

The Effectiveness of the IPCS Physical Capability
Evaluation Process For Food Manufacturing
A Validation Study

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Introduction

The purpose of this analysis was to demonstrate through a scientific validation method that the Industrial Physical Capability Services, Inc. (IPCS) isokinetic physical capability technology is valid as a tool to assess the necessary strength (skill) to safely perform the essential functions of the jobs requiring a physical capability evaluation (PCE) before being hired specific in the food manufacturing industry.

An Overview

Assessing the physical capability skills of a worker to determine if the worker meets the physical demands of the job is becoming more prevalent in industry particularly in physically demanding jobs. Correctly matching the physical capability of the worker to the physical demands of the job should enhance productivity and efficiency of the worker and, thus, the company, as well as minimize on-the-job injuries. This is best accomplished with a correctly matched worker, which results in fewer turnovers and less fatigue during the workday. In contrast, a worker not correctly matched will fatigue, resign or attempt to do work that he/she does not possess the physical skills to do. This results in injury, lost time and many other indirect cost factors that contribute to lost productivity and the inability to service the 'customer'.

In the food manufacturing industry, one of the critical physical capability skills needed to perform the essential functions of the job is strength. Detailed job descriptions and job task analyses in the food manufacturing industry clearly identify skills such as lifting, carrying, bending, reaching and others as critical to performing the job. A job analysis for the jobs requiring a physical capability evaluation (PCE) identifies the critical requirements to perform the jobs including physical demands. The physical demands of the jobs for the IPCS Plants

group were determined by job task analyses, which were performed independently by certified ergonomists. The JTA's are reviewed routinely and updated (most recent in 2009). The Addendum contains the matrix of the jobs analyzed and a sample of a heavy job.

The IPCS PCE evaluates the strength of the major muscle groups critical to performing the essential functions of the job as developed in the job analyses. The IPCS PCE uses isokinetic equipment to assess the strength of shoulder flexion and extension and knee flexion and extension. Inadequate strength associated with these two major muscle groups will prevent the worker from safely performing the essential functions of the job.

Validity of the IPCS Technology

There are several validation procedures that can be used to validate a process or technology. Construct validity uses a process in which a known condition exists and then a treatment is applied to determine if the known condition can be altered. If the known condition is altered, then the treatment is purported to do what it was designed to do; thus, it is validated. Criterion validity is based on a demonstrated relationship between a performance criterion (i.e., on-the-job injuries) and scored evaluations in the assessment process (i.e. the IPCS evaluation).

Since the physical capability skill of strength is critical to performing the essential functions of the job, it is safe to assume that workers who possess the critical strength perform the job better and more safely. One way to assess this is to review the company's injury history (a criterion measure) as it relates to strength. One common injury in the food manufacturing industry associated with strength is the overexertion injury. Most overexertion injuries occur because the worker lacks adequate strength to perform the essential functions. This results in injury. Thus a company that uses a validated physical capability strength test should experience an increase in productivity and efficiency because of fewer overexertion injuries and a decrease in the severity of overexertion injuries as measured by cost of injury.

Background Information

To validate the IPCS technology, injury data from 2005-2008 was collected and analyzed (the criterion) for 12 food manufacturing plants. Four plants utilize the IPCS PCE (assessment) and 8 plants do no PCE testing. All new hire applicants hired between 2005 – 2008 were tracked for injuries. The new hire applicants from the eight plants not using the PCE were labeled the No IPCS Plants and the four plants using the IPCS PCE is the treatment group labeled (IPCS Plants). Both groups were matched on length of employment.

Table 1 shows the number of associates hired between 2005 through 2008 by gender.

	No IPCS Plants	IPCS Plants
Males	7,127	9,318
Females	6,720	6,632
Total	13,847	15,950

The selection criteria for new hire applicants were the same for both groups except the IPCS Plants was administered the IPCS PCE. In addition, the data indicates that the demographics between the two groups were similar. The physical demands of the jobs for the IPCS Plants group were determined by job task analyses. The job task analyses were performed independently by certified ergonomists.

