Effectiveness of Training on Lifting Technique: A Review of the Literature

Author: Frank Myron Gonzales

Colorado State University
(970) 491-2724
(970) 491-4804 (fax)
Frank.gonzales@colostate.edu
Abstract

Purpose: Somewhat limited research has been conducted which provides significant data on the effectiveness of training on lifting techniques for people in the workforce. Most experts in the field of ergonomics would argue that lifting, especially heavy and/or awkward lifting should be avoided whenever possible and the manual lifting task replaced with an engineering control, however, this is often times impractical. Although various studies suggest that training may be ineffective, alternative studies have indicated training may be effective when delivered appropriately. Because of somewhat limited research and insufficient evidence that supports the effectiveness of training on lifting techniques; the purpose of this paper is to further investigate the effectiveness of training on lifting techniques has been found to be beneficial.

Methods: Various databases were searched including the Educational Resources Information Center (ERIC), Science Direct, and Web of Knowledge amongst others to determine the number of research studies performed on the topic as well as review the conclusions.

Results: After reviewing the literature, an insufficient amount of research is available specifically on the effectiveness of training on lifting techniques. Research does indicate that when delivered using proper training techniques including active engagement and interactive class sessions, ergonomics training can be effective. These results are not however specific to training on lifting techniques and it is because of this, future longitudinal studies are needed to clarify training effectiveness on lifting techniques including which training methods are most effective. Conclusions: From these results, it can be concluded that additional, longitudinal research is needed. Future research should address the ideal lifting technique as well as the effect on additional factors such as fatigue and management commitment to training. Longitudinal research conducted on the topic will benefit future ergonomics trainers deliver effective courses to employees in the workforce.

Keywords: lifting, training, education, ergonomics, effectiveness, efficacy
Effectiveness of Training on Lifting Technique

Many experts in the field of ergonomics define the science as the interaction between humans and the work environment. This interaction is unfortunately common in creating injuries, most specifically, musculoskeletal disorders. One of the most commonly injured areas of the body is the lower back, which is commonly reported as the most costly from a workers' compensation standpoint. To avoid the likelihood of injury, ergonomists will often attempt to redesign the work task to avoid employee manual lifting by using an engineering control such as a scissors lift table. However, because of frequently encountered barriers with redesigning the work environment, many experts are supporting training and education as a method of preventing workplace injuries [1]. The general assumption regarding the training of workers in health and safety is that education increases safe behavior [2]. Many experts also believe that by providing the proper training to employees in the workforce, the number and severity of work-related injuries will decline [3]. In one study it was uncovered that brief education on ergonomics was found to be effective [4]. In addition it was found that this training improved worker ability to apply learned knowledge at work [4]. Conversely, it was reported in the same study [4] that the effectiveness of ergonomics training and the techniques used to facilitate learning are not easily found in literature. In addition, it was reported that an insufficient amount of research which discusses the reason for barriers to ergonomics education [4]. Some have argued that minimal importance placed on ergonomics education as a method of preventing workplace injuries [5]. However, it was found that personal interactive training with an expert was most beneficial [6] and that when that when used in combination with other methods of injury prevention, training can be effective [7]. Because of inconsistent initial findings, further review of the literature is needed.

Statement of the Problem

The purpose of this paper is to compile further information to help determine whether the effectiveness of training on lifting techniques has been found to be beneficial. It is presumed that there is a lack evidence truly supporting the effectiveness of training in proper lifting techniques provided to employees in the
workforce. More recent research indicated that there is no evidence to support use of advice or training in working techniques with or without lifting equipment for preventing back pain or consequent disability [8]. "Findings challenge the overwhelmingly popular methods of educating the workforce on proper lifting techniques" (p. 1) [8]. However, back schools and safe lifting classes appear to have been in existence for many years and it would seem that a great deal of research may be available on the topic which either support or refute certain research results and further address the problem statement herein.

With the advent of the first back school, they have become more widespread [9] with one of the main goals being to provide education to patients so that they are accountable and active participants in their own health and safety [9]. In any health and safety course, including ergonomics, the issue of responsibility for one's own actions is frequently highlighted and when conducting future review of the literature, the interest in the end results will be amplified. Again, because of somewhat conflicting reports, additional literature review is warranted. In this paper we address the following research questions:

1. Is sufficient research on lifting techniques training available?
2. Has training on lifting techniques been found to be advantageous?
3. Have the most effective training techniques be identified?

It is being hypothesized that there is an insufficient amount of research regarding the effectiveness of training on lifting techniques, and reports that training is beneficial are uncertain. Along with this, it is assumed that most valuable training techniques have also not yet been identified.

