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HEALTH PROMOTION PROGRAMS

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The present study reviews comprehensive worksite health promotion programs and their cost effectiveness. It was hypothesized that by conducting a qualitative meta-analysis of the literature in this area, it would be possible to reveal a general understanding of worksite wellness programs. Pelletier's (1991) meta-analysis of comprehensive industrial wellness programs was chosen as a model for the current review. The present author adds an additional category (program interventions) to Pelletier's work and studies published during or after 1990 were also incorporated into the present qualitative meta-analysis. Results suggest that the most common health promotion programs implemented by businesses are fitness, health risk appraisals and/or chronic disease education, tobacco cessation, nutritional awareness and/or weight control, stress management, and mental health services. In addition, the current study reviews many other factors associated with the cost effectiveness of worksite health promotion programs.

COST EFFECTIVENESS OF WORKSITE HEALTH PROMOTION PROGRAMS

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CHAPTER 1

INTRODUCTION

Health care is a major concern in our society today. Not only are medical expenses and insurance rates increasing but there is a limit to what the current medical system can do to prevent illness (Kennedy, 1991). However, another health philosophy, referred to as health promotion or wellness, takes a pro-active approach to fighting chronic diseases and accidents. This preventive medicine method focuses largely on health related interventions at an early stage in order to avoid the onset of disease (Hettler, 1978). This method is potentially very effective since cardiovascular diseases, cancer and accidents are the leading causes of death in this country and all three causes of death are significantly linked to a person's lifestyle (Prokop, Bradley, Burish, Anderson & Fox, 1991).

Health promotion programs help prevent chronic diseases and accidents by reducing individual risk factors that lead to illness and death (Shape: A Resource For Wellness, 1983). Examples of risk factors are cigarette smoking, obesity, dietary and exercise habits, drug abuse, ultraviolet light exposure and certain sexual behaviors (American Heart Association, 1991; The National Resource Center for Health Promotion, 1991; Prokop et al., 1991). Subsequently, employers have increased their awareness of the importance of reducing individual risk factors through implementing wellness programs in the workplace (Gebhardt & Crump, 1990). Another factor that has caused employers to implement health promotion programs is cost. Chen (1989) writes that "industry pays twice for the cost of health care: first through insurance premiums and then

through the economic burden for employee absenteeism, turnover, re-training, and premature death" (p.18). Due to the fact employers must absorb much of the nation's skyrocketing health care expenditures, it is logical that business organizations would introduce cost effective health promotion programs. The current author defines "cost effective," in this context, as a health promotion program that reduces the company's overall industrial costs.

The present study focuses on the cost effectiveness of worksite wellness programs. By using a qualitative meta analysis to summarize the data pertaining to the cost effectiveness of health promotion programs, this study addresses the lack of significant research in the area. This type of evaluation is needed because many employers predict health promotion programs reduce health care costs and other business expenses without providing data that supports this belief (Geisel, 1992). When employers do provide data about cost savings, their cost benefit ratios have received little consideration in published reports (Caldwell, 1992; Chovil & Altekruse, 1986). Therefore, it would be advantageous for businesses to provide cost savings data because funding agencies frequently require evaluations, managers use evaluative data for resource allocations, and evaluative reports add to the existing knowledge base in a research field. Unfortunately, many organizations lack cost effectiveness data to support their health promotion programs (Wagner & Guild, 1989).

A company's cost savings obtained from its health promotion program can be evaluated through a review of the literature which discusses the cost effectiveness associated with different health promotion programs. This is important since the research in this area has not been sufficiently generalized and

no global theories of worksite health promotion program cost effectiveness have been developed. By conducting a qualitative meta-analysis of the worksite wellness literature, it is possible to educate businesses about the cost savings health promotion programs may bring to a company and explain the importance of evaluating these programs thoroughly. This paper will discuss the current status of the research in the area of cost effective comprehensive worksite health promotion programs. Cost effective worksite health promotion programs are interventions that bring cost savings to an organization. This will be accomplished by reviewing the history of worksite wellness, stating the results of health promotion programs, explaining what intervention techniques are most useful and most often implemented into wellness programming, describing the cost effectiveness of these programs, addressing the research limitations of the studies reviewed and defining qualitative research and meta-analysis techniques.

HEALTH PROMOTION PROGRAMS AND THEIR COST EFFECTIVENESS

History

The idea that worksite health promotion programs are assets to a company has been applied in the distant past as well as in the present. For example, National Cash Register (NCR) established daily exercise breaks to increase productivity in the late 1880's . E. I. du Pont Nemours & Co. offered industrial hygiene programs and employee counseling in the 1940's and other organizations began to develop fitness and exercise programs in the 1960's (Federal Employee Worksite Health Promotion Case Study Project Summary Report, 1991). These

types of programs progressed into what we refer to today as comprehensive worksite health promotion programs.

The rise of these early preventive health programs in the mid 1980's not only resulted from reports stating alarming health care statistics, but it also coincides with America's technological development and increased investment and creation of service oriented industries (Frederick, Davis & Henningfield, 1989). Moving from a predominantly production oriented society into a service and professional culture fosters a more sedentary lifestyle (Gebhart & Crump, 1990). The practice of a sedentary lifestyle produces a risk of developing cardiovascular disease that is 1.9 times greater than that in an active population (Gebhart & Crump, 1990).

Health Promotion Program Outcome Measures

Once the history of worksite wellness is understood, current health promotion programs can be examined. Employee health promotion programs range from a single fitness class to company-wide, comprehensive programs. According to a 1985 survey by the Office of Disease Prevention and Health Promotion, 66 % of worksites with 50 or more employees had implemented some type of worksite health promotion activities (Muchnick-Baku & McNeil, 1991). Major studies, surveys and national resource centers identify the most effective health promotion programs. "Effective" is defined differently by each investigation.

There are three categories of measurements of effectiveness that are predominant in the wellness literature. They are physiological improvements,

direct and indirect cost reductions, and psychological benefits. All three categories use a plethora of specific criterion variables.

Physiological criterion variables assess the impact a certain health promotion program implementation has on a person's body. For example, the effects of implementing exercise classes, nutritional awareness and body weight are concerned with the physiological change in a person's percent of body fat (Browne, Russell, Morgan, Optenberg & Clarke, 1984; Prokop et al., 1991). Some other criterion variables that are categorized as physiological in nature are reductions in blood cholesterol, measurement of overall employee health status and increased cardiovascular ability (Baun, Bernacki & Tsai, 1986; Blair, Piserchia, Wilbur & Crowder, 1986).

