting the most suitable employees [15]. Work simulated pre-employment assessments are defined as “using direct work tasks to determine whether an individual is safely capable of performing a particular job” [15]. Although there is a significant amount of literature, generating various hypotheses in relation to the possible benefits of work-simulated pre-employment assessments (generally and specifically related to the Fire Brigade), limited literature on the validity or accuracy of these assessments is available. For this reason, a qualitative study was conducted and centred on the employee’s perception of the validity of the P.A.T in indicating the job tasks and demands, and selecting appropriate personnel.

The purpose of pre-employment assessments is to determine whether an individual is capable of performing a job, and to ensure a reasonable match between the individual and the job [22]. Traditional pre-employment assessments, based mainly on strength, flexibility and aerobic fitness, have been conducted within Australia, Europe and America since the industrial revolution, as a means of finding suitable employees. It was believed, if only the fittest and strongest participants were employed, the possibility and rate of work-related injuries would be reduced [16, 14]. However, research has indicated assessments based purely on general physical capability are relatively ineffective [16]. Kumar highlighted the poor predictive validity of these tests, concluding, that because no industrial job is performed in an isometric mode, the testing of strength as a predictor of work task performance is inappropriate [13]. Bilzon et al. also concluded that traditional

pre-employment assessments focussing on aerobic fitness impose a systematic bias against heavier personnel when predicting fitness for load carrying tasks [5].

Specifically in relation to the occupation of fire fighting, the inaccuracy of generic physical performance tests was highlighted by Ben-Ezra & Verstraete, who found the cardiovascular demand of stair climbing is significantly higher than that of running on a treadmill [4]. Work simulated pre-employment assessments have been designed to replace pure fitness tests in many industries.

Development of the P.A.T., by the NSW Fire Service, aimed to reduce the risk of work related injuries by only selecting employees who were best able to perform job tasks. This is supported by a study within a Los Angeles based Fire Brigade, where work simulated pre-employment assessment applicants with the highest scores sustained the lowest rate of back injuries, whereas those with the lowest scores, sustained the highest injury rate [7].

The P.A.T. also aimed to comply with anti-discrimination laws, by ensuring that the pre-employment assessment was directly related to the job [2]. This was reinforced by Worth [23] and Oldham et al. [18] who stated it is essential that the pre-placement assessment should not test any capacity other than that required to perform the specific job for which the person is applying.

When designing the P.A.T, relevant local and overseas literature was referenced and a

panel of ergonomic experts conducted a workplace assessment to determine the essential demands and tasks of a fire-fighter. Subsequently, the following tasks were included in the P.A.T.: a shuttle run, a ladder-raise, a stair climb and drum haul, a dummy rescue and a hose drag.

In relation to the NSW fire department, it was recognised that a significant amount of research had been conducted when designing the assessment. For the P.A.T. to achieve its aims, it must contain tasks that accurately simulate the work performed and assist in selecting staff most suited to the job. This formed the basis of the research question “what are fire-fighters’ perspectives of the accuracy of the P.A.T. as a pre-employment assessment?” The overall aim of the study was to gain the employee’s opinion of the relevance of the P.A.T. in selecting staff and simulating work tasks and demands.

2. METHODOLOGY

2.1 Study design and procedures.

An ethnographic, qualitative study design was utilised to explore the participants’ opinion of the validity of the work simulated pre-employment assessment. Semi-structured interactive interviews generated large amounts of descriptive data. By reflecting on this data, emerging themes are directly shaped by what was said by participants [11, 3]. Ethics approval from the Faculty of Health Research Ethics Committee and written approval from the Commissioner of the NSW Fire Department was gained. The Professional Standards and Conduct Officer from the fire department identified possible

participants, who met the inclusion criteria, and issued the information letter and consent form. Interested employees returned the consent form to the researcher via the university.

2.2 Participants.

Participants were selected for the study on the basis of the following inclusion criteria:

- Joined the fire force one to two years ago (to ensure the participant is able to accurately remember the pre-employment assessment and has worked for sufficient time to understand job demands);
- Completed the P.A.T in order to gain entry to the NSW fire brigade;
- Are employed within a Metropolitan fire fighting station.

A convenience sample from one Metropolitan station was used, as this was easily accessible.

Six individuals were randomly selected from the twenty interested employees by selecting approximately every third consent form that was received. This eliminated the possibility of bias within the selection [6]. It was then ensured that the participants met the inclusion criteria before being contacted by phone to arrange an interview time. Table 1 outlines the characteristics of the participants.

2.3 Setting

The interviews took place at the participants' workplace at a convenient time for them and the Fire Station Commander. To ensure confidentiality, each interview was conducted in a room located away from other offices and employees.

