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MANAGEMENT VERSUS NON-MANAGEMENT KNOWLEDGE TRANSFER FROM
TRAINING TO REAL WORK ENVIRONMENTS: A META-ANALYSIS

THESIS

Robert P. Toney, Captain, USAF

AFIT/GEM/ENV/07-M15

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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AFIT/GEM/ENV/07-M15

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THESIS

Presented to the Faculty

Department of Systems and Engineering Management

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In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Engineering Management

Robert P. Toney, BS

Captain, USAF

March 2007

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MANAGEMENT VERSUS NON-MANAGEMENT KNOWLEDGE TRANSFER
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Abstract

This study reviewed 78 articles from previous research to investigate the effects of factors in the organizational environment on training transfer. A meta-analysis was performed with training transfer as a dependent variable and post-training independent variables of supervisor support, subordinate support, peer support, workplace support/transfer climate, relapse prevention, goal setting, continuous learning culture, task constraints, and frequency of use. In addition, analysis of differences in the relationship of these variables with training transfer based on training type (management versus non-management training) was conducted. Results of the meta-analysis revealed training transfer sample-weighted means effect sizes were largest for relapse prevention ($d = .84$), and supervisor support ($d = .73$) and that differences in effect sizes were found depending on whether training was management or non-management in nature. The study's limitations along with suggestions for future research are discussed.

To my wife and children. Thank you for all you have endured during this time. Your love and support made this all possible. You give me direction and purpose.

Acknowledgments

I would like to express my heartfelt appreciation to my faculty advisor, Dr. Michael Rehg for his guidance and support throughout the course of this entire process. His knowledge and guidance made the learning process throughout this period an experience I will always remember. I would also like to extend my gratitude to my thesis committee member, Lt Col Daniel Holt, for his attention to detail and superb guidance in making this thesis a product that I am proud to call my own.

Robert P. Toney, Capt USAF

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MANAGEMENT VERSUS NON-MANAGEMENT KNOWLEDGE TRANSFER FROM TRAINING TO REAL WORK ENVIRONMENTS: A META-ANALYSIS

I. Introduction

Millions of dollars are spent on training every year by business, civic, and military organizations alike, and for good reason. The importance of training personnel, and the transfer of that knowledge gained in training to workplace behavior, has huge impacts on organizational performance, be it private or public. The independent investigation into the March 2005 accident at a BP refinery in Texas City found a lack of process safety training contributed to the accident's occurrence (BP US Refineries Independent Review Panel, 2007). Breakdowns in the response to hurricane Katrina in the areas of command and control, in coordination of Joint Task Force Katrina, and in the National Guard, were all partially blamed on a lack of training (US House of Representatives, 2006). Indeed, in a recent survey by PriceWaterhouseCoopers, the number one response of global CEOs to a question about what one achievement they would consider their legacy, 21% "concerned employee issues (developing talent and skills through training and creating a great working environment)" (PricewaterhouseCoopers, 2006: 37).

The importance of training is supported by the statistics on how much organizations spend on training their employees. KLA Tencor has a training budget of \$41.8 million per year and spends 200 hours of time per year on training. (Noe, 2005). Lee (1988) found that organizations spend an estimated \$40 billion annually on formal education and training, while Holton, Bates & Ruona (2000) estimated total expenditures

exceeded \$ 200 billion. Are organizations getting their money's worth? It has often been cited that only ten percent of total training leads to positive transfer of the skills obtained during training (Georgenson, 1982, Kupritz, 2002). Lim and Morris (2006) noted this and found that learning outcomes are becoming broader in scope, beyond the obvious outcome of learning, to include individual outcomes like self-esteem and organizational outcomes like profitability. Perhaps it is true that other outcomes of training are important, but the difficulty of transferring knowledge from a class setting to the workplace has been shown to be quite a complex process with many individual and situational level variables coming into play (Colquitt, LePine & Noe, 2000). There has been a virtual explosion of studies on the effectiveness of training, to the point where at least four meta-analyses on various aspects of the training literature have been done since 1997 none of which looked at the same aspect of the subject (Alliger, Tannenbaum, Bennett, Traver & Shotland, 1997 - training criteria; Colquitt et al, 2000 – training motivation; Arthur, Bennett, Edens & Bell, 2003 – design & evaluation features; Taylor, Russ-Eft & Chan, 2005 – behavior modeling training). Transfer of training has been a part of these studies, but by and large has not been the focus of previous meta-analyses. Given the presumed importance of transferring knowledge from training to the workplace, this is somewhat surprising. How much do we really know about what impacts the transfer of training? One fact about training that stands out is that it is conducted on almost any subject imaginable - including task-specific training, such as how to operate machinery (Warr, Allen & Birdi, 1999), drug and alcohol safety (Pidd, 2004), to managerial-related training including supervisory skills (Burke & Baldwin, 1999; Cromwell and Kolb, 2004), core management skills (Enos, Kehrhahn, & Bell,

2003) and even MBA degrees (Cheng, 2000; Camuffo & Gerli, 2004). Obviously, not all training is alike, and the differences may affect likelihood to transfer. An administrator who takes a typing class probably has a better chance of transferring that knowledge to the job than an executive who takes a leadership class being able to transfer what she learned back to her job as an executive. Managerial knowledge is fuzzy, tasks are complex, and outcomes are often not specifically measured, which we believe is going to make it that much harder to transfer. Against this backdrop, management and leadership training has seemed to become a focal point for many organizations. (Use WSJ article on executive training). MBA degree programs at some of the premier business schools are starting to emphasize the “soft skills” in their programs, in the face of demands for employees with skills such as “communicating and brokering compromises....” (Dvorak, 2007: B3). Even the Swiss Army has begun to market a course in decision-making and leadership skills for corporations, in which they try to solve case studies based on military history (Taylor, 2006).