The second category contains direct and indirect cost reduction factors as criterion variables. A few examples of direct cost reduction analysis are insurance data, disability claims and medical costs (Bowne et al., 1984; Gibbes, Mulvaney & Henes, 1985; Shepard, Corey, Ruezland & Cox, 1982). Examples of measures of indirect cost reduction are level of worker performance, job turnover and absenteeism (Tsai, Baun, & Bernacki, 1987; Shepard, Cox & Corey, 1981; Caudron, 1990). The last category is concerned with psychological criterion variables. These criterion variables range from general satisfaction, self esteem and motivation measures to stress reduction (Forouzesh & Ratzker, 1985). Even though all three categories are unique, they all relate to overall organizational cost savings.

Health Promotion Program Interventions

It is necessary to discuss the predictor variables or program interventions used in wellness research. Managers, medical directors and senior executives of 48 companies listed the following health promotion intervention categories as health priorities: chronic diseases, alcohol and other drug abuse, mental health, HIV infection, and tobacco use (Health Insurance Association of America, American Council of Life Insurance & U.S. Department of Agriculture 1990). Like the above survey, the United States Public Health Service has acknowledged six wellness intervention categories that are important to the development of a healthy lifestyle. They are smoking, alcohol and drugs, nutrition, exercise and fitness, stress control, and safety (Wellness at the Worksite: A Manual, 1990). Furthermore, the Federal Employee Worksite Health Promotion Case Study Project Summary Report (1991) lists the health promotion activities most commonly implemented to date. The top six interventions listed were tobacco cessation, weight control, nutrition, exercise, stress management, and disease risk education.

Just as the above resources have listed major wellness activities, The National Center for Health Promotion (1991) identifies six prominent risk factors that should be used to develop health programs. Smoking, hypertension, mental health problems, alcohol use, seat belt use and diet are the risk factors indicated. By combining these studies, surveys and databases, it is possible to itemize the most important worksite health promotion activities used by organizations today. Table 1 includes eight categories of health promotion program interventions. By reviewing studies that use the types of interventions listed above, one is able

Table 1

Major types of health promotion programs used in organizations

Health risk screening and education for chronic diseases
Alcohol and drug abuse counseling
Mental health services
Tobacco cessation
Nutritional awareness and weight control
Exercise and fitness
Stress management
Safety

to assess the impact of industrial health interventions. The most effective studies combine health interventions so that the worksite health promotion program is a comprehensive one (Pelletier, 1991). For this reason, the studies reviewed here will be comprehensive. Programs that have been defined as comprehensive are

> programs that provide an ongoing, integrated program of health promotion and disease prevention that knits the particular components (smoking cessation, stress management, coronary risk reduction, etc.) into a coherent, ongoing program that is consistent with corporate objectives and includes program evaluation (Pelletier, 1991, p. 312).

A comprehensive program study by Erfurt, Foote & Heirich (1992) implemented hypertension control, weight loss, smoking cessation and exercise as worksite health promotion activities. The study found that the above interventions, combined with follow-up counseling, resulted in health care cost savings for the entire company. Also, individual risk factors were reduced.

Another review (Elias & Murphy, 1986) cites several studies that implemented comprehensive programs. All studies discussed were comprehensive in breadth and demonstrate some correlation between program intervention and increased employee fitness, decreased individual risk factors and cost savings for the organization. Some studies discussed were the Prudential Study (Bowne et al., 1984), Canada Life and North American Life Study (Shepard et al., 1982), Tenneco Study (Baun et al., 1986), and the Blue Cross-Blue Shield of Indiana Study (Gibbs et al., 1985).

Pelletier (1991) discussed 24 major studies that have attempted to quantify the benefits associated with comprehensive corporate health promotion

programs. The evidence pointing to the success of programs in reducing medical and disability cost is solid. Pelletier (1991) demonstrates a growing body of documented quantitative and qualitative assessments of program cost effectiveness.

Hollander and Lengermann (1988) also add to the existing literature on worksite health promotion program implementation. Through use of a survey (n=247), these authors found that wellness activities in Fortune 500 companies are numerous and varied. They go on to explain that organizations reported they provide an average of 11 different activities, including hypertension screening and control, health risk assessments, alcohol or drug issues, smoking cessation, accident prevention, safety, fitness, weight control and nutrition, stress management, mental health information and counseling. These findings list the same type of activities that previous health promotion literature documented. However, needs assessments, evaluations and cost analyses were not addressed. This is highly unfortunate since the issue of cost effectiveness will remain unsettled until companies apply cost analysis and other evaluative techniques to worksite health promotion programs.

Health Promotion Program Cost Effectiveness

Before looking at health promotion program cost effectiveness analysis, it is imperative that health care cost growth is explained and cost effectiveness is defined. Generally, companies' health care costs are rising at the rate of 25 to 100 percent per year (Wellness At The Worksite: A Manual, 1990). According to a study by Coopers and Lybrand International Management Consulting Service (1989), private companies are spending as much as 25 % of their total payroll for

health care, including indirect costs such as absenteeism, disability, turnover, decreased productivity, replacement and recruiting (Wellness At The Worksite A Manual, 1990). The cost effectiveness of worksite wellness programs considers the previous list of hidden costs and insurance expenses. Some other factors that affect cost effectiveness in this area are the cost of establishing health promotion programs, projected cost data, and morale (Hollander & Lengermann, 1988; Elias & Murphy, 1986; Erfurt et. al. 1992).

Elias and Murphy (1986) also agree that a full cost benefit study of an employee health promotion program requires the analysis of direct and indirect cost data. These are important criterion variables to examine because both direct health care cost savings (ambulatory, hospital and disability claims) and indirect cost savings (absenteeism and productivity) impact cost effectiveness. Whether the cost data is directly or indirectly related to cost savings, wellness programs are still important to evaluate because corporate managers are finding it necessary to lower health costs and improve the ability to deal with non-health concerns such as absenteeism, morale, and productivity. "Unfortunately, little sound evidence on the economic usefulness of workplace health promotion is available" (Warner, Wickizer, Wolfe, Schildroth & Samuelson, 1988 p. 106). However, the authors state that the lack of definitive reports on health promotion programs should not be interpreted as a negative assessment of the potential towards industrial cost savings. These authors recommend that a "healthy skepticism" is needed when reading the literature. It is also explained that the development of sound research in this area is needed to bring credibility to the issue of cost savings from worksite health promotion programs.