**Methods**

In order to gather the desired information and respond to the research problems, a more detailed literature review was conducted. Various databases were searched including the Educational Resources Information Center (ERIC), Science Direct, Web of Knowledge, as well as, Academic Search Premier and Google Scholar. The keywords used to find research relating to the topic were: lifting, training, education, ergonomics, effectiveness, and efficacy. Along with exploring various databases for literature, a further more detailed review of the reference lists provided in obtained studies were also reviewed to find information on the desired topic. Although there may be hundreds of studies on topics related to ergonomics,
review of the literature does not indicate a massive amount of research is present that specifically addresses the effectiveness of training on lifting technique. The research and studies that do exist appear to be outdated, further justifying additional research specifically on training effectiveness. Along with determining the impact and effectiveness of training in the future, the correct and most useful techniques should also be identified. This however will require additional and most likely longitudinal research.

**Results**

As expected, locating sufficient and solidifying research studies that specifically address the topic of effectiveness of training on lifting techniques proved difficult to uncover. The aforementioned hypothesis stating an insufficient amount of research regarding the effectiveness of training on lifting techniques appears to be accurate. Prior research conducted on the specific topic is not explicit and there are inconclusive and conflicting results. Although a few studies related to the specific topic are available, the research which specifically addresses the effectiveness of training on lifting techniques is limited. Research in 2008 [4] found that brief ergonomics education was effective and improved worker ability to apply learned knowledge, however this research was specific to office ergonomics, not specifically to lifting techniques. The research that is available on this specific topic indicates that there is uncertainty as to whether training in lifting techniques is truly effective. Although one review of the literature found that there was no evidence supporting the effectiveness of training on lifting techniques [8], there was little mention of the type of training technique used as well as the role work related factors may have played in the effectiveness of training. Although another study found that a specific lifting technique resulted in fewer stresses on the back and reduced likelihood for injury when lifting [11], there was very little mention of how effective training may be provided to employees to inform them of the most beneficial technique to utilize. It was also reported in this study that further analysis is needed to confirm results and recommendations were made to perform future studies on the topic. These key components of injury prevention training appear to be overlooked.
Along with these findings, while it was found that personal interactive training was most beneficial [6], it was also reported that the significance the study has to those in the workforce was uncertain because the subjects used were not workers. This creates some uncertainty in the usefulness of their results in future training and research. It was reported that workers on the job were observed using proper body mechanics that were superior to those in the group who did not receive training [11], however, it was mentioned that because follow up did not occur, the future effects of the provided training were uncertain. Aforementioned research by stating that training had no benefit on lifting techniques [8] conflicts with other research [4, 6-7, 11]; however, despite conflicting results, it appears that there is a greater amount of research supporting rather than refuting ergonomics training effectiveness. To further support training effectiveness, one study revealed that the conclusion from several narrative reviews has been that most training interventions lead to positive effects on safety knowledge, adoption of safe work behaviors and practices, and safety and health outcomes [12]. Proper education and training can be effective in obtaining an increase in the number of employees using newly taught working methods and a decrease in the number of reports of work related discomfort [13]. Unfortunately, although various studies indicate that when training is delivered adequately positive results have been seen, these results are not specific to training effectiveness on lifting techniques. However, future trainers would benefit from the understanding that if proper training techniques are used, benefits may follow.

**Fatigue**

One commonly considered factor in injury prevention is the effect fatigue plays on workers, however, this important factor was infrequently mentioned in research on lifting and back safety. Subsequent to training, fatigued workers revert back to awkward lifting postures [14]. Furthermore, it was mentioned that "if workers do not maintain the use of safe techniques, the effectiveness of training is severely diminished" (p. 493) [14]. Further research regarding the effect fatigue has on lifting postures is needed as this will have an effect on not only training effectiveness but perhaps employee use of proposed proper lifting technique. If fatigue is not properly considered during any given job task involving lifting, training and application of knowledge, no matter how beneficial
the learners may find it, may not be utilized correctly [14]. Similarly, additional work related factors should be considered and were not regularly mentioned in identified studies including the fact that incorrect handling techniques leading to back pain or injury may be related to other work related factors and not merely technique [8]. As ergonomist know, job modifications which are engineered to meet the needs of the user are the most ideal solution. If barriers in the work environment are present, training employees how to perform a lift which is already unsafe is not likely to change the outcome.

Reverting Back

Further collection of longitudinal research was mentioned regularly in the review of the literature and must be considered in future research studies as well. Many past researchers question whether training intervention had a lasting effect on the lifting techniques used [9]. The general assumption is that over time, employees may revert back to former undesired behaviors. Merely attending a training session does not necessarily mean that safe behaviors will follow [15]. This seems especially true over the long term. Despite a few studies which support training effectiveness when delivered properly, more recent research reported more specifically that training on lifting techniques did not result in a decrease in back injuries a year following training [8]. Because of these results which are specific to the topic of lifting techniques the need for supplementary longitudinal research to determine whether employees revert back to former habits following training and if so, how can training help illicit the desired behaviors and ensure the behaviors are sustained over the long term. In addition, work related and environmental factors must also be considered in future research as these factors may either benefit training or increase barriers to its effectiveness.