Regardless of how much immediate learning occurs during training, if that skill or knowledge is not practiced and incorporated into the trainee’s daily routine, supported by others in the work place, the newfound knowledge or skill will fade quickly or become irrelevant. Reinforcing behavior that is not in sync with previous training may have other consequences as well, such as lower morale, commitment, or intent to remain with the organization. Given the vast differences between what employees are being trained to learn about, and the importance being placed on management training, it would be instructive to investigate the differences between management training and more task specific or technical training and the ability to transfer knowledge from those different

types of subject areas. We found that, despite in-depth review of 78 articles on the training process, and a cursory review of many others, no previous studies have treated training as anything other than a homogenous event. While management training has been explicitly studied, it hasn't been empirically compared to other types of training, in the ability to transfer knowledge back to the workplace. We think there is an important distinction between types of training, which may affect the ability to transfer knowledge from training to the workplace. In making this distinction, we are also focusing on situational factors affecting transfer, as that is where the distinction between training types comes into play. Management concepts in the classroom are not any more difficult to grasp than technical concepts, but their application to real world situations is not well defined. Going back to the example of learning a skill like typing, what you do on a keyboard in a training environment is exactly the same as what you do in your job, if you perform a typing task. Management knowledge, on the other hand, is often situation-specific, so that while learning the concepts is not difficult, transferring them back to the situation-specific workplace is not like typing, or any task-specific knowledge, in general. The contribution this study makes to the training literature is 1) to explicitly compare the transfer of managerial-related training with other types of training, from formal settings back to the workplace, which to our knowledge has not been previously researched; and 2) following the recommendation of Alvarez, Salas & Garofano, 2004, that more research is needed on the effect of organizational characteristics on training outcomes, we investigated the situational factors influencing training transfer. Is management training more difficult to transfer than other types of training, and what organizational factors affect training transfer? We believe that an empirical comparison of the transfer of

management-related training will show smaller correlations and effects than the transfer of other types of training back to the workplace. We use a meta-analysis of previous research to conduct this comparison.

II. Literature Review

Training has been studied for quite some time, as far back as the early 1900's researchers were investigating training transfer (Webb, 1917). Kirpatrick's (1960) study laid the groundwork for modern studies on training, and proposed the concept of training being a linear process of pre-training motivation, learning, training performance and transfer outcomes. Much of the progress and theory development on training or learning transfer began in the 1970s and thrived in the 1980s through the present. In research studies since 1980 independent variables commonly found to play a role in the process included cognitive ability, locus of control, self efficacy, career/job attitudes, organizational commitment, decision/reaction to training, goal setting, behavioral self management (also known as relapse prevention), peer support, supervisor support and transfer climate. As further development of the training process model has taken place (Noe, 1986, Tannenbaum, 1991), the linearity of the process has been challenged (Alliger and Janik, 1989; Alliger et al., 1997,). Colquitt et al (2000), using meta analytic path analysis, found support for a partially mediated model of the training process, in which distal outcomes (such as personality, age and climate) explained as much as a third of the total variance explained than accounted for by more proximal variables, and led to a better-fitting model. Previous research has often overlooked organizational and situational variables (Tannenbaum, Cannon-Bowers, Salas & Mathieu, 1993). Thus, this study will use meta-analysis to closely examine the post-training environment, and what has been found in terms of the situational effects on training transfer.

Earlier Meta-analyses

As mentioned above, none of the previous meta-analyses conducted since 1997 were focused specifically on the post training environment and the transfer that occurs in relation to it. Alliger, Tannenbaum, Bennett, Traver, and Shotland (1997) conducted a meta-analysis using 34 studies on the relations of training criteria, based on Kirkpatrick's (1959a, 1959b, 1960a, 1960b) model composed of training reactions and post-training measures of learning retention and behavior/skill demonstration. It was a replication of a previous meta-analysis by Alliger and Janak (1989).

A meta-analysis conducted by Authur, Bennet, Edens and Bell (2003) focused on studies that evaluated relationships between specified training design and evaluation features that support the effectiveness of training in organizations that essentially focus on the immediate training session. A portion of their study looked at post training behaviors in relation to the work environment. Their results found an effect size $d = 0.62$, from 122 studies with a combined sample size of 15,627 for behavioral criteria. Thus, in relation to the training design and post training effects, Arthur et. al, (2003) found that what was applied to the job may be a function of the post-training environment for the performance of trained skills. He went on to describe that a positive work environment is favorable to applying newly trained skills.

Colquitt, Le Pine, and Noe's (2001) meta-analysis culminated literature based on training motivation, its antecedents, and its relationships with training outcomes such as declarative knowledge, skill acquisition, and transfer. Their research found that personality, age, and climate justified incremental variance in motivation to learn, declarative knowledge, skill acquisition, post-training self-efficacy, reactions, transfer,

and post-training job performance. Work climate and transfer are found in this study but only as a side bar to the main focus of the work. The data presented produced a beta of .12 between transfer of knowledge and climate. The climate variable was not divided between supervisor or peers, but lumped together in an overall work climate as was found in the present meta-analysis. Goal setting and relapse prevention are absent in this study altogether.

The current meta-analysis is different from the previous studies in that it is concerned only with variables directly related to transferring knowledge to the job in the post-training environment. This study incorporates 28 studies concentrated on post-training interventions that resulted in 84 separate meta-analyses.

Background on Training Transfer

Transfer of training can be defined as “knowledge, skills and attitudes learned from training that are generalized to the job context and maintained over time” (Baldwin and Ford, 1988). Because so much money and resources are being devoted to training, it can be inferred that maximizing the transfer of knowledge and skills obtained during that training back into the workplace is the main objective. Two basic types of training are formal and informal training. An example of informal training is on-the-job training, where as formal training can be as simple as a classroom environment with a set curriculum or as complex as an independent school dedicated to an array of curriculum. The transfer of knowledge gained in formal training, conducted outside of the job, is the focus of this study.

The term training transfer is described as trainees effectively and continually applying the knowledge, skills, behaviors and cognitive strategies to the workplace. (Noe,

2005) Noe also describes two descriptive levels of training transfer such as generalization and maintenance. Generalization of training is the ability to apply the acquired content such as verbal knowledge and or motor skills directly to the work environment which are similar but exactly the same as those found in the training session. The process of using trained abilities continually through time is Training Maintenance.

Baldwin and Ford (1988) created a model of the transfer process. This model shows that both training inputs and training outcomes have direct and indirect effects on conditions of transfer. Working in reverse as the model shows with linkage six, training outputs of learning and retention have direct effects on conditions of transfer of generalization and maintenance. The model theorizes that both trainee characteristics and work environment have direct effects on conditions of transfer. This means that even if skills are learned they may not be maintained due to a lack of a positive transfer climate or work place support. Trainee characteristics, training design, and work environment all have indirect effects on conditions of transfer because they each are directly related to training outputs.