Many studies have researched the area of worksite health promotion cost effectiveness (Bly, Jones & Richardson, 1986; Erfurt et. al. 1992; Oster, Colditz & Kelly, 1984; Pelletier, 1991). The overall theme of these studies is that worksite health promotion programs are significantly related to cost savings. However, many of these same articles state there is not enough data in the area to make unchallenged cost saving predictions. Most authors explain further research is warranted. Some of the more noteworthy studies are discussed below.

In 1989, Katzman & Smith continued the search for companies that were conducting financial analysis of their health promotion programs. The results of the study were paradoxical in nature. Companies enthusiastically supported the implementation of wellness interventions, while these same organizations produced limited concern about actual financial evaluations. This is exceedingly distressing since it is imperative that occupational health promotion programs be cost-justified if they plan to survive. Otherwise, business owners will demand to use other alternative medical care cost containment approaches.

Fortunately, a few companies have accumulated sound cost effectiveness evidence by evaluating their worksite health promotion programs using comprehensive cost benefit analysis (Caldwell, 1992). Caldwell gives the example of Travelers Corporation reported savings. This company reported a health care plan saving of $7.8 million in 1990, a $3.40 return for every $1.00 invested in its corporate health promotion program. The article evaluated findings of a survey conducted by the Association for Fitness in Business. Some examples of the savings for each dollar spent on corporate wellness programs are as follows: Kennecott Copper Co. saved $5.78, Equitabel Life Assurance saved

$5.52 and Metropolitan Life Ins. saved $3.15.

Obviously, the findings on credible cost benefit research has increased since the mid 1980's . The evidence clearly shows an overwhelmingly positive direct correlation between the implementation of worksite wellness programs and cost effectiveness. However, the research also warns of significantly insufficient data and low generalizability between studies. This is due to the fact that many worksite health promotion studies have methodological limitations.

Research Limitations

Some of these methodological limitations result from flaws in study design. Basic research principles such as random assignment of subjects to treatment groups and statistical control for differences between individuals are not being met in much of the worksite health promotion research (Elias & Murphy, 1986). Also, most population samples being used in these health studies are specific groups that do not allow for generalizability (Erfurt et al., 1992). Furthermore, concerns about the relationship between an employee's family health care utilization and overall reduced corporate costs are seldom addressed (Elias & Murphy, 1986). In addition to these research problems, many worksites do not even attempt to evaluate the cost effectiveness of health interventions, making it impossible to determine the usefulness of the intervention (Hollander & Lengermann, 1988). Gebhart and Crump (1990) attribute the above research problems to the lack of written health promotion program goals found within organizations and the scarcity of worksite health promotion evaluation procedures.

By examining the implementation strategies and cost effectiveness of

worksite wellness interventions across studies, it is possible to realize what research problems are most prevalent. Furthermore, one can observe what type of interventions and evaluation methods produce the most sound and effective results. Since many businesses today are combating increasing health care costs, it is important to provide information that summarizes health promotion literature in an effective manner. This is why a qualitative meta-anlysis can be useful in interpreting the research on comprehensive cost effective worksite health promotion programs. However, before discussing the methodology and results of the current studies' qualitative analysis of worksite health promotion programs, it is imperative that qualitative research and meta-analysis techniques be discussed.

Qualitative Meta-analysis

All fields of research must be summarized at some point so that the general status of the literature can be ascertained (Raudenbush, 1991). This holds true for qualitative as well as quantitative research methods. This is especially important in the area of health promotion since there is a plethora of research in the field but no general theory of cost effectiveness. The principle notion is that qualitative summarization is a needed and worthwhile research manipulation. Qualitative research is needed when one would like to understand a global relationship, generate holistic descriptions and analyze natural settings. Many times quantitative research limits the problem and therefore limits the range of understanding (Fraenkel & Wallen, 1990).

By justifying the use of data summation techniques and qualitative research, it is possible to combine these two methods into one practical application. The use of a qualitative meta-analysis will create hypotheses that are based on global

research views. This method will also generate usable categorizations of variables found in a large body of research and add new insight into the area of cost effective comprehensive worksite wellness programs.

Using the above knowledge on qualitative meta-analysis, it was concluded that by ranking comprehensive worksite health promotion studies by methodological soundness and cost savings it would be possible to observe what specific health promotion interventions relate to the first, middle, and last studies ranked. From this idea two research questions where formed as the bases for the current study. Question 1 was to determine what worksite health promotion activities are related to direct and indirect cost savings. Question 2 was to determine what worksite health promotion activities are most commonly implemented by the organizations.

CHAPTER 2

RESEARCH METHODOLOGY

Database

This study reviews literature that contains direct and indirect health care cost data associated with the implementation of comprehensive health promotion programs. Studies containing the above information were sought from eight data-bases: PsycLit, ProQuest, ERIC, SPORT, Health Periodical Database, Medline, Health and Planning Administration and Employee Benefits Infosourse. These data-bases hold psychological, industrial, educational and health research material.

Through the exploration of the current literature, Pelletier's (1991) study was noted as valid meta analysis of the genre through the year 1990. The present study replicated Pelletier's analysis of cost effective outcome studies of comprehensive health promotion programs but this study also added more recent literature and a qualitative category.

Facets of each study were given numerical weights which were summed to produce a numerical value for each study. This value represents the study's Cost Effectiveness Index (CEI). Studies were ranked according to the CEI with the highest ranking corresponding to studies with high cost effectiveness values and high methodological rigor.

Only studies with comprehensive health promotion programs were analyzed. Comprehensive health promotion programs are defined in this study as programs implementing more than one health promotion intervention. For example, if a study only reviewed the effects of stress management as it relates to

cost effectiveness, that study would not be considered comprehensive. However, if the study observed exercise and stress management interventions, it would be defined as comprehensive.

With respect to cost effectiveness analysis, the present study acknowledges outcome measures that are directly and indirectly related to cost savings data. From the literature, Chen (1989), Elias and Murphy (1986), and Yen, Eddington & Witting (1991) define direct cost data as insurance premiums, ambulatory and hospital costs, disability claims and medical claims. Indirect cost data are defined as absenteeism, turnover, re-training, premature death, recruitment and productivity analysis. Furthermore, the author ranked Pelletier's (1991) studies and additional studies in terms of methodological rigor and amount of savings attributed to each study's health promotion program. (Direct measures of cost effectiveness were viewed as more significant than indirect measures, projected or estimated measures.)

Therefore, research that fits the above description published in the year 1990 and after was added to the present research project. Nine articles were found that met the criteria. These articles are listed in Table 2 by author and year, begining with the most recent study.

Design

As previously mentioned, the design used is a qualitative meta-analysis. ✓ All studies were described using the facets indicated below. All but the last facet (health promotion interventions) was used by Pelletier (1991).

