

EVALUATING THE DISSEMINATION OF RESEARCH FINDINGS IN THE REAL WORLD

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ABSTRACT

Recommendations derived from laboratory research that have the potential to improve the health and safety of workers, are not always precisely implemented when disseminated in the “real world.” In a study examining a brief training to promote frequent visual rest breaks to decrease eye strain in computer users, the correlation between compliance with the intervention and eye strain was evaluated. This article describes some of the inherent difficulties with conducting this type of research, and may be helpful for those designing a similar study of their own.

INTRODUCTION

Many researchers have identified factors that affect the interaction between the worker and the environment. The safety, health and well being of workers have improved significantly over the years as a result of the discovery of this knowledge. Learning the true nature of the interaction of different work processes on the health and performance of the worker often times requires the controlled environment of a laboratory setting. This helps the researcher be clear on precisely what the influences are most likely to be. However once the hypothesis is accepted as valid, generalizing the recommendation to the general public for implementation is fraught with inconsistencies and uncertainties. It is not always clear if the beneficial process identified in the research environment results in an actual benefit to the worker when implemented in the real world.

In this study the healthy computing habit of visual rest breaks was investigated. Many investigators have described eye strain as being associated with prolonged computer use, Woods, (2005) and Rossingnol, (1987) among others. Some investigators have identified visual rest breaks as helpful in decreasing eye strain in computer users such as Balci, (2003), Swanson, (1989), and Galinsky, (2000). However this healthy computing habit is not widely practiced by the growing number of computer users experiencing eye strain. Experience tells us that merely explaining a potential benefit to workers does not necessarily result in an immediate change in worker behavior. Those workers who do implement a recommendation to improve their health and well being frequently individualize the recommended behavior change and do not implement in a manner entirely consistent with the original research findings of the most effective intervention. This study evaluated the effectiveness of a brief 20 minute training in causing a change in behavior to incorporate frequent visual rest breaks into the work routine of computer users. The compliance of the workers was then evaluated and correlated with change in eye strain as measured before and after the intervention. The small positive correlation between

compliance and improvement in eye strain seemed to support the effectiveness of the intervention, and these results are reported elsewhere. This paper focuses on the lessons learned in studying the implementation in the real world of a researched ergonomic recommendation.

RECRUITING PARTICIPANTS

After identifying a population likely to benefit from the research finding you would like to promote, getting participants is not as easy as it seems. In this study on visual rest breaks, three different employers who had employees that used a video display terminal (VDT) four or more hours per day were approached. In the largest employer (2,000 employees), the idea was supported by a Safety Department staff member. After approval by the Safety Department director, a presentation to the Safety Committee, which included the various department managers, was prepared and delivered. After approval of the managers to allow their employees to participate, a somewhat passive mechanism to recruit was implemented and managed by the Safety Department staff person. The researcher did not have direct access to the employees. Approximately 25 persons participated in the study, and there were many incomplete data sets.

A second employer of approximately 100 employees allowed the researcher to present directly to the staff with no manager present. Approximately 20 persons agreed to participate. The group was fairly homogeneous with females who had been on the job for the most part 5 years or less. The incomplete data sets were a problem for some, but the compliance with the outlined intervention was very poor, even if the data returned was complete. The researcher did not have direct access to the participants during the study except through email, and the pick up of the data was coordinated through a secretary.

For the final employer group, the Vice President of a large IT department was approached and approved the project. It was then presented in his presence and with his endorsement to his Department Directors, and several of the smaller departments agreed to participate. The employees of these departments were mostly men and many had been with the employer over 10 years. (Average was 7 years for the group as a whole.) The employees of these smaller departments signed up during staff meetings and presentations were offered at a number of times for convenience. The researcher had email access and could access the employees personally to deliver training and collect the final data sheets. Almost 50% of those who signed up participated, and with several trips a full data set was completed for most of the participants.

In recruiting participants in the work place for a study on the dissemination of pertinent research findings, the factors that seemed most supportive to the project were 1) the visible support of management from a high level; 2) direct access to the participants by the researcher to explain the process, answer questions, and encourage participation; and 3) approaching employee groups who have a long term relationship with their employer.

STUDY DESIGN

The design of the study affects the compliance of the participants a number of ways. A simpler, straightforward design that helps the participants imagine how their contribution fits into answering the research question is important to encourage participation. Even more important, is

the complexity and frequency of the responses requested. In this eye strain study, the participants were to provide eye strain reports three times prior to the intervention, and three times after the intervention. This proved problematic in that participants sometimes submitted three reports at the beginning but only one at the end, or some participants were enthusiastic and submitted four or more responses instead of three, and sometimes a work schedule prohibited the submission of three consecutive reports.