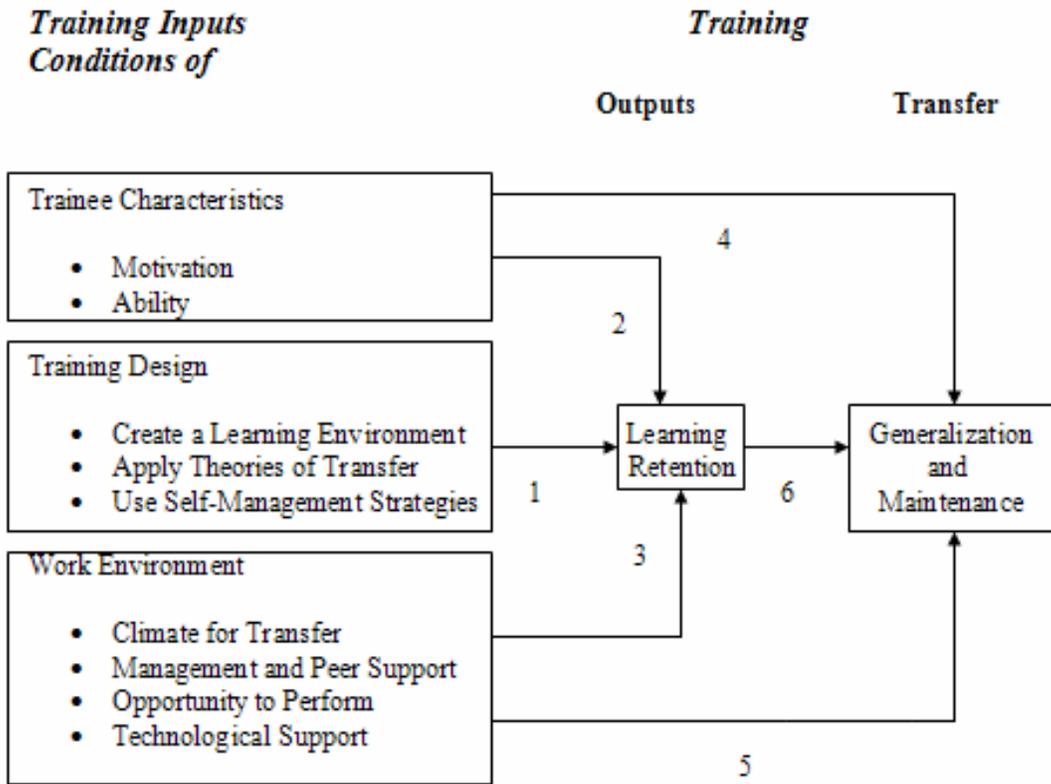


Figure 1. Training Transfer Model (Noe, 2005)

Cheng (2001) describes two models, one from Kirkpatrick's (1987) views on training evaluation, and Tannenbaum et al.'s (1991) recommendation's for training effectiveness that when combined give the four critical stages of the training process: Pre-training motivation, learning, training performance and transfer outcomes. Pre-training motivation refers to the intended effort towards mastering the content of a training program. Learning is the process of mastering the content of a training program. Training performance is the measurement of the extent of what a trainee has achieved in a training context. Transfer outcomes are those attainments made by the trainees when they apply what they have acquired in a training context back to the job, which can benefit both the trainees through better production and higher appraisals as well as the

organization also through higher production and better application of their resources. Some examples of such attainments are behavior change, perceived post training attitudes, perceived transfer of training, job performance, skill maintenance, etc.

Post training interventions

A recurring theme in writings is that traditional approaches to learning are deficient because they focus only on the period of acquisition of skills within a training process (Leifer and Newstrom, 1980). Leifer and Newstrom (1980) proposed that broadening this traditional perspective might enhance transfer to include strategies for three time periods—before, during, and after training programs. The literature has focused primarily on the period after training as the crucial time to facilitate positive transfer (Feldman, 1981; Leifer and Newstrom, 1980; Wexley & Baldwin, 1986). Wexley and Baldwin (1986) went on to say that two post training strategy concepts more familiar to organizational researchers are behavioral self-management, also known as relapse prevention, and goal setting .

Post training interventions entail obtaining feedback from trainees and implementing some type of behavioral self-management training (Cheng, 2001). Two examples are relapse prevention training and goal setting, both of which may encourage the employee to retain more of what was learned (Marx, 1982; Morin and Latham, 2000). Relapse prevention is a program designed to enable people to foresee probable obstacles in the environment and within themselves that will hurt their ability to follow through with the trained behavior as well as planning responses to cope with those obstacles.

Behavioral Self-Management Training

According to Richman-Hirsh (2001) self-management training is the same as relapse prevention. Marx (1982) brought these ideas into the workplace by developing a relapse prevention model for managerial training. Self-management training, as it is called now, involves teaching people to assess potential obstacles to performance, monitor ways in which the environment facilitates or hinders performance, plan coping responses when faced with those obstacles, and administer rewards upon successfully avoiding or overcoming obstacles (Gist, Bavetta, and Stevens, 1990; Noe, 1986; Wexley and Baldwin, 1986; Richman-Hirsh, 2001). According to this literature relapse prevention and behavioral self management should be treated as the same variable.

Relapse Prevention

Relapse prevention has its origins in combating addictive behaviors like drug abuse and over-eating. Analysis of several groups revealed that circumstances causing an initial lapse in behavior after treatment had major implications for further slips and eventual resumption of the addictive behavior. (Marlatt and Gordon, 1980) They constructed a theoretical model to prevent setbacks in attaining freedom from the behaviors plaguing those in treatment.

Marx (1982) proposed a model of relapse prevention to help give managers the necessary cognitive and behavior skills to prevent minor lapses from turning into full scale. The original model created by Marlatt and Gordon (1980) for addictive behaviors can be easily used for managerial training because it views maintenance behavior from a perspective that locates determinants of treatment failure and when those are identified

they can be exploited during daily activities to prevent a relapse into pretraining behaviors.

Many of the empirical articles detailing relapse prevention use it as part of the experiments when measuring training transfer. A training program selects a group of trainees to go through one of two to three training sessions. One is a control that only entails the basic material to be applied in the workplace. The alternative class(es) have a follow-on session to teach relapse prevention skills.

Marx's (1986) article on relapse prevention gave 7 steps to follow beginning with: setting a skill maintenance goal, operationally define a slip and relapse, detail the advantages and disadvantages of applying the new skills, learn 14 specific transfer strategies which consist of both cognitive and behavioral strategies, predict the trainees first slip, create skills to cope with that slip, and monitor their progress back on the job. Burke (1997) found that relapse prevention significantly, positively affected the trainees' ability to transfer and desire to transfer. Relapse prevention is important because it enhances the employee's ability to continue using the methods obtained during training by resisting the temptation to backslide into old pre-trained habits which is imperative to giving the trainee more opportunities to replicate the trained behaviors at work.

Burke and Baldwin (1999) used these seven steps for one group and steps 4,5, and 6 for a modified relapse prevention test group. The results concluded that in a non-conducive transfer climate the full (RP) training was better than the modified, but in a good transfer climate the modified (RP) training was more effective because the other steps of the full RP training were not needed to combat the poor transfer climate.