"Sample size" was defined as the size of the sample tested. The size of the experimental and control groups were listed when that data was available.

Table 2

Studies incorporated into the present meta-analysis

Jeffery, Forester, French, Kelder, Lando, McGovern, Jacobs, & Baxter	1993
Erfurt, Foote, & Heirich	1992
Golaszewski, Snow, Lynch, Yen, & Solomita	1992
Dalton, & Harris	1991
Lynch, Teitelbaum, & Main	1991
Yen, Eddington, & Witting	1991
Baily	1990
Rozek	1990
Stral, & Johnson	1990

No sample is perfectly representative of a population. To be as accurate as possible, Fraenkel and Wallen (1990) suggest that a minimum of 100 subjects is needed for descriptive studies, a sample of 50 for correlational studies and a sample between 15 and 30 for experimental studies.

"Types of workers" is a description of the types of subjects used. Examples might be managerial, professional or clerical subjects. This facet is important because the degree to which a sample represents the population of interest determines the generalizability of that sample (Mitchell & Jolley, 1988). This means the usefulness of any findings from a small or narrowly defined sample is seriously limited (Fraenkel & Wallen, 1990; Maxwell & Delaney, 1989).

"Comparison group" states whether a comparison group was used. It is important to use a comparison or control group to show whether treatment had an effect (Fraenkel & Wallen, 1990). If there is no group to compare results with, it becomes difficult to assess the influence history and individual maturation had on the subjects (Maxwell & Delaney, 1990).

"Evaluation period" is the duration of the study in question. For many manipulations, effects found six months after the intervention are thought to be noteworthy. However, there is considerable variation in many researcher's notion of the ideal duration for a particular study (Cascio, 1991).

"Outcome measures" describe the criterion variables assessed. Examples might be disability days, ambulatory care, rehabilitation costs and major medical costs. These factors identify whether direct or indirect measures were used. A study was categorized by whether it used direct cost measures, indirect cost

measures, or measures that only related to indirect cost measures.

"Evaluation design" is the description of the design of the study or evaluation method used. Some examples are pre/post longitudinal design, pre/post, quasi-experimental at two worksite locations and one control site. Some studies are more valid than others because of threats to internal validity (Cook & Campbell, 1979). Good designs control many of these threats, while poor designs control only a few.

The quality of an experiment depends on how well the various threats to internal validity are controlled (Fraenkel & Wallen, 1990). Each study will be placed in one of three design categories depending on the study's control of internal validity. The categories are weak experimental design (WED), true experimental design (TED) and quasi-experimental (QED) design. The most valid results come from true experimental designs (randomized posttest only control group design, randomized pretest-posttest control group design, randomized Solomon four-group design, using matched subjects and randomized pretest-posttest control group design with a comparison group) followed by weak experimental designs (one shot case study, one group pretest-posttest design and a three group pretest-posttest design) and lastly, quasi-experimental designs (matching only design, matching only posttest-only control group design, matching only pretest-posttest control group design, matching only posttest only control group desing with a comparison group, time series longitudinal analysis and a pretest-posttest one group longitudinal design) (Fraenkel & Wallen, 1990; Pelletier, 1991). In this study TED are given more weight to demonstrate the importance of validity control. However, many times a WED or a QED may

prove to be better suited for an intervention, given that the design still controls for validity.

"Subject self-selection" concerns methods used to select subjects for the study. Methods might include self-selection or use of the entire work force. However, the most valid selection process is random selection (Rosenthal & Rosnow, 1975). There is more sampling error when subjects are not randomly selected. For example, if subjects are self-selected it is appropriate to assume many people who volunteer for a health related experiment are interested in health concerns and may already be committed to a healthy lifestyle. Those who are not interested in health or do not practice healthy behaviors may be under represented in the study (Rosenthal & Rosnow, 1975). Therefore, studies will be categorized as random selection or use of entire work group population, partially random selection and partially self-selection, volunteer/self selection, or other.

"Findings" is a brief description of the study's results. This is an important factor because a study's findings are the component one first views to determine if the study produced significant results. If the study did not produce significant results, it will be impossible to answer the present research questions.

"Predictor Variables" is the category the present author added to Pelletier's (1991) work. This category describes what health promotion interventions each study implemented. By noting this factor, it is possible to observe which health promotion interventions relate to cost effective research.

Categorical Ranking

To address the research questions, it was necessary to rank order the studies. Basically, studies were ranked by methodological soundness as well as cost

savings. The categories described above were ranked in order of their importance in producing valid research data. Obviously, this is a very subjective task and the order of importance is only in relation to the present study. Other researchers may have ordered these categories differently or used different variables. The categories were ranked as follows, beginning with the most significant factor: findings, outcome measures, evaluation design, types of workers, subject self selection, sample size, comparison group, and evaluation period.

Since the results were essential to answering the research questions of this study, the category of "findings" was ranked as the most significant factor. Therefore, studies reviewed were ranked by the significance of their findings then the directness of their criterion measures. For example, direct cost effectiveness was ranked higher than indirect cost effectiveness and, actual cost data was ranked higher than projected cost savings. Next, the design of the study was assessed. True experimental designs were viewed as more valid than weak experimental designs and quasi-experimental designs.

The facet "Types of workers" was viewed next in importance, as the representaveness of the sample affects both internal and external validity. If the workers are a homogeneous group the study was considered to be less significant than a study using a diverse population that is generalizable.

The selection process was the next variable considered. Random assignment was considered more valid than self selection or other selection devices. The acceptable sample size was 200 subjects since most studies assessed are at least partially descriptive in nature and investigate an entire corporate work force.

Having a comparison group also affects the significance of research findings. Therefore, the fact a study used a comparison group will give a study more credibility than if it did not use one.

Lastly, the evaluation period is an important factor in a study's validity. It was ranked last because the other variables are seen to hold more weight. A study could have a duration of five years but if the design was invalid or the sample size insignificant it would not raise the credibility of the study in question. The study's length was recorded and the length of time was the final consideration in the placement of a study's significance.

The description of predictors (health promotion interventions implemented) was not ranked. This category was used to assess the current study's research questions. This will be done by determining the relation between the health promotion interventions and the study's findings.

Ranking of the Studies

The current study categorized the information obtained from each article in the above areas. Then, each study's methodological rigor was assessed by the study's ability to meet each facet's criterion. Obviously, the study that met all or most of the categories criterion was ranked first in effectiveness.