2.4 Data Collection

A semi structured interview format, containing mostly open- ended questions was utilized to collect a rich description of the research phenomenon from the perspective of the individual. Questions including, ‘What did the PAT consist of?’, ‘What job tasks have you been engaging in since you first started working for the fire force?’, ‘How did the PAT results accurately indicate your physical abilities? or your abilities to perform fire fighting tasks?’ were asked during the interview. The interviews were approximately thirty minutes in duration and were conducted in a face to face format which allows the researcher to interact directly, and develop rapport with participants [3]. By utilising the semi-structured approach, the researcher was free to ask probing questions and build upon emerging issues [19]. Each interview was taped and then transcribed verbatim.

2.5 Data Analysis

In accordance with the qualitative research paradigm, each of the interviews were firstly transcribed verbatim. The interview transcriptions were inductively analysed using the constant comparative method. Inductive analysis involved identifying themes and categories that emerged directly from the data [19]. The first step involved coding, where the researcher selected key words that represented the most significant issues discussed by the participant [3]. The codes were then categorised to form the basis of the themes to be analysed. Transcripts were independently coded by two researchers to enable comparison of the coding, and to identify areas of consensus and non-consensus between the researchers. This allowed the opportunity for discussion and reflection on the interpretation of the data and as a method of enhancing the credibility of the research.

3. RESULTS AND DISCUSSION

Four major themes were identified from the study. These were: the physically demanding nature of fire-fighting work; the degree of difficulty of the P.A.T; the employees' confidence in other workers and the relevance of the P.A.T to work.

3.1 Physically demanding work

While gathering data, the physically demanding nature of fire fighting work became evident. Gledhill & Jamnik's [9] support this, commenting that fire-fighting is acknowledged to be a one of the most hazardous and physically demanding of all occupations. The participants believed that the occupation of fire-fighting is extremely demanding due to the nature of the work tasks, the environment in which the tasks are being completed and the equipment that is utilised.

The physical demands of fire fighting due to the work tasks and environment were highlighted by participant 1:

"...to pick up a person with your own uniform on is not an easy task...you're within an extreme environment...and you probably have to run up about three to four flights of stairs...it's not easy".

Participant 2 commented:

"once you're in there... it's so hot and your heart is beating one hundred and eighty beats per minute...you can work like that for twenty to thirty minutes...it's really physical."

The occupation of fire fighting is unique among all occupations because of the physiological demands associated with it. Not only do fire-fighting tasks require a high energy cost, but the fire-fighter must contend with working in extreme environmental conditions, which impose additional physiological load [4]. The participants also indicated that the physical demands of the job are further increased due to the equipment used. Participant 3 commented:

“...it is a lot harder to breathe when you’re trying to suck in big breaths through a face-mask than it is without one...that’s one of the major things I think people find hard to adjust to.”

This increase in work demand due to the equipment utilised was highlighted by Gledhill & Jamnik [10] who proved that wearing a self-contained breathing apparatus increased the fire-fighter’s oxygen consumption by 0.54L/minute and reduced their maximum performance capability by 20%.

3.2 Degree of difficulty of the P.A.T

In discussing the physically demanding nature of fire-fighting work, it was the general opinion of the participants that the P.A.T should reflect this degree of difficulty. This particular theme consisted of two related components: the simplicity of the P.A.T and the need for difficulty; and the scoring of the P.A.T.

The simplicity of the P.A.T was highlighted by participant 3:

“...I guess I was just expecting a lot more...I trained for it all and then when I got there it wasn’t much harder than PE [physical education] at school.”

Participant 2 reinforced this:

“... [the P.A.T] was much easier than what I thought it would be...I basically breezed through it.”

In discussing the easiness of the P.A.T, the participants emphasised that the P.A.T needs to be more difficult in order to accurately simulate the demands of the job. This was highlighted by participant 4:

“I don’t think that it would hurt to have a fairly rigorous P.A.T test...I think you’re better to make it hard because the actual job is very hard so then at least you’re...providing an indication of the demands of the job.”

The sole purpose of pre-employment assessments is to determine whether the individual is capable of performing the job [20]. Therefore, it is essential that the pre-employment assessment accurately reflects the physical demands of the job.

The participants also believe that the difficulty of the P.A.T needs to be increased in order to ensure individuals who pass the test are able to perform the job tasks. This was highlighted by participant 5 who observed:

“I saw a lot of people who were struggling with things and I thought...I don’t want someone that I know is not strong enough trying to pull me or some poor victim out of a building.”

This is supported by Jamnik & Gledhill [12], who suggest, rigorous pre-employment assessments should be designed for occupations involving job tasks that may jeopardise life or property. This ensures that the employees are more than able to perform the tasks.