Goal Setting

“Goal setting is a theory of employee motivation regarding task performance.” Morin and Latham (2000:567). Goal setting has repeatedly been shown to be an effective motivational strategy to induce behavioral changes through a variety of settings (Locke & Latham, 1984). Goal setting theory states that trainees will apply recently acquired knowledge to the work environment when given a skill use objective (Tziner, Haccoun, and Kadis, 1991). Researchers report that behavioral targets do lead to higher transfer levels.

Wexley and Baldwin (1986) state that up to 1986 training literature seriously discussed assigned and participative goal setting as possible post training transfer mechanisms. Research suggests that trainees should be given defined behavioral goals after completing a training program. They go further to say trainees and supervisors should monitor the extent of the goal achievement through progress reports back on the job.

Morin and Latham (2001) conducted a study to measure training transfer with goal setting and mental practice with self-efficacy as an intervening variable. Their sample included 41 supervisors and engineers from a pulp and paper mill. They found that goal setting alone does not always cause an effective transfer of training intervention, but has more effect when combined with some other style of mental practice. They noted a limitation was the small sample size and it contradicted earlier studies conducted by Wexley & Baldwin, (1986) and Wexley & Nimeroff, (1975).

Supports in Organization

The work environment that trainees return to can have as much an impact on transferring the knowledge and skills acquired as on the learning itself (Kupritz, 2002). A supportive work climate in which reinforcement and feedback from co-workers are obtained is more likely to result in transfer of skills from the training environment to the work environment—that is, trainees are more likely to use the skills acquired in the training program on the job. (Noe & Schmidt, 1986) Cromwell and Kolb (2002) define transfer climate as work environment factors perceived by trainees to encourage or discourage their use of knowledge, skills, and abilities learned in training on the job. Without a supportive transfer climate in the work place there is a high probability that most of the training will not transfer in the long term.

Yanmill and McLean (2005) describe Holton's (1996) model on "factors affecting training transfer" with respect to transfer climate in conjunction with motivation to transfer and transfer design. Holton believed that transfer climate and transfer design were vitally important along with individual motivation to instill a transfer of knowledge. Yanmill and McLean (1996) explain that Holton's model lacks background theories and conceptual framework to fully understand what types of organizational environment supports employees as they apply the knowledge, skills, and attitudes gained in a training program to their job. They attach what they perceive as the necessary theories to Holton's model such as theories of expectancy, goal setting, identical elements, organization, principals, and near and far transfer. They propose that those background theories combined with Holton's model will give human resource directors the understanding that performance change and solutions are derived from many factors and

to resist focusing on one or two alone. They highlight Rouiller and Goldstein's (1993) conceptual framework for operationalizing transfer climate through two types of workplace cues from which eight distinct dimensions are reviewed. The two cues are situational cues that help the trainees remember the opportunities at their workplace to use what they have learned and consequence cues which is the feedback received after having applied the knowledge learned during training (Yanmill and McLean, 2005).

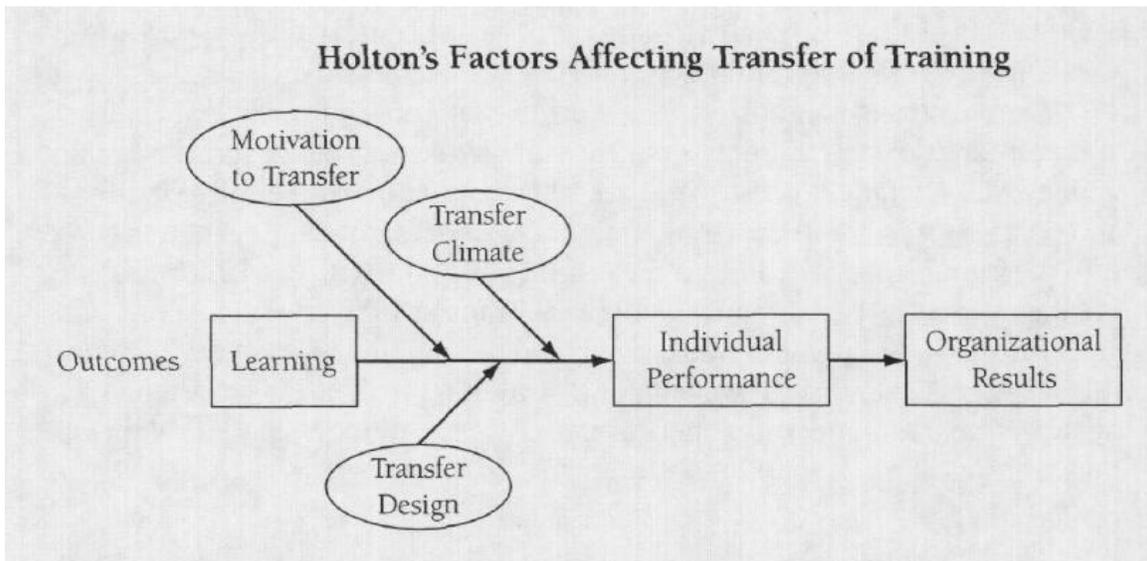


Figure 2 Factors Affecting Transfer of Training (Yanmil and McLean, 2005; Holton,1996)

Supervisor Support

Bates, Holton and Selyer (1996) define supervisor support as the extent to which supervisors reinforce and support the use of learning on the job. (Cromwell & Kolb, 2002) The extent to which managers/supervisors encourage, tolerate, or discourage newly acquired skills by the trainee has an equally profound effect on how well those skills are retained. (Ford et al. 1992; Huczynski and Lewis,1980; Axtell et al., 1997) If the supervisor creates an environment that is hostile to change leading to the newly acquired skills not being practiced, then the trainee is less likely to incorporate the skills

at the workplace, and very little transfer results. The opposite also holds true. If managers are supportive then employees feel more comfortable to practice the skills, which will lead to greater transfer of knowledge. (Ford et al. 1992; Axtell et al. 1997)

Cromwell and Kolb (2004) found in their study that trainees who received higher levels of supervisory support retained and used more of the trained knowledge than those that did not. Their findings on supervisor support were noteworthy since the data came from employees in a supervisor skill-training program and their managers concerning transfer and perceptions of support.

Peer Support

Peer support is the same as supervisor support but the positive or negative influences stem from the trainee's co-workers with whom interaction occurs. Empirical research on the importance of peer support relative to transfer of training has increased in recent years (Bates et al. (1996); Facticeau, Dobbins, Russell, Ladd, and Kudisch (1995); Holton et al., 1997). Holton et al. (1997) reported data showing peer support along with five other factors had a correlation with learning transfer ($r = .83$). Cromwell and Kolb (2004) stated Bates et al. (2000) found that peer support was a significant predictor of learning transfer. Their own research found that peer support had an F statistic of 8.163 ($p < .001$), providing further evidence that peer support for trainees is very "influential" on the training process. Cromwell and Kolb also found that the higher levels of support provided by the trainee's peers indicate that the trainees were also applying recently learned skills to a higher level.