"Weighting" is the process of determining the relative influence each item in a series should have in determining the total score (Chaplin, 1985). As each aspect was ranked in importance, it was possible to give numerical weight to variables within each category. Table 3 presents the current study's weighting process in detail.

Each study was ranked by summing the weight of each study aspect,

Table 3

Weighting the Facets

Findings:
studies reporting numerical cost savings = 7
studies reporting numerical estimated cost savings = 6
studies reporting projected numerical cost savings = 5
studies reporting indirect cost savings (using no numerical amount) = 4
studies providing insufficient evidence for cost savings = 0

Criterion measures:
studies using one or more direct cost measures = 6
studies using one or more indirect cost measures = 4
studies using measures than only relate to indirect cost measures = 0

Research design:
studies using true experimental research designs (TED) = 5
studies using weak experimental research designs (WED) = 4
studies using quasi experimental research designs (QED) = 3
studies not using the above experimental designs = 0

Types of workers:
studies using a heterogeneous sample = 4
studies using a homogeneous sample = 2
studies using neither = 0

Random assignment:
studies using random assignment of subjects or an entire work groups = 3
studies using some random assignment & some subject self selection =2
studies using only volunteer subjects = 1

Sample size:
studies using above adequate (200) sample size = 2
studies using adequate (100-200) sample size = 1
studies using insufficient (1-99) sample size = 0

Comparison group:
studies using at least one comparison group = 1
studies using no comparison groups = 0

Evaluation period:
studies using an above adequate evaluation period (at least 2 years) = 2
studies using an adequate evaluation period (1 year) = 1
studies using an insufficient evaluation period (less than 1 year) = 0

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resulting in a CEI. If two or more studies were assigned the same CEI, then each study's "findings", "criterion variables" and "research design" categories were compared. The study with the highest weight in these three categories was ranked above other studies with the same CEI. Therefore, if five studies had the same CEI, then each study was compared with the others until the studies were ordered from one to five in importance. However, if the "findings", "criterion variables" and "research design" aspects of two or more studies in no way differentiated from each other, the studies involved were given the same rank order and were considered equal.

Health Promotion Intervention Categories

After all studies were described and ranked, the health promotion program categories were tabulated. These categories were taken from the literature reviewed. There were eight categories of health promotion intervention techniques that have been demonstrated to relate significantly with lowering individual risk factors (The National Center For Health Promotion, 1991; Wellness at the Worksite: A Manual, 1990; Muchnick-Baku & McNeil, 1991). The category of "other" was placed in Table 4 so that the activities that were not included in the list could be tabulated.

Each time an article stated a particular health activity was used, a tally mark was made under the appropriate category. Once all interventions were tabulated, it was possible to see what interventions were most commonly used. It was also apparent, from the cost effectiveness descriptions, what health activities related with the most cost effective health promotion programs.

Table 4

Health promotion worksite predictor variables

Health risk screening and/or education for chronic diseases
Alcohol and/or drug abuse counseling
Mental health services
Tobacco cessation
Nutritional awareness and/or weight control
Exercise and/or fitness
Stress management
Safety
Other

CHAPTER 3

RESULTS

The results of this study are important for a number of reasons. First of all the psychological, business and health literature lacks methodologically sound research in the area of cost effective worksite health promotion programs. Thus, such literature is an ideal area for industrial/organizational psychologists to examine.

By ranking worksite health promotion cost effectiveness studies in order of methodological and result oriented significance, one is able to discover which health promotion activities have been associated with direct and indirect cost savings. It is also possible to discern which particular worksite health promotion activities are most commonly implemented by organizations to produce cost savings.

Health Promotion Interventions

An assessment of the 34 articles reviewed allows tabulation of frequency of interventions (Table 5, & Figure 1). First, there are many interventions listed under "other." This is to be expected since each worksite is unique and has a specific population that has individual health concerns. For example, some of the interventions listed under "other" are back care, goal setting and interpersonal skills. A manufacturing company may be concerned with a prevalence of back injuries or a sales department may want to stress interpersonal communication. Interventions can and should be very specific to the needs of a particular population. Therefore, a high percentage of interventions in the "other" category most likely means that worksites are doing a good job in assessing their

Characteristics Of Worksite Health Promotion Programs

Study Author/Year	Predictor Variables	Findings	Criterion Variables	Research Design	Sample Type	Sample Selection	Sample Size	Comparison Group	Study Duration
Goetzel, Thrope, Fielding, Bruno, Dunn, Hillman, Knight, Wades, Wilson, Long & Pelletier (1990)	customcare (not available)	medical cost rose 7% in 1989 while national averages rose20.4%: in 1990 cost rose 10% while national rose 21.6%	claims costs & utilization	QED	all active workers dependents & retirees	all workers	87,000	yes	3 years
Bally (1990)	fitness program: courts, run, lifting cholesterol screening, health fair, lectures on: stress, nutrition, weight, infant care health care system incentives, HRA, newsletters coaching	savings of 1.6 million in health care costs annually & an average of 52% fewer work days lost annually	medical costs, surveys, lost work days due to illness	QED	Mesa Petroleum employees & dependents	all workers	650	no	5 years
Dallam & Harris (1991)	HRA, chronic disease monitoring marketing, newsletters, safety, nutrition, smoke, stress, lifestyle change, guidelines for medical use	cost improvements totaling several million dollars a year, 60-70% reductions in in patient costs & increase in outpatient costs	compensation benefits claims utilization-management risk assessment, diagnostic data, surveys	QED	Northern Telecom employees	volunteers & data on all workers	1,000	yes	5years
Bellingham, Johnson, McCauley, & Mendes (1987)	Total Life Concept: HRA, stress, smoke, weight, BP, cancer, interpersonal skills, cholesterol, alcohol & drugs, safety, exercise, support groups, marketing	reduced health risk, exercise increase, smoking decrease, cost benefit of $12.2 million	HRA, smoking rates & exercise levels	QED	wage & salaried employees	entire worksite	experimental -1,623 & control-1,673	yes	2 years
Jeffery, Forester, French, Kelder, Lando, McGovern, Jeffery, & Baxter (1993)	classes: obesity, smoke; incentives; marketing	43% quit smoking, average weight loss -4.8 lbs: estimated cost savings from smoke but not from weight loss	survey: smoke weight; exercise job characteristics health history, job satisfaction: direct measures of height, weight, expired carbon monoxide	TED	Minneapolis-St. Paul area 12 public sector taken from each site for interventions half the sample-women, 40% professionals or in management positions, 40% clerical or sales, 20% blue color	random intervention & control	32 sites 545-610 in each site, 200	yes	2 years