Learner Engagement

One method of increasing awareness is to engage learners. As training becomes more engaging, workers gain a greater level of understanding and ultimately the number of injuries decrease [12]. Although active engagement is a commonly accepted method used to train adult learners in any given training session, results were not specific to lifting training. Future trainers should be mindful of actively engaging learners in the classroom or work setting rather than just spitting out
information. In further support of active learner engagement and participation, results showed training to have a significant effect upon knowledge of ergonomics [16]. Additionally, they reported that ergonomics training affects employee behavior. However, their research also found that training alone does not improve job satisfaction and may actually produce adverse effects. Along with this, their research was not performed over the long term. Trainers and future researchers must consider the implications training has on employee job satisfaction as this too may affect injury and illness rates. For training to be effective, trainers must be aware of the specific job tasks employees perform and be able to make a training session applicable to those job tasks [16]. Along with this, trainers should actively involve those in the classroom and move away from traditional methods of teaching towards a participatory approach of learning [16]. Research by [11] supported these findings and further states that training and back safety should be conducted during the first few years of employment as training may prevent poor lifting techniques by employees.

There appear to be a variety of explanations why ergonomics training sessions either end in success for failure. Many of these surround the training technique, which as earlier mentioned has not thoroughly been examined on the specific topic of training effectiveness on lifting techniques. Along with this, it appears there often times is a greater emphasis on training itself such as the mention of the use of proper lifting techniques for a specific job task rather than a greater importance on actual job redesign and ergonomics solutions [2]. Effective training along with appropriate job modification to incorporate ergonomics solutions should be considered and provided concurrently to obtain ideal results.

In summary, after a review of the literature, it appears the aforementioned hypothesis is correct in that although a few studies support ergonomics training effectiveness, an insufficient amount of research is available specifically on the effectiveness of training on lifting techniques. However, there appears to be more support for training and its effectiveness rather than contradictory findings. Although several research studies indicate ergonomics training is effective when delivered appropriately, the results, although not specific to lifting training, have been found to be advantageous when the appropriately applied teaching
techniques are incorporated, including active engagement and interactive class sessions. These results, and utilization of advantageous teaching techniques, will help future ergonomics trainers avoid pitfalls and deliver the most effective course to increase the likelihood of success. Further research will be needed to determine the effectiveness of training on lifting techniques using the beneficial methods mentioned here.

**Discussion**

In light of somewhat conflicting and insufficient research studies, and because training in lifting techniques is very commonly used in businesses despite the concrete support of research, it would be beneficial for further longitudinal studies to be performed to determine the true effectiveness of training on lifting techniques and support the beneficial results of training mentioned in this paper. Although various research suggests certain training techniques are beneficial, such as interactive training and active engagement, further research supporting the use of these techniques would assist future ergonomic trainers in delivery of the most effective class. More specific and longitudinal research using various identified training techniques should be conducted to solidify results. Along with this, additional information including demographic statistics such as age and gender which were not included in research thus far may further enhance knowledge of the barriers faced. Management commitment is another very important factor not often mentioned in research and it would be interesting to determine what role this plays in the success or failure of a class on correct lifting techniques.

During training and instruction, another important factor that must be considered is that of the different personalities and characteristics of both trainer and trainee. Although the personalities of both educators and learners will not change we may be able to further enhance learning if we become aware of the impact of their differences [17]. Using different techniques to increase active participation of students is a must. Thereafter, we must be able to know with some certainty that the training delivered is effective and without additional research and evaluation of training effectiveness, any training provided may remain controversial. The use of job site specific aspects in a training program can have a positive affect employee behavior [16]. Employees must receive a form of reinforcement when
learning about job tasks they perform. Without this reinforcement, employees may revert back to old undesirable behaviors. Accomplishing this however can be challenging when time allotted for a class is less than two hours and not repeated more than annually. Results of future research on the effect of behavioral learning theory applied to the effectiveness of training on lifting techniques would be very useful for future trainers on the topic.

Further longitudinal studies are clearly needed to clarify whether training on lifting techniques is beneficial and employee desired behaviors can be sustained over sufficient period of time. Along with factors such as the type of training technique used, such as active participation and engagement of learners, the incorporation of the safest and most beneficial lifting technique must also be provided to employees. In addition, factors including fatigue, work related and environmental factors should also be highly considered in future research to determine the impact these factors have on training. Ensuring these factors are accounted for with the support of research will help future trainers recognize the training techniques that should be used in order to increase the overall effectiveness of training on lifting techniques.
References