Establishing the Cut-off for Hire

To determine the appropriate cut-off score in evaluating the performance of applicants on the IPCS PCE, the Job Task Analysis completed by GMSI was compared against the United States Department of Labor for the Dictionary of Occupational Titles (DOT). Based on the frequency of lifting as defined by the DOT (i.e. never, rarely, occasional, frequent, and constant) in conjunction with the weight lifted and carried, push/pull requirements derived from the Job Task Analysis, it was possible to link the JTA for the IPCS Plants jobs to the strength definitions of Medium, Heavy and Very Heavy. Since the IPCS cut-off (see next

paragraph) is correlated to both the Job Task Analyses and the DOT, this link is critical in order for the IPCS PCE program to be effective in reducing on-the-job injuries.

Two validation studies were completed by IPCS to demonstrate the relationship between the IPCS cut-off scores for the DOL strength definitions of Medium, Heavy and Very Heavy. The attached American Airline validation studies make reference to jobs that varied between Medium and Very Heavy (i.e. Cabin Cleaner – Medium; Fleet Service Clerk – Heavy; Shop Repair Person – Very Heavy). Reviewing the data retrospectively of new hires (4,915) in terms of injury history as it related to the new IPCS program, it was determined that a Medium job should have an IPCS cut-off of 1.32, Heavy cut-off of 1.56 and Very Heavy cut-off of 2.24.

Results

Incident Rate of Injury

Table 2 shows the number of All Injuries that occurred by gender for each of the two types of plants. A Chi-square analysis of this data showed a significant difference in the observed frequency compared with the expected frequency (Chi-square = 11.598, df=1, p=.0007).

Table 2

	No IPCS Plants	IPCS Plants
Males	123	51
Females	143	29
Total	266	80

When plotting the interaction of male – female injuries versus receiving the PCE or not, the following plot shows the difference in injury reduction is greater for females than males because of the PCE.