Characteristics Of Worksite Health Promotion Programs

Study Author/Year	Predictor Variables	Findings	Criterion Variables	Research Design	Sample Type	Sample Selection	Sample Size	Comparison Group	Study Duration
Bly, Jones, & Richardson (1986)	health promotion: health screening & education in smoke, weight, stress, BP nutrition & fitness	experimental group had lower increases in inpatient costs & hospital days	medical costs & utilization & health screening	TED	61% & 56% salaried in experimental group	entire worksite	experimental -5,192 & 3,259	yes	5years
Gibbs, Mulvaney, & Henes (1985)	health promotion: HRA, publicity, feedback, follow up classes: nutrition, weight, smoke, fitness, drug abuse therapy	participants had lower health care costs (76%) & program savings -2.51/1.00	claims data	WED	all headquarter employees of BCBS of Indiana who completed a HRA	participants vs non-participants	participants -667/non-participants -892	no	5 years
Bowne, Russell, Morgan, Untenberg, & Clarke (1992)	fitness measure & follow up [illegible], exercise prescription: run, swim, weight room, bike & classes: smoke, alcohol, obesity, nutrition, stress	fewer disability days (43% less) & lower major medical costs (46% reduction)	disability days & major medical costs: fitness measure	WED	white collar workers enrolled in fitness program	subject self selection	disability study-184 major medical study-121	no	disability-5 years & medical-1 year
Golaszewski, Snow, Lynch, Yen, & Solomita (1992)	HRA, newsletter, marketing, classes: weight, aerobics, fitness, classes in smoke, BP & stress	predicted a 3.4 return on investment	health claims, absenteeism, life insurance, pension liability claims, productivity, revenue	QED	employees & retirees of Travelers Insurance Co.	all workers	36,000	yes	4 years
Erfurt, Foote, & Heirich (1991)	Site A: marketing health education classes, BP, newsletter, health fair Site B: fitness: aerobics, lifting, classes: weight; smoke & BP Site C: health education & follow up, support groups, counseling, self help, BP, obesity & smoke Site D: health ed. & follow up plans organization, use the same interventions as site A and	site D had the most cost effective outcomes with risk reduction of 58% and a return on investment (ROI) of 1.32, site C was the 2nd most cost effective with 48% risk reduction & a ROI of 1.55	cost of program health screening	WED	active work force at General Motors: predominantly white males, average age 39-43	all workers	A-1,560 B-3,260 C-2,540 D-2,281	yes	3 years

Characteristics Of Worksite Health Promotion Programs

Study Author/Year	Predictor Variables	Findings	Criterion Variables	Research Design	Sample Type	Sample Selection	Sample Size	Comparison Group	Study Duration
Jose, Anderson, & Haight (1987)	Stay Well: health survey, HRA orientation to program, lifestyle change courses, campaigns, action teams, newsletter. program includes: smoke, fitness, stress, nutrition, weight, back	reduced claims & absenteeism, savings=1.8 million	risk factors medical costs	QED	all Control Data employees	non random	50,000	no	6 years
Wood, Olmstead, & Craig (1989)	triathalon health promotion program: fitness, nutrition & weight, safety, stress, relax, recreation, smoke chemical use, inter-personal relations, cancer, positive think & goal setting	participant smoking declined, exercise increased, reduction in absenteeism, seat belt use increased, cost savings of 3 to 1	HRA, medical costs, absenteeism	QED	national sales division, white collar	volunteer	experimental =685 & control=341	no	2 years
Cauldron (1990)	HRA, nutrition, smoke, stress, orthopedic rehab, mammography, BP, counseling, classes, weight, incentives, follow-up & support groups	health program saves the company an estimated 1.9 million annually	medical costs, sick leave, employee productivity	QED	Coors Co. employees & dependents average age is 40 years	all workers	not available	no	3 years
Yen, Edington, & Witting (1991)	HRA; made health profiles; gave feedback; BP and cholesterol screening	employees with high risk behaviors will cost more	HRA, self reports, BP & cholesterol screening, medical claims, high and low risk classifications	QED	single employees of a large manufacturing company	all available	1,838	no	3 years
Henritze; & Brammell (1989)	cardiac rehab program: HRA nutrition, stress, fitness, BP & health education: counseling, smoke weight, alcohol, parenting, back	wage savings= $1,078,588 rehab savings= $226,198 treadmill=$85,905 total=$1,390,661 annually	wage savings cardiac rehab savings & treadmill testing savings	QED	wage & salaried employees	post coronary employees	180	no	6 years

Table 5
Characteristics Of Worksite Health Promotion Programs

Study Author/Year	Predictor Variables	Findings	Criterion Variables	Research Design	Sample Type	Sample Selection	Sample Size	Comparison Group	Study Duration
Spilman, Goetz, Schultz, Bellingham, & Johnson (1986)	health program: HRA, health orientation, health education: stress, back, weight, smoke cholesterol, cancer nutrition, communication	participants reduced health risks, more positive attitudes & gains in positive health behavior	biometric data, risk calculations health & job attitudes, days absent	TED	some KC AT&T employees & all AT&T employees in New Jersey	70-82% participation & random sample for control group	study sites-1,198	yes	1 year
Shepard, Corey, Ruezland, & Cox (1982)	fitness program: health articles, calisthenics & endurance	fewer hospital days & fewer medical claims	hospital admissions & medical claims	WED	Canada Life employees who took 3 fitness evaluations	participants vs non-participants	392	yes	1 year
Lynch, Teltelbaum, & Main (1992)	HRA; smoking	high risk groups (smokers) cost the company more than low risk groups (non-smokers)	HRA, self reports health claims data	QED	male employees from Travelers Corporation in Hartford, CN	employees with needed data available	752		
Harris (1986)	needs analysis for employee health, HRA, health articles, marketing, behavior change incentive program,health classes, support groups: smoke, BP, fitness, weight seatbelt safety	smoking declined 11%, seat belt use increased 34% & medical cost remained constant: estimated annual savings=3.7 million	smoking prevalence, observed seat belt use & overall medical costs	QED	all Northern Telecom employees	self selection	(not available)	no	1 year
Baun, Bernacki, & Tsai (1986)	fitness program: aerobics & calisthenics, lifting, bike, courts, jog & walk	participants had fewer sick hours and lower hospital costs & had higher utilization rates	number of sick hours & medical care utilization rate	WED	1/5 random sample of workers at 2 Tenneco sites	random selection of participants and non-participants	exercisers -221 & non-exercisers -296	no	1 year
Jones, Bly, & Richardson, (1990)	live for life program: health screening & smoke, weight, stress, nutrition, education, fitness & BP	absenteeism lower for participants	absenteeism levels	WED	wage & salaried	self selected	experimental -1,406 & control-487	yes	3 years