The eye strain indexes were collected using a web based tool, and because the participants used computers extensively as a part of their employment, familiarity with computer use was not a problem. However the consecutive inputs for the web based tool keyed from the individual computer the participant used to submit the report, and some participants submitted both from home and from work, or they were issued a new computer during the four week intervention time, and these issues made linking the pre- and post-intervention data challenging. Also four weeks is too long for many people to remember a code number to identify their submissions. Many of the submissions needed to be matched based on dates submitted and demographic data to link the full data set. In the end, names were used and people were asked to help identify their data, and then the names were later dropped to guard confidentiality. Other data submitted were completed using a paper and pencil format, and could more easily be completed a second time if lost.

In an attempt to increase the rigor of the study, a wait treatment design was originally envisioned. That is, after signing up participants, one group was given the intervention immediately, and the other group was asked to wait four weeks to serve as a control group, and then given the intervention at that time. The measure of the eye strain index at the beginning and then after the four weeks of waiting was to serve as a comparison of the variability of eye strain without the intervention. However the drop out rate for the wait treatment group was very significant. In four weeks of non-involvement many employees lost interest or changed job responsibilities or went on vacation or medical leave and did not participate.

For a complete look at other factors that may be variables in this intervention, four additional data sets were collected. These included demographics, visual health, characteristics of the job, and characteristics of the work station. The additional different data sets each participant was required to complete increased the odds that at least one piece of the data would be missing or unusable. Because the multiple sets of data were retrieved at different times of the study, participants were not always clear that one more response was requested.

When designing a study that will involve participants in the “real world” a greater success for enthusiastic participation and complete data sets may be achieved if the following considerations are taken into account, 1) minimize the number of active responses required by the participants, 2) make the responses as concrete as possible with a way to verify any confusing or missing data immediately, 3) begin the intervention and/or data collection as close in time to the decision to participate as possible to capture the highest level of enthusiasm and commitment, 4) help the participant track where in the process of data collection they are to make sure they complete all portions of the data collection.

MEASURING COMPLIANCE

In this study, the compliance with the recommended frequent visual rest breaks was one of the two primary variables. It was anticipated that just because employees received a 20 minute training that explained the value of engaging in frequent visual rest breaks, not all employees would automatically be fully compliant. Therefore a pre- and post- intervention comparison of the mean of the eyestrain index was not an appropriate analysis. Rather a correlation between compliance and improvement in eyestrain was the anticipated finding. So a measurement of compliance was needed.

Two different measures were used. In one measure the participant was asked to make a tic mark for every time a brief visual rest break was taken for each work day of the four week intervention period. Then at the end of the day the number of hours at the computer was to be recorded. In this way a somewhat precise measurement of the rate of compliance could be generated, dividing the number of breaks by the number of hours worked. This was completed comprehensively by a few participants, but not consistently by most. Also, when each day's data were compiled to result in one final number to correlate with the change in eye strain index, it did not account for a gradual change over the four weeks of compliance or a gradual drop off in compliance over the same time frame. The form that the participants filled out was originally designed to be a cue to action as it was bright yellow cardstock and kept in view on the participant's desk. However the completion of the data proved to be too onerous for most participants.

The other compliance measure was simply a mark on a 10 cm line indicating whether the participant perceived they had been compliant with the visual rest breaks. The anchors were not at all on the left and consistently on the right. The value of this simple measure was that at the end of the study, even those who did not comply or participate could quickly record a measure of compliance that could be compared with the eyestrain index. It seemed to better represent the overall compliance better than the individual day's data, and it was less subject to incorrect data entry.

Although the two compliance measures did correlate with each other ($r_s=.567$, $p=.009$), it was not as strong a correlation as anticipated. There were some participants with the same measured compliance who had a perceived compliance that was very different. Interestingly the perceived compliance correlated with eyestrain change more strongly than the measured compliance. (Perceived compliance and eye strain change $r_s =.480$, $p=.032$, measured compliance and eye strain change $r_s =.445$, $p=.049$).

If your research question includes a measure of the compliance of your "real world" participants, consider carefully how it will be measured. Who is collecting the measure of compliance, and is the task too onerous for the person completing the task? Is the measure valid for the compliance construct you intend to evaluate? Especially if the other variable to be collected is a subjective measure, think carefully about the participant's perception of his or her compliance and how that may influence the subjective response or vice versa. Finally, try to devise a compliance measure that can be quickly and accurately completed by those who choose to be non-compliant or only partially compliant so that level of response is accurately reflected in your data pool.