Opportunity to Use Training

The opportunity to use the skills and knowledge obtained in a training session has a definite effect on true training transfer. Ford et al., (1992) conducted an empirical study with graduates of an Air Force technical training program and their supervisors and found that the factors contribute to their opportunities to perform trained tasks on the job.

Donovan et al. (2001) along with Ruona, Leimbach, Holton, & Bates (2002) stated that opportunity to use training was an influencing factor of training transfer.

Continuous-learning Culture

Tracey, J., Tannenbaum, S., and Kavanagh, M. (1995: 241) define continuous-learning work environment as "one in which organizational members share perceptions and expectations that learning is an important part of everyday life." Individuals working in such an environment will believe that education and learning is essential to them and their careers (Cheng, 2001). Such a culture in an organization further enhances the feeling that using the trained content is encouraged and expected. The common thread between these constructs is that they all enhance the trainee's probability to use the trained material at their work place, which is crucial to fully transfer the material. As long as the worker is restricted or refuses to incorporate material acquired in training then real training transfer will not occur.

Chiaburu and Tekleab (2005) hypothesized that trainees who perceive that the company embraces a continuous learning culture will have higher levels of training motivation. They found that continuous learning culture is directly related to trainee motivation, which was related to training maintenance, but strong support was not found

for training transfer. Regression analysis showed learning culture was significantly related to supervisor support ($\beta = 0.46, p < 0.001$), but the relationship between continuous-learning culture and training motivation was not significant ($\beta = 0.05, p < 0.10$) when supervisor support was entered into the equation (Chiaburu & Tekleab, 2005). Cheng (2000) also found similar results from a study of MBA graduates in their organizations. He found continuous learning culture to be significantly correlated with motivation to learn ($r = 0.2, p < .1$).

Research Questions and Hypothesis

On the basis of transfer models and data from empirical studies in the prior sections, this study addressed the following questions:

1. Hypothesis one: the frequency of using trained tasks on the job site will have the strongest impact on generalization and maintenance of moving the trained tasks to the job.
2. Hypothesis two: supervisor support will have the highest effect size (d) related to training transfer followed by peer support, goal setting, relapse prevention, and continuous learning culture
3. Transfer of managerial-related training will have smaller effect sizes than studies conducted using non-managerial related training.

III. Methodology

Literature Searched

The research included in this meta-analysis range from 1970 to 2006. We employed electronic searches including Google Scholar, ABI Inform, InfoTrac OneFile, Business Source Premier via the Ohio Public Library Network, Psych Info, ERIC, Social Sciences, Dissertation Abstracts, and the Air Force Institute of Technology (AFIT) multi-database Search. Publications included research data from journals, books, book reviews, and conference presentation or paper materials. Electronic searches were conducted with key word combinations beginning with “training transfer” as a primary search with the secondary searches containing “quantitative”, “supports in organization”, goal setting, supervisor support, peer support, and “relapse prevention.” These word combinations were used primarily in the OPLIN multi-database search and the AFIT Library multi-database search engines. The Google Scholar search engines key words contained “training transfer” as a primary and either “managerial, empirical, or quantitative” as a secondary. Articles that were retrieved from the database searches were scanned for relevant titles and the abstracts were reviewed. Articles whose abstracts contained applicable variables including relapse prevention, goal setting, peer support, supervisor support, continuous learning culture, opportunity to use training, and behavioral self-management training were saved electronically and printed. In addition, manual searches were conducted of the Journal of Applied Psychology, Personnel Psychology, International Business Review, International Journal of Human Resource Management, Journal of European Industrial Training and Development, Journal of Occupational

Psychology, Academy of Management Journal, Applied Psychology and International Review back to 1990. Bibliographies of four previous meta-analyses were also reviewed for relevant articles. A search of non-published material from theses and dissertations was conducted for any research on training transfer. Authors of relevant articles and books such as Baldwin, Burke, Latham, and Marx were contacted for said unpublished data or information on alternative locations to search.

Inclusion Criteria

As the basic goal of this study was to empirically examine training transfer in the workplace, three basic criteria were applied to determine article inclusion in the study. One, the research had to include the use of transfer of training as a dependent variable. Therefore, we excluded studies that used dependent variables such as *intent* to transfer or *motivation* to transfer, as these measures were not of actual transfer in the workplace. In addition, we restricted this criterion to the measurement of transfer in the workplace. Studies that measured trainees immediately after the training (such as a reaction measure), but before they returned to their job were not included. However, we did not discriminate on *how* transfer was measured. Some examples of the various ways training transfer has been measured include perception of transfer, knowledge transfer, task performance, workplace behavior, etc. These measures have been self-reports as well as supervisor or peer reports. Secondly, we focused on variables related to what occurs in the workplace, and excluded studies that did not include any measures of workplace related factors, such as supervisor support or transfer climate. Thus, studies that were limited to personality variables (which were often conducted as experiments), were not included. The third criteria applied was the article had to contain basic data points from

empirical studies such as sample size, and at least one test statistic such as F, t, r, or effect size (d) statistics related to training transfer. Aside from purely qualitative studies, several articles were excluded due to not reporting statistics related to the relationship between the independent variable and transfer of training. This study took the different test statistics and converted them into one effect size statistic (d) as described under Calculating the Effect Size Statistic (d) and Analyses below.

Articles were subdivided into three categories for purposes of the analysis. One category included all studies that met the basic criteria above, regardless of the type of training. The other two categories that the articles were segregated into were management-related training and all other types of training. If the type of training was not specified, it was included only in the overall meta-analysis that included all studies. If the type of training was non-managerial, then the article was part of the comparison group of literature. A critical decision is what to call managerial-related training. Some articles examined training in skills that would be used by managers in performing managerial duties, such as communication, decision-making, and negotiating, which we included in the managerial category. Many of the non-managerial studies dealt with simple job performance training such as bank tellers initial training. Training in areas such as computer skills, automotive diagnostics, or basic sales training were classified as non-managerial.

Rejected Studies

One of the main reasons for rejection of an article was lack of a training transfer variable. Many of the searches both hand and electronic unearthed work performance studies that focused on how individuals performed on their jobs without a connection to

any type of training. Some of them focused on performance evaluations and how environmental support would increase the score of those evaluations in relation to that performance. Many of the independent variables from this meta-analysis were found in a variety of studies that examined parts of training other than transfer along with work performance studies.