Table 5
Characteristics Of Worksite Health Promotion Programs

Study Author/Year	Predictor Variables	Findings	Criterion Variables	Research Design	Sample Type	Sample Selection	Sample Size	Comparison Group	Study Duration
Stral, & Johnson (1990)	reduced medical coverage, child care preventive dental care, BP, mammograms, immunizations, counseling	predicted short term medical increases & long run medical decreases	medical costs benefits data, cost sharing estimates	QED	Square D workers a multinational manufacturing company	all workers & retirees	20,000	no	1 year
Tsai, Baun, & Bernacki (1987)	fitness center: aerobic, weight training, calisthenic classes	participants had less turnover, retention highest for female exercisers	Job turnover	QED	all Tenneco employees	random	1,788 new hires from 1978 81 &	no	7years
Rozek (1990)	cholesterol check BP, education in nutrition, medical use, back, exercise program	fewer sick days taken, employee morale up	medical costs, utilization rate of benefits for illness	QED	Hollister employees	volunteer & data from all employees	(not available)	no	2 years
Lotig, Kraines, Brown, & Richardson (1989)	health education programming: orientation, health books & newsletter, classes on: growth, illness, marketing	reduced number of physician visits	self-reported physician visits	QED	employee from 22 employers	participants vs non-participants	5,191 employees	yes	15 months
Erfurt, Foote, Heirich, & Gregg (1989)	risk education: BP, smoke, obesity, health screening, health education classes, health fair, wellness counselors	In 2 counseling sites participation 46-54%: no counseling 10% reduction	smoking cessation weight reduction overall risk reduction	QED	wage & salaried	randomized	7,804 employees	no	3 years &
Shipley, Orleans, Wilbur, Piserchia, & McFadden (1988)	smoking cessation program & overall Live for Life: HRA well being test; CHD risk, BP	6% more smokers quit in experimental sites	smoking status self report	WED	all Johnson & Johnson employees at eligible work sites	random & volunteers	experimental-1,399 workers control-748 workers	yes	2 years
Conrad, Riedel, & Gibbs (1988)	health promotion: (not available)	fewer claims & lower costs, increased life expectancy-negative cost benefits: lower average medical payments	HRA, smoking weight, absenteeism	QED	site 1- employees free from heart disease, cancer or stoke site 2- workers in experimental units site 3- employees	volunteers	6 programs ranging from 746-1,559 participants	no	1-5 years

Table 5

Characteristics Of Worksite Health Promotion Programs

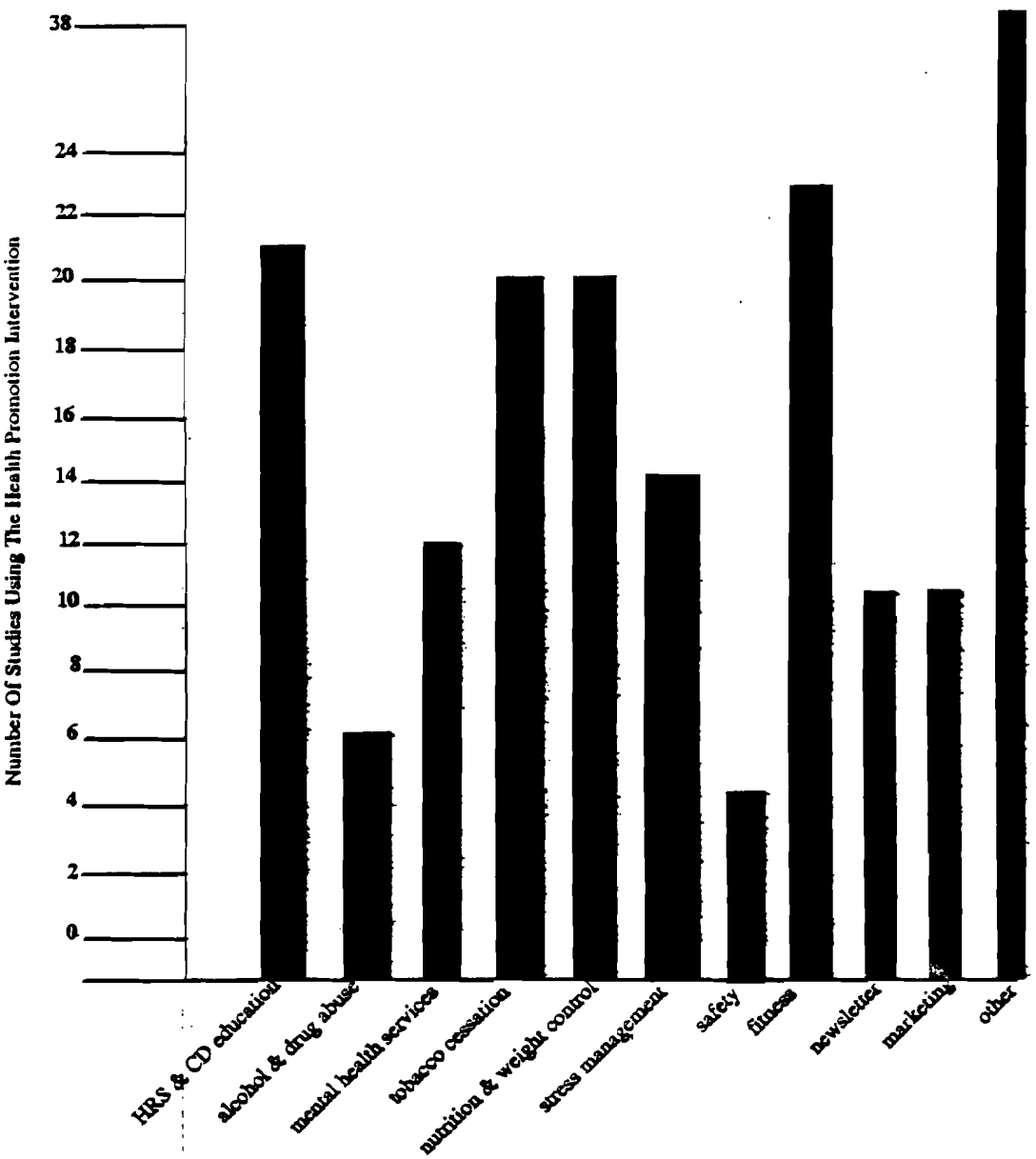
Study Author/Year	Predictor Variables	Findings	Criterion Variables	Research Design	Sample Type	Sample Selection	Sample Size	Comparison Group	Study Duration
Lynch, Golaszewski, Clearie, Snow, & Vickery (1990)	fitness center: fitness testing & orientation, fitness	absenteeism decreased for participants	mean number of absences due to illness with risk factors	QED	white collar & clerical	volunteers	2,232 insurance workers	no	2years
Bertera (1990)	health promotion & marketing: HRA, counseling & health education: smoke, fitness, nutrition, weight, stress, back health newsletter	7% more decline in disability days for experimental group cost savings of 2/1	disability days	QED	white & blue collar	volunteers	experimental -29,315 in 4 sites & 14,573 in 19 sites	no	2 years
Tsai, Bernacki, & Baun (1988)	exercise program: lifting, bike, row, courts,basketball, walk, aerobics	exercisers had lower medical costs & same amount of injuries	injury prevalence	QED	In 1984-3,230 In 1985-2,874	random	6,104 employees	no	2 years
Bernacki, & Baun (1984)	health & fitness program: physical fitness measure, nonmember, non-exerciser, exercise 1 or 2 x a week	exercise & job performance are positively related	job performance exercise adherence levels	QED	management-561 professional-1,265 clerical-1,078 other-327 Tenneco workers	subject self selection	3,231	no	6 months
Blair, Piserchia, Wilbur, Crowder (1986)	Live for Life health promotion program: health screening & follow up, fitness test	participants had a greater increase in daily energy expenditure in exercise	daily energy expenditure estimates & oxygen consumption self report of exercise	WED	Johnson & Johnson employees at four worksites	volunteers & random assignment of non participants	experimental -2,600	no	2 years & &
Holzbach, Priserchia, & McFadden (1991)	health promotion: HRA, health seminars: fitness, weight, nutrition, smoke, stress,BP, alcohol, & program marketing: newsletters & health fairs, incentives	changes in attitudes in organizational commitment, supervision,working conditions, job competence & pay	attitude scales measures from family, co-workers, pay/benefits & job security	WED	all workers at 7 sites	53% random sample of non-volunteers	experimental -1,019 & control-586	yes	2