THEORETICAL BASIS OF TRAINING

Training employees to follow ergonomic recommendations is a frequent method of trying to bring about changes in work practices. How the training is structured and delivered affects the results. Many trainers are aware of some of the principles of adult education such as engaging the participants to increase attention and understanding. In this study a Health Promotion and Education theory was used to maximize the effectiveness of the training delivered. In the Health Belief Model, the intervention is considered to be more likely to produce a health behavior change if the person *perceives* they are *susceptible* to the negative condition to be prevented, if the condition is perceived as *severe*, and if the *benefits* are perceived to be greater than the *barriers* to engaging in the behavior. (Janz, 2002)

The training was designed to be brief (20 minutes) so that it could most easily be added to an existing staff meeting without taking the full time. The prevalence of eye strain associated with VDT use was described to highlight *susceptibility*. Eye strain is not currently recognized as a *severe* condition, although as a society we do not know what 40 years of long term VDT use will do to our eyes. The changes in eye function associated with eye strain that have been measured in the laboratory were highlighted. The previous effectiveness of visual rest breaks in research studies was explained to emphasize the *benefits* expected. A group discussion was facilitated to identify possible *barriers* to participation and problem-solve ways to overcome the barriers.

Self efficacy is a theoretical construct that has been added to the Health Belief Model as well as several other models of health behavior change. Self efficacy is, “One’s confidence in one’s ability to take action.” (Janz, 2002, pg. 49). This confidence in the ability to carry out the behavior requested helps people more successfully incorporate requested changes in their routines. To develop this confidence in the participants of this eye strain study, actual practice of the frequent visual rest break was included as a part of the training. The mnemonic 20-20-20 was suggested, (Anshel, 1998). That mnemonic suggests that a person should every 20 minutes look at least 20 feet away for 20 seconds. Using a string to clearly demonstrate how far away 20 feet is, the shift in the visual focus was practiced so that participants had a physical sense of what the rest break felt like in an effort to increase self efficacy.

Finally, looking at the research that is being done on habit change, which is a little different than a health behavior change, the need for individualization becomes apparent. Swartz (2002) suggests that habits are the result of an interaction of individual disposition and history with external cues and circumstances. In this study, participants were encouraged to individualize the suggestions offered. Although the research supporting brief, frequent visual rest breaks as being more effective was discussed, participants were encouraged to find a cue in their environment or a routine that would work for them. Every twenty minutes illustrates frequency, but the frequency has to fit the work habits and style of the individual. This is obviously not as precise as the research findings, and that was the purpose of this study. If research findings are presented to workers in the “real world”, would the workers experience improvement in subjective symptoms as suggested by the research even if the recommendations were individualized?

COMPLIANCE WITH THE INTERVENTION OR THE STUDY?

One caution should be considered with research of this type. In order to obtain a full set of data to successfully analyze whether an ergonomic training session has been successful in producing a change in habit or work process, the researcher strives to encourage the participants to fully complete all phases of data collection. However the compliance with research participation is in fact different from compliance with the suggested intervention. After designing the study, carefully check your compliance measure and your data collection safeguards to make sure they are not contaminating each other. The method of understanding whether the participant has complied cannot affect that compliance, or your results will be confusing. In this study, the collection of the daily tic marks was originally meant to also serve as a reminder to comply with the visual rest breaks. However in the end, some participants said they had in fact increased their visual rest breaks, but had not completed the full compliance record. The discrepancy between measured compliance and perceived compliance added confusion to the results, and now it is not clear whether the recorded compliance measure of daily tic marks actually measured compliance with the intervention or with data collection.

CONCLUSION

Obtaining similar results in the “real world” when research findings are disseminated to employees is important in validating the value of the original research. This article outlines suggestions and concerns in carrying out studies of this nature. It is more effective to recruit participants directly and with the visible support of upper management. Direct access by the researcher for both recruitment and ongoing contact is also very helpful. The type of participant response should be carefully considered in the study design to maximize complete data sets. Compliance as a variable can be measured both objectively and subjectively, and the choice of how to measure this variable will greatly influence your results. Structuring an ergonomic training session using an evidence-based theory template may improve the effectiveness of the delivery of your information. Finally, carefully examine the two different responses of compliance with the intervention and compliance with data collection. Studying the effectiveness of research findings in the “real world” is challenging, but a valuable perspective of the true effectiveness of research findings.

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