Some researchers had a transfer variable, but it was either evaluated directly at the end of the course as knowledge regurgitation or a Likert questionnaire, or it was given some point in the future but the trainees were not in their work setting. A recurring example is an academic course taught either at a collegiate business school or an MBA program where the students do not return immediately to a job to be evaluated (Gist, Bavetta, and Stevens, 1990, 1991). Another related rejection cause is the lack of a direct link between training and the related transfer. A leadership or management course taken some point in the past by different people at different times does not substantiate a scientific link between the training and the performance of the “trainee” (Chen, Takeuchi and Wakabayashi, 2005)

A large discriminator was the lack of any of the selected post training independent variables. A large body of transfer research dealt with constructs that focused on trainee characteristic variables such as motivation to transfer, locus of control, conscientiousness, anxiety, age, cognitive ability, and self-efficacy, and training design features concerning the learning environment or actual implementation of the training session. A vast majority of the studies searched on training transfer were more focused on these types of variables. This is consistent with findings reported by Alvarez, Salas and Garofano,

2004, who found individual characteristics to be more widely researched than organizational characteristics in their 10-year review of training literature.

Calculating the Effect Size Statistic (d) and Analyses

This study uses the Hunter and Schmidt (2000) method of meta-analysis of the d statistic as the common effect-size metric. Test statistics such as correlations, F and t statistics were all converted to d statistics where the d statistic was not already available in collected studies. Hunter and Schmidt (1990) gives all appropriate formulas for converting each of the statistics. Data analysis was performed using a software package related to Hunter and Schmidt's (1990) formulas and code. Arthur and others (2001) used an SAS PROC MEANS meta-analysis program. This study used Comprehensive Meta Analysis version 2.2.032. Sampling error is reduced when larger sample sizes are weighted against other smaller samples. (Hunter & Schmidt, 1990) A confidence interval (CI) of 95% will be used for the weighted mean d.

Correction of correlations for unreliability was done where possible. Many times reliability values for measures went unreported, and in these instances we did not substitute any other values.

Coding Accuracy and Inter-rater Agreement

The coding process was done by the author as follows. First, a training session was held in which instructions on the inclusion criteria as described above were given to the thesis committee, so that they understood what to look for in each article. Then, the author and committee coded seven articles for initial review, as a test to see how well the coding was performed between the three raters, and resolve any differences or

misunderstandings of the criteria. The thesis committee agreed on 100% of the articles, while all three coders agreed on 90% of the articles, which went to 100% after discussion of differences. After all questions and issues were resolved the remaining 71 articles were coded by the author and committee chair.

IV. Results

The objective for this meta-analysis was to examine the effect of post-training factors on transfer of training, and compare transfer success based on type of training. The results of the meta-analysis are presented below in Table 1 and show that the effect sizes for all variables are positive. The effect size results will be discussed with respect to each variable.

Supervisor support had a mean weighted effect size of .726 (SE of .037) for all studies, .686 (.039) for management studies, and 1.413 (.158) for non-management studies. The total analysis contained 15 correlations to be cumulated with an un-weighted total sample size of 3338, and of these 14 were management studies. Only one study had a negative effect size to be cumulated. One study in the analysis produced four correlations to be included as four separate studies with two of them statistically significant at a p of .05. Another study produced three statistics. Nine of the fifteen studies were significant at the same level or higher.

Peer Support was only represented in three managerial studies, which had a total sample size of 1266, a mean weighted effect size of 1.104 with a standard error of .066 and a variance of .004. All effect sizes were positive with two of the three being statistically significant to a level $p=.05$ and $p=.001$.

Subordinate support was found in two studies as a separately studied independent variable while gathering data on other variables. From a sample of 1241, its effect size was 1.310, and its standard error was .068. Though there were only two studies the

sample size was fairly significant. Since the effect size was so high, closer attention should be paid to this support variable in future studies of training transfer.

Some articles included in this study did not evaluate peer support, supervisor support, and continuous learning culture as separate variables. Those studies measured them together, sometimes with other workplace environmental support variables and reported them as “workplace support” or “transfer climate.” Since the aspects of influence on training transfer were combined, this study conducted a separate meta-analysis including that variable.

Workplace Support/Transfer Climate for all 25 effect sizes had a mean weighted effect size of .499 (.029), $N = 5326$; an effect size of .346 (.038) for the management studies; and .643 (.06) for the non-management studies. For management training, this analysis included nine studies with 16 data points for an unweighted total sample size of 4877. There was one negative effect size which was close to zero. Six out of the fifteen positive effect sizes were significant at a p value of .05 or better. For non-management training, four studies produced 9 effect sizes, with a total N of 1880.

Relapse Prevention included a total of 11 effect sizes, with a total $N = 1038$, and an average effect size of .835 (.073). In the management category, the analysis revealed a mean weighted effect size of 1.305, a standard error of .103 and a variance of .011. There are six effect sizes that were pulled from three studies. Their total unweighted sample size is 629. Two studies reported a significance level of .01. Non-managerial analysis resulted in a mean effect size of .367 (.103).

Goal Setting research netted 16 effect sizes with a mean of .459, $N = 1224$. Managerial studies had a mean weighted effect size of .270 with a standard error of .107 and a variance of .011. There were only two applicable studies of which eight statistics were pulled. There was only an unweighted sample size of 388. There were no p values reported for any of these studies. Non-managerial studies had a sample size of 836 and showed a mean weighted effect size of .582 (.067).

Three management studies were found that included task constraints as an independent variable. The total N equaled 1535. The effect size was very small at .067 with a standard error of .052.

Only one study was found containing Frequency of Use. It qualified as a non-management study and only had a sample size of 123. The effect size was moderate at .473 with a higher standard error of .188.

Continuous Learning Culture reported 10 effect sizes with a mean of .377 (.068), $N = 936$. Managerial studies had a mean weighted effect size of .304 with variance and standard error of .074 and .005 respectively. Three studies were found containing this variable with respect to training transfer as a dependent variable, but five effect sizes were obtained from them. The sample size was 761, but only one of the studies reported a significance level of .05 for p. Non-managerial studies found a mean weighted effect size of .762 (.171).