In discussing the study topic, the participants also provided a number of their own recommendations in order to increase the difficulty of the P.A.T. The first recommendation was related to increasing the endurance component of the assessment.

Participant 3 commented:

“...everybody can [drag the dummy] for ...a minute or two minutes...it’s whether you can keep that stamina up for half an hour because that may be required on a job.”

O’Connell et al. [17] stated that it is essential that all fire-fighters have the physical capacity to be able to carry out their work tasks for at least thirty minutes, maintaining their stamina throughout that period. It was the general opinion of the participants that this requirement should be reflected within the pre-employment assessment.

The second recommendation was based on the need to wear the breathing apparatus whilst performing the P.A.T. as this substantially increases the demands of fire fighting, and to increase the accuracy of the P.A.T in simulating the job demands. Participant 1 summarised this by stating:

“I think they should incorporate a few more tasks into the P.A.T where you are actually wearing the air-set because it is just so much harder to work...your breathing is a lot more restricted and it’s something that you need to be able to do in order to effectively perform the job.”

The scoring of the assessment was raised by participants, who felt the pass/fail result for each assessment activity was not an accurate method of measuring ability to perform job tasks. At present, as long as the activity is successfully completed, a pass result is awarded. This point was highlighted by participant 6:

“...you could finish the test and just about die, but you’d still pass.”

Participant 1 commented:

“there should be more emphasis on setting a certain standard... or overall score that must be achieved in order to pass”.

This emphasis on setting a minimum standard, and awarding points for each task rather than a pass/fail mark was recommended in a study conducted at the York Centre for Health Studies. This emphasis was based on the fact that because loss of life and damage to property is at stake, it is essential that fire-fighters have the strength and endurance to at least reach the minimum requirement for each task [9]. In addition, the use of a proposed point scoring system would inform new recruits which tasks need to be focussed on whilst at training college.

3.3 Employees’ confidence in fellow workers

Participants doubted the ability of fellow workers because they lacked confidence in the difficulty of the P.A.T.

When discussing this diminished confidence, many participants related this directly to the application process. Participant 3 illustrated this:

“...the people that get through the application process...we expect them to be at a certain level and if the application process doesn’t provide for that, then somebody will get hurt in the long run...”

Since high physical demands affect worker productivity and increase the chance of injuries, one would expect that workers who assume jobs that are physically demanding have the physical capabilities to meet those demands [12].

Another point raised by participants when discussing their confidence in other worker's abilities related to the safety of the public as well their own personal safety. This was highlighted by participant 5:

"...us fire fighters, we are probably one of the main priorities because if we get hurt, then we can't help anyone else out".

Participant 1 agreed:

"if you haven't got people who can perform the job, like taking people out of fires and rescuing people, you're not only risking the person who you are trying to save, but you're also endangering the person that you're working with."

Rayson [21] agrees commenting the operational efficiency and safety of the workforce is of primary importance where the lives and safety of the public and their colleagues are at risk. This is ultimately dependent upon the ability of each employee to perform the necessary tasks to the required standards. They may be directly impaired by the inability of employees to carry out their duties or indirectly impaired if resources are diminished through absenteeism or medical retirement. Gledhill & Jamnik [10] also discussed this point suggesting it is essential that all fire-fighter recruits have the physical capabilities to meet the demands of the job because the safety of the general public and the fire-fighters themselves depends on successful job performance.

The fitness training of personnel was another point that was related to the participants' confidence in other workers. Participants expressed concern that if individuals do not continue their training following employment, their physical fitness and capabilities may

be reduced, ultimately risking the safety of other workers or the general public. This was highlighted by participant 5:

“if you really want to get into the job, you’re obviously going to make sure that you’re fit and can pass... but some people get into the job and then completely stop with all of their physical training...this presents a risk to the safety of themselves as well as other work-mates.”

The importance of maintaining physical fitness was stressed by Bilzon et al. [5] who suggested that the fitness of personnel is an important attribute that may directly influence the effectiveness of an organisation.

In an attempt to ensure that fire fighters maintained their fitness the participants suggested that it should be the responsibility of each individual fire station to ensure that the workers continued training. This was emphasised by participant 2:

“if each station makes sure that everyone is still training then... it might keep everyone on their toes and make the workers feel a bit more relaxed because they would know that everyone is fit enough to be able to perform the tasks.”

Continuing physical training is supported by Adams et al. [1] who assessed the benefits of physical fitness on a group of Los Angeles fire fighters. They found, when the experimental group was provided with regular aerobic and anaerobic training, they were able to perform their job related tasks in a decreased amount of time.