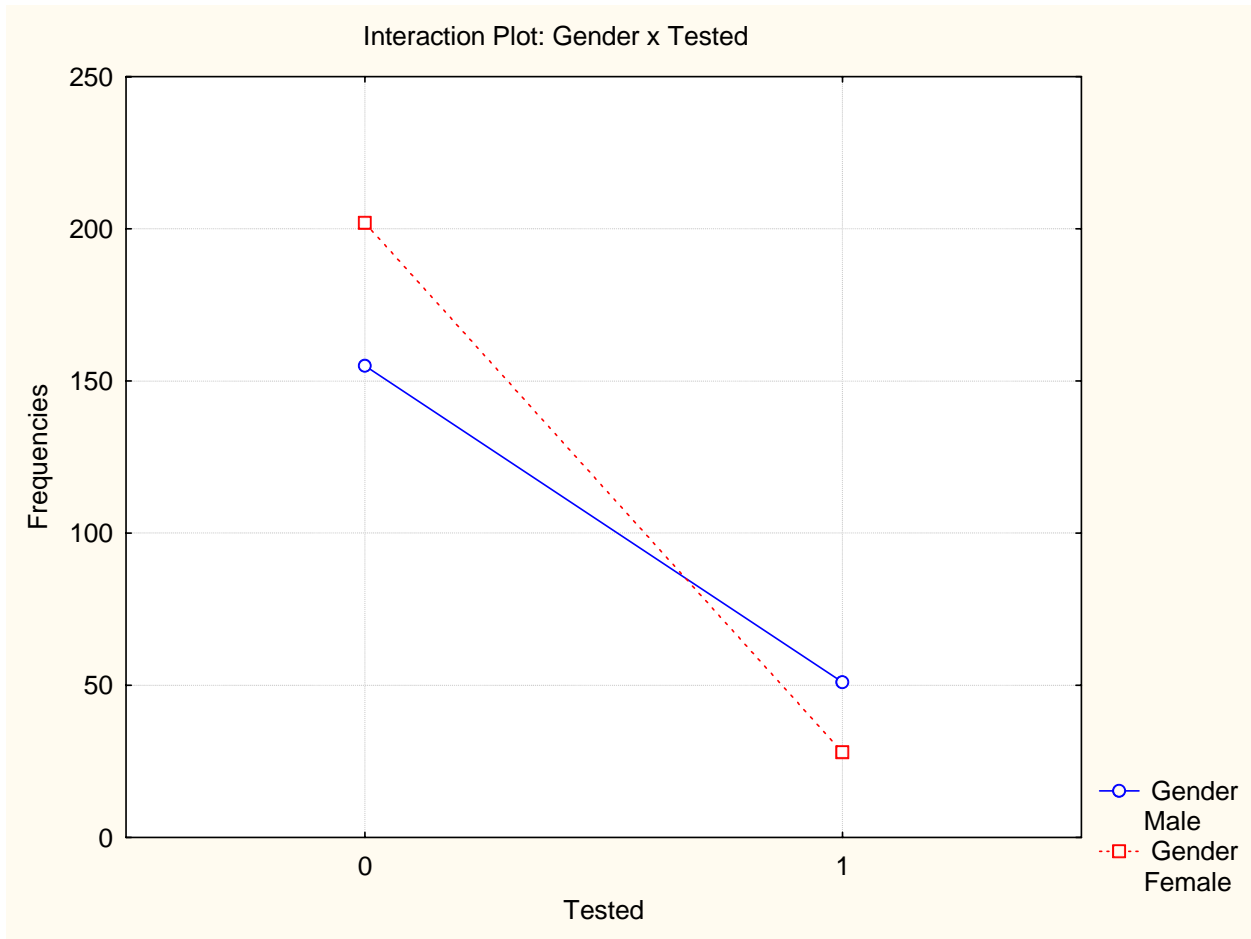


Table 3 shows the number of Strain-Sprains that occurred by gender for each of the two types of plants.

Table 3

	No IPCS Plants	IPCS Plants
Males	43	23
Females	49	14
Total	92	37

Tables 2 and 3 show that the No IPCS plants had more All Injuries and Strains-Sprains than the IPCS plants even though the No IPCS plants hired fewer workers between 2005 and 2008.

When expressing the number of new hires by gender according to plant type relative to the number of injuries for All Injury types, Chart 1 shows the incident rate of injury is substantially greater for the No IPCS Plants when compared to the IPCS plants for both genders. In fact, the male injury rate for the No IPCS Plants was 4.4 times greater for all injuries and 7.5 times greater for the female incident rate.

Chart 1

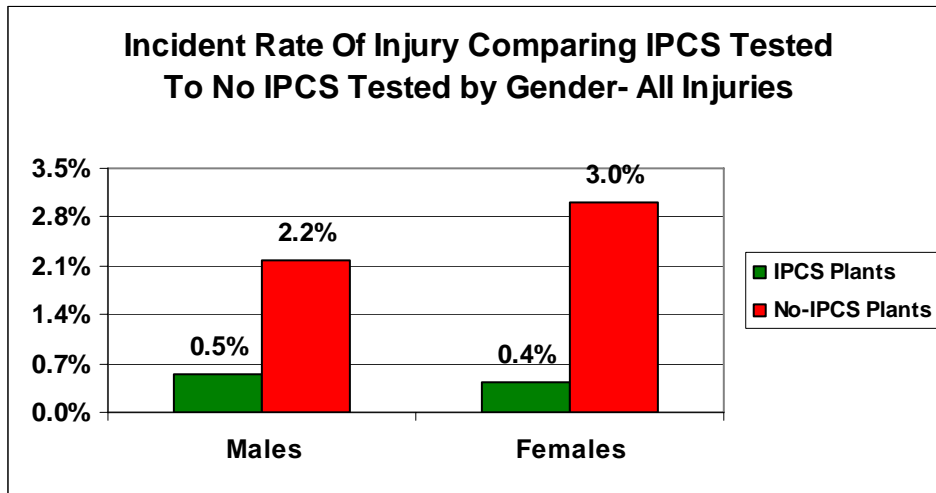
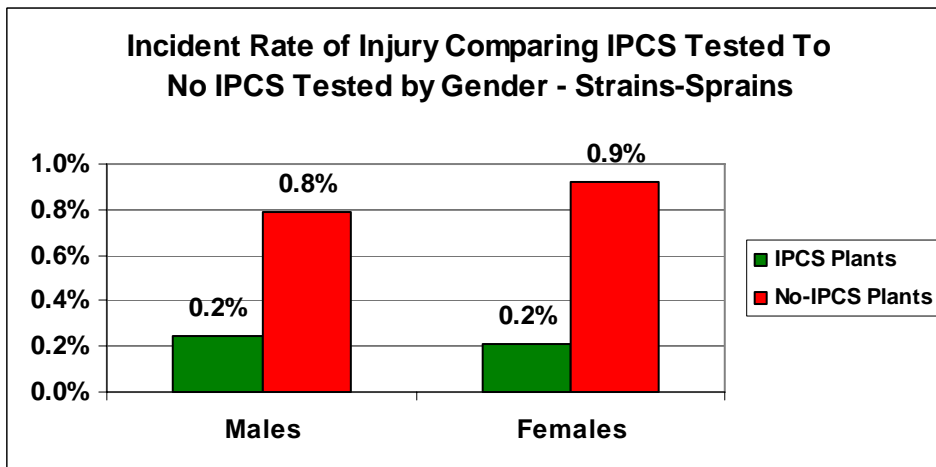