Table 1. Meta-analysis results of post-training variables on training transfer by training type

Independent Variable	Training Type	K	N	Effect Size (d)	Std Error	% Variance Due to Sampling Error	95% Confidence Interval
Supervisor Support	All	15	3338	0.726	0.037	1.60	0.653 – 0.8
	Mgmt	14	3096	0.686	0.039	1.70	0.61 - 0.761
	Non-mgmt	1	242	1.413	0.158	4.30	1.102 - 1.723
Peer Support	mgmt	3	1266	1.104	0.066	2.30	0.975 - 1.232
Subordinate Support	mgmt	2	1242	1.31	0.068	2.00	1.176 - 1.443
Workplace Support/ Transfer Climate	all	23	5326	0.499	0.029	1.30	0.442 - 0.555
	mgmt	14	2943	0.577	0.031	1.80	0.517 - 0.636
	Non mgmt	9	1880	0.643	0.06	2.10	0.524 - 0.761
Relapse Prevention	all	11	1038	0.835	0.073	2.60	0.693 - 0.977
	mgmt	6	629	1.305	0.103	2.80	1.103 - 2.484
	Non-mgmt	5	409	0.367	0.103	4.60	0.166 - 0.568
Goal Setting	all	16	1043	0.342	0.065	2.70	0.215 - 0.469
	mgmt	8	388	0.27	0.107	5.00	0.06 - 0.469
	Non mgmt	8	655	0.455	0.072	3.20	0.313 - 0.597
Task Constraints	mgmt	3	1535	0.067	0.052	2.50	-0.034 - 0.168
Frequency of Use	Non mgmt	1	123	0.473	0.188	8.50	0.105 - 0.84
Continuous Learning Culture	all	10	936	0.377	0.068	3.10	0.244 - 0.51
	mgmt	5	761	0.304	0.074	3.60	0.159 - 0.449
	Non-mgmt	5	175	0.762	0.171	6.60	0.427 - 1.096

Hypothesis Testing

Hypothesis one stated that the frequency of using trained tasks on the job site will have the strongest impact on training transfer. It could not be fully tested in the meta-analysis, as only one study that examined trainee's ability to use trained tasks on the job met the criteria for inclusion. That study that was included found an effect size of 0.473, which ranked near the bottom of influential variables related to training transfer in the non-management category. Many authors referenced Ford et al., 1992, agreeing that without using what was trained the knowledge acquired would be diminished (Arthur et al., 1998). Most of the empirical data found in articles was merged to make up one of the workplace support variables. Most often only one aspect of a post training questionnaire incorporated the data on ability to use trained tasks. (Tracey et al. 1995, 246)

Hypothesis two stated that independent variable effects on training transfer would be ranked in the order of supervisor support, peer support, goal setting, relapse prevention, and continuous learning culture. It was not supported by the results of the analysis. Relapse prevention had the largest effect size followed by peer support, supervisor support, and workplace support/transfer climate in that order. Task constraints, continuous learning culture, and goal setting showed lower effect sizes. Goal setting had the lowest sample size even though the number of statistics it produced was greater than all but two of the variables. Two other analyses were conducted using statistics from studies that fell outside of the inclusion criteria of this study. One included all of the studies found that had some sort of transfer dependent variable, contained one or more of the appropriate independent variables, but did not meet the criteria of

measuring transfer back at the trainees work environment or the training was non-management related. 'Frequency of Use' was included with this analysis because it also pertains to how much training is transferred back to the job. It was not included on the main analysis because no articles measuring frequency of use fit the criteria. The third analysis used all the articles to observe the over-all combined effect after relaxing the criteria. Two other articles were integrated here that fit well but did not provide enough details to determine whether they were in the management or non-management training category.

Hypothesis three stated that transfer of managerial-related training will show smaller effect sizes of the independent variables than non-managerial related training. This hypothesis was supported for the independent variables of supervisor support, transfer climate, goal setting, and continuous learning culture. It was not supported for the relapse prevention variable, and couldn't be tested for peer support, subordinate support, task constraints or frequency of use due to lack of studies in one category or another.

V. Discussion

Introduction

The focus for this meta-analytic study was to examine post-training variables specifically as they relate to the transfer of managerial training. Much of the previous research deals with some aspect of management training. There were 78 studies analyzed for inclusion in the study, with only 28 accepted. Four of the seventy-eight journal articles found for the overall category were non-managerial training programs. Even without looking at training transfer within a managerial context, it seems that very few studies attempted to look so closely at the post training area of Baldwin's transfer model.

The results across every variable examined showed a positive effect size d ranging from .27 to 1.305. Task Constraints, Continuous Learning Culture, and Goal Setting were all mildly significant. Workplace Support/Transfer Climate was found to be moderately significant with an effect size d of .577, whereas Supervisor Support, Peer Support, and Relapse Prevention ranged from moderately significant to greatly significant.

Several interesting findings resulted from reviewing the literature on training transfer. Not surprisingly, training transfer has been measured in many different ways, although many authors used Baldwin and Ford's (1992) definition of transfer. The difficulty of measuring training transfer may be one reason its measurement has varied. Most studies used questionnaires with Likert scales, on a five point or seven point scale pertaining to the transfer, while others used an interview process. Time between the end of training and the evaluation of transfer varied completely from study to study. Some

only waited a couple of weeks while others went as long as five years. Researchers also varied on the number of times the transfer evaluation occurred. Once, twice and sometimes a third evaluation took place to test the trainees if the skills they acquired were still being utilized at their workplace. The transfer variables that researchers evaluated differed widely. Some examples include, post training behavior, on-the-job-skill usage, application knowledge, reported competence, behavioral change, use of trained skills, job performance, transfer outcomes, perceived training transfer, transfer of learning, managerial skill utilization, or some variant of each of them. Without a coherent idea of what constitutes transfer, it is difficult to generalize findings across studies of training transfer.

In terms of the source of the data, some researchers used the supervisors of the trainees to give their feedback along with trainee self report data, or separately on how much of the training seemed to have transferred back to the workplace. This also is not consistent between articles and is individualized for each study. Other researchers used test data to make the claim for transfer. Often, an immediate post test would be administered following the training session and then some point in time later, a second test would be given to see if the scores remained the same, increased or decreased.

Past Findings

The results of a meta-analysis are the culmination of many individual research studies that each had their own unique findings and flaws. Those results and limitations need to be brought forward for examination in comparison with the averaged results of the meta-analysis. This gives a deeper understanding of what has been found previously to

validate the present findings. The following variables all include results from studies that contain the management training aspect unless otherwise specified.

Supervisor Support

One of the hypotheses of this study stated that supervisor support would have the largest effect size in relation to the other variables, but that was not the case. Awoniyi's (2002) study found a correlation of 0.11 with supervisor support and concluded that there was not enough evidence to support the notion that supervisory encouragement increases the transfer of training. Fecteau (1995) found a correlation of .36 on training transfer with respect to supervisor support – a strong and highly significant finding with 967 subjects.