Another recommendation was that all workers be re-assessed by the P.A.T on a regular basis. This would ensure that:

“participants were able to successfully perform each required work task as well as providing an indication of their fitness” (participant 1).

Ensuring fire fighters maintain the skills required to successfully complete the P.A.T, may enhance employee’s confidence in the physical abilities of fellow workers.

3.4 Relevance of the P.A.T to work

In carrying out the study, it became increasingly evident that although the participants believe that some changes could be made to the P.A.T in order to accurately reflect the demands of the job, the P.A.T does provide a precise indication of the job tasks. This was shown by participant 4’s statement:

“...I guess when you think about the actual tasks that we do for work; [the P.A.T] is pretty relevant.”

Participant 3 commented:

“...I think that the P.A.T covered pretty much everything that we do...pulling the hose around, lifting the ladder, dragging the dummy...I mean they are all things that fire-fighters need to know how to do.”

The fact that the P.A.T included these common job tasks is a necessary requirement of work-simulated pre-employment assessments. Gledhill & Jamnik [10] stated, in light of equal opportunity legislation, employment equity programs and affirmative action initiative, it is essential that applicant fitness screening protocols comprise tests that embody the specific and essential tasks related to fire fighting.

The participants also believed that the accuracy of the P.A.T in simulating the job tasks is enhanced because the fire-fighting uniform and protective equipment must be worn

whilst performing the P.A.T. Participant 6 stated:

“the job tasks that you do are heaps different when you are wearing your equipment...there are more factors that you have to take into account...I think that it’s great that you have to wear the equipment when you perform that P.A.T because then you get a spot-on indication of what the job tasks are like.”

Oldham et al. [18] support this, stating since fire-fighters must wear thirty kilograms of protective gear, applicants attempting the job-related performance test should be encumbered by a similar weight.

In discussing the relevance of the P.A.T to their work, the participants also identified the benefits of utilising a work-simulated pre-employment assessment as opposed to traditional fitness based assessments. Participant 5 commented: *“... [pure fitness tests] don’t really give an indication of how good someone is going to be on the job...it might be a good way of showing fitness but that doesn’t necessarily mean that they are going to be a good fire-fighter.”*

Participant 4 adds:

“work-simulated assessments are better because...with fitness tasks, they don’t give an accurate indication of the person’s actual ability to do the job...blokes in here would probably fail a fitness test, but the fact is that they could fight fires all day long if they had to.”

This comment relating to the accuracy of pre-employment assessments was supported by Dempsey et al. [8] who stated the extent to which physical standards and their testing have predominated in the selection process have been criticised. The emphasis on

“physical prowess” rather than “job needs” analysis was considered to affect the eligibility of certain individuals for entry into the fire service.

4. LIMITATIONS OF THE STUDY

A few limitations to the study must be considered. To comply with the wishes of the NSW Fire Department, information letters and consent forms were only sent to one major fire station which may have created some bias. In addition, in order to comply with university ethics requirements, a random selection process was utilised and as a result, only one woman participated in the study.

The NSW Fire Brigade requested that the interviews take place within the participant’s workplace; however, various work distractions may have influenced the results.

5. CONCLUSION

This study produced rich descriptive data from the small sample about the physically demanding nature of fire-fighting work, the degree of difficulty of the P.A.T and the employees’ confidence in fellow workers. It became evident that these participants felt that the P.A.T provided an accurate indication of the job tasks to be performed, however, in order for the P.A.T to be considered accurate in simulating the job demands and selecting appropriate personnel, these participants felt it needed to be more physically demanding. Participants believed that this could be achieved by focussing more on endurance, wearing all fire fighting equipment during the P.A.T and raising the assessment scoring standard. Participants also suggested that in order to further increase their confidence in fellow workers, the P.A.T should be re-conducted on a regular basis.

As this was a small qualitative sample, to build upon the results, a larger, survey-based, quantitative study could be developed using data from this study. A larger study would allow a more in-depth understanding of the use of the P.A.T. with fire-fighters across NSW.

Pre-employment assessments have been, and are being used in a variety of industries across the world. This trend of using pre-employment assessments to select appropriate personnel requires constant review. Consideration should be given to the nature of the assessment, the accuracy, the validity, and the relevance to particular occupational requirements, in light of the ever-changing demands of employment and legislative requirements. Constant review will assist in eliminating discrimination. Further research into the validity and reliability of pre-employment assessments needs to be explored.

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Table 1 A SUMMARY OF PARTICIPANT CHARACTERISTICS

Participant	Age	When PAT was completed	No of times PAT was attempted
Male 1	39	1999	one
Male 2	28	2000	one
Male 3	28	1998	two
Female 1	25	1998	one
Male 4	30	2000	one
Male 5	31	1998	one