Chart 2 shows the number of Strains-Sprains that occurred by plant type according to gender. Like Chart 1, the incident rate of injury is at least 4 times less for males and females for the IPCS Plants compared with the No IPCS Plants. It should be noted that the incident rate for Strain-Sprains is identical between genders for the IPCS Plants (each at 0.2%).

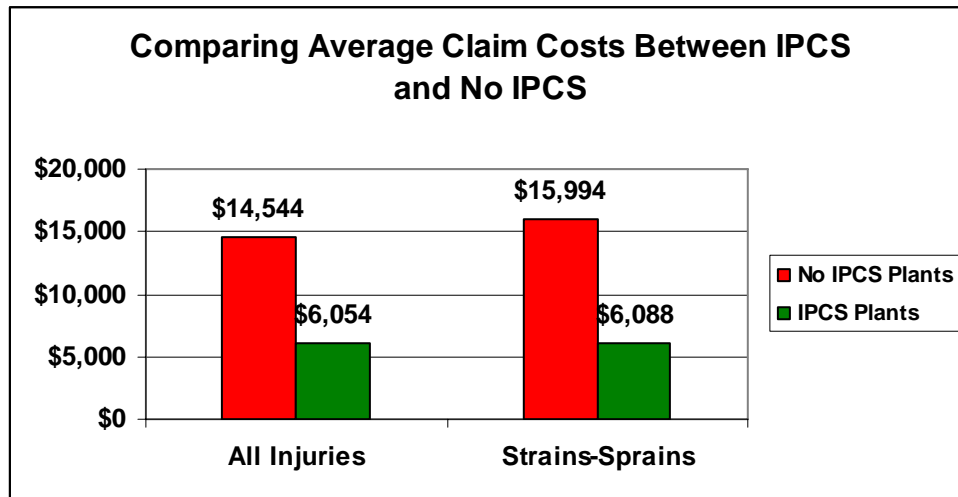
Chart 2



Average Claim Cost

Although there is debate as to the significance of using average claim cost to determine validity of a PCE, the average claim cost does provide information as to the severity of the injury. In addition to reducing the incident rate of injury, a PCE should always reduce the severity of the injury. This in turn reduces the rehab time and puts the returning injured worker less at risk for re-injury. Chart 3 clearly shows that those in the IPCS Plants had lower average claim cost than the No IPCS plants. The statistical analysis showed the difference between the No IPCS plants versus the IPCS Plants was not significant ($P < .15$) because of large variances.

Chart 3



Conclusion

The data analysis clearly shows that the performance in terms of the criterion (incident rate of injury) was substantially improved through the use of the assessment (physical capability strength test); thus, validating the technology.