Peer Support

Peer support was infrequently measured as a stand-alone variable. It was discussed frequently in studies, but was usually included with other factors that make up transfer climate or workplace support. There were three correlations contained in the three studies found. A combined sample size of 1108 gives the findings significance even though the number of studies (k) is low. Fecteau (1995) found that peer support was positively related to perceived transfer which reflected that managers who believed their peers were supportive of their training efforts had a greater perceived transfer of those skills. Enos, Kehrhan, and Bell (2003) reported a weak correlation between peer support and transfer. Cromwell and Kolb (2004) found a very high correlation, but it was only evident one year after the training had occurred. They state that peer support

networks deserve attention although many of the subjects report sometimes they are “too much in touch”.

Transfer Climate/Workplace Support

Transfer climate/workplace support had the highest combined sample size of 5326 in 14 studies, with 23 total correlations. Cromwell and Kolb (2004), and Tracey et al. (1995) had very high correlations with statistical significances of .001 and .01 respectively. Cheng (2000) was the only study to have a negative impact on transfer with respect to transfer climate. Clark (2005) reported a correlation of .26 for transfer climate where others such as Tziner and Haccoun (1991) , Enos et al. (2003), Burke and Baldwin (1999), and Nijman, Nijhof, Wognum and Veldcamp (2006) all reported correlations ranging from .06 to .18 which are slightly significant to moderately significant.

Relapse Prevention

The relapse prevention variable was only found in six studies that met the criteria, but those studies yielded 11 data points to cumulate in this meta-analysis. The combined sample size totaled 1038. Individual studies like Richman-Hirsch (2001) basically found no correlation between self management strategies and transfer. She stated that self-management principles are relatively new in the workplace and fairly complex for both trainees and trainers alike. That could have had an effect on the face validity of the intervention which in turn could have affected the effectiveness over transfer. Tziner and Haccoun (1991) found significant correlations for transfer and stated their finding supported Wexley and Baldwin’s (1986) claim that relapse prevention may be beneficial

to training programs. Burke and Baldwin (1999) also had a significant correlation between relapse prevention and transfer.

Goal Setting

Goal setting, like relapse prevention, also had a low number of studies to be included in this analysis. Of the five studies found, 16 data points were extracted for a population size of 1043. Richman-Hirsch reported slight to moderate correlations for transfer. Brown's (2005) four data points ranged from a negative correlation with respect to proximal goals and training generalization to a moderate to high correlation for proximal goals and training maintenance. Goal difficulty on both generalization and maintenance were slightly significant. Wexley and Baldwin (1986) found that assigned goal setting along with participative goal setting both had significant positive effects on maintenance transfer. Morin and Latham's (2000) findings however contradicted Wexley and Baldwin by their finding that goal setting by itself is not an effective training transfer intervention.

Continuous Learning Culture

Only four studies were found within the limitations of this study that reported findings on continuous learning culture. Of those studies, 10 correlations were found with a total sample size of 936. Chiaburu (2005) examined the effect of his selected independent variables against skill maintenance, skill generalization, and perceived transfer. Of the three he found little to no correlation. Cheng (2001) found that continuous learning culture was a significant predictor of perceived learning and skill transfer. Tracey et al. (1995) found an even greater significance and said that continuous

learning culture can influence specific behaviors associated with a particular training program. One thing that seemed to become clearer as the research data was examined is that continuous learning culture could probably be included with Transfer Climate/Workplace support. The reason being is that its definition varied across studies, but each had an underlying theme of positive organizational influence for training to occur throughout ones career and support would be given to nurture or help transfer it back to the job to improve performance of the trainee.

Task Constraints and Frequency of Use

Task constraints were found throughout the search for relevant studies but only one was included in the study. It does not serve the purpose for a meta-analysis, but it helps show what has been found in terms of the constructs of this study and to further its use for the future. Frequency of use as a variable was not included in the primary meta-analysis but counted in the second analysis. As with task constraints there was only one instance of its use found in relation to this study, but its application in the future findings would be interesting.

Limitations and Implications for Future Research

One major limitation of this meta-analysis is the low number of studies found and included. Studies that included supervisor support and workplace support were located most often. Relapse prevention and goal setting were difficult to locate in relation to training transfer as defined in this study and even more when restricted to this meta-analysis' conditions. This study looked at each of the independent variables' direct relationship with training transfer. Due to the low number of studies and the restricted

data found for those same studies, moderator analysis could not be accurately performed. Effects of goal setting and relapse prevention could possibly be influenced by workplace support aspects as moderators and should be examined in subsequent studies. Burke and Baldwin (1999) found that relapse prevention only seemed to make a significant impact when workplace support was low. When supervisor or workplace support was high, the behavioral self management techniques were not needed to reinforce the ability to continue to use the trained tasks.

Future research should examine these variables again, but they should report all findings such as variance, significance, and control data. More research needs to be done on the workplace variables with respect to management training to compare with other types such as basic skills training. Team training was not included mainly because of the lack of support, relapse prevention, and goal setting variables in relation to training transfer. More quality studies conducted will result in greater numbers to include in a meta-analysis to increase the validity of the findings and the ability to generalize those findings to other areas of training. A majority of the studies in this analysis only reported the means, standard deviations, N of participants, and correlation matrices. Most studies with variables supervisor support, peer support, workplace support, and continuous learning culture reported significance levels where studies with goal setting and relapse prevention had very few reports of significance levels.

Conclusion

In conclusion, this study identified several post-training variables from past literature that seemed to show a positive effect on trained knowledge and/or behaviors to transfer back to the trained individual's workplace. A meta-analytic procedure was used

to evaluate the effectiveness of those variables on the transfer results quantitatively. The results of this study suggest that if a supportive work environment exists in any form, that there is a greater chance to transfer recently trained skills back to the workplace. The analysis also shows to a lesser extent that self behavior management and goal setting can help influence transfer. Hopefully the results of this study will help other researchers design and execute additional studies to build on what has been found so far to give more validity to these and past findings. Also upper management and immediate supervisors may benefit from these findings to help make the most out of their organizations training budget and their employees' time.

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14. ABSTRACT This study reviewed 78 articles from previous research to investigate the effects of factors in the organizational environment on training transfer. A meta-analysis was performed with training transfer as a dependent variable and post-training independent variables of supervisor support, subordinate support, peer support, workplace support/transfer climate, relapse prevention, goal setting, continuous learning culture, task constraints, and frequency of use. In addition, analysis of differences in the relationship of these variables with training transfer based on training type (management versus non-management training) was conducted. Results of the meta-analysis revealed training transfer sample-weighted means effect sizes were largest for relapse prevention ($d = .84$), and supervisor support ($d = .73$) and that differences in effect sizes were found depending on whether training was management or non-management in nature. The study's limitations along with suggestions for future research are discussed.					
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