Note. Many of the health promotion interventions listed under "predictor variables" are in abbreviations. For example, the word smoke = the health promotion program smoking cessation, HRA = health risk appraisals or health risk screenings which may include such interventions as: blood pressure screening (BP), cholesterol screening, fitness tests, health history reports, surveys and other interventions. Nutrition= nutritional awareness, weight= weight loss programming, stress= stress management, alcohol and drugs= alcohol and drug prevention, safety = safety programs, obesity= dealing with obesity programs & weight loss programs, education in, or classes = classes and or programs in health promotion.

Note. All studies are ranked in order with the exception of the last two. Blair et al., 1986 and Holzbach, 1990, are ranked equally; one is not higher than the other.

Figure 1

Worksite Health Promotion Program Implementation



employee's needs.

Two interventions that were not predicted to correlate highly with cost savings and were not listed on Table 4 were health promotion newsletters and health promotion marketing strategies. Both of these interventions occured in almost one third (29.4%) of all the studies reviewed. This is not surprising, however, since many worksite wellness programs focus on recruiting, retention and education. Obviously, these interventions are important factors in reducing health care costs.

Fitness (67.6%), health promotion screening and chronic disease education (61.7%), tobacco cessation (58.8%), and nutritional awareness and weight control (58.8%) were the leading interventions shown in this sample of health promotion programs. These findings address question 2 which questioned which health promotion programs were most commonly implemented. Mental health services (35.3%), alcohol and drug abuse treatment (17.6%), and safety (41.2%) were not among the interventions predominately found within the worksites. Stress management was another health promotion intervention tabulated. It seems to have average appeal to worksites fighting rising medical costs. Fourteen of the 34 studies assessed implemented stress management courses.

First Ten Studies Ranked

Ranking studies by methodological soundness and outcome data produces a list of articles that begin with studies that are relatively sound and produce significant results. Out of the 34 studies ranked, the first ten share several commonalities (see Table 5 for the rank order of all studies and their categories). The first ten studies ranked were Baily (1990); Dalton (1991); Bellingham et al.

(1991); Jeffery et al. (1993); Bly et al. (1986); Gibbs (1985); Bowne et al. (1984); Golaszewski et al. (1992); Erfurt et al. (1991) & Jose et al. (1986). The first study ranked (Goetzel, 1990) is not included in the first ten due to the unavailability of the study's predictor variables.

Of the first ten studies ranked, six studies used medical cost data as a direct measure of cost effectiveness. Three studies used absenteeism as an indirect measure of cost effectiveness and four studies used medical claims data to measure direct cost effectiveness. Three of the studies in the first ten incorporated two of the three measures cited above into their study. These studies reported some of the largest cost savings. These savings were, 13% reduction in medical cost the first year and a 10% reduction the second year, saved $1.6 million in health care cost and 52% fewer lost work days, 43% less disability days taken and 46% reduction in medical costs and a 3.4% return on investment from the health promotion program implemented.

However, two studies that used only medical claims data as a criterion measure and one study that only assesed medical cost still report significant cost savings. These companies reported savings such as a 60-70% reduction in patient cost which saved one company several million dollars, 76% lower health care cost that produced cost savings of $2.51 for every dollar spent, and $1.8 million were saved in health care costs for a third organization.

All six studies used HRA and/or chronic disease education, five used fitness, four used smoking cessation and four used newsletter interventions. An average of five health promotion interventions were used for each of the six studies reporting significant cost savings.

Predictor Variables

Most of the articles categorized in the top ten used health risk appraisals (HRA/HRS)(60.0%), health education classes (100.0%) and exercise prescription (90.0%). The most prevalent health interventions used by the top ten studies are similar to the top interventions tabulated from all the studies reviewed. For example, fitness was used as a health intervention by most of the 34 studies and it was also found in nine of the first ten studies ranked.

However, nutritional awareness and/or weight control was found in all of the top ten studies ranked but in only 21 out of the 34 total studies reviewed. Smoking (70.0%) and stress (60.0%) categories were also found in the majority of the top ten studies ranked. This is similar but not identical to the the percentages found from all 34 studies. Health risk appraisal and/or chronic disease education, newsletters, marketing strategies and counseling were found in half of the top ten articles ranked. This is particularly noteworthy since the HRA and/or chronic disease education was the only category that was also predominantly found in the lower ranking articles. It may be that the more comprehensive and research related a worksite health promotion program is the more it is likely to use promotional interventions to gain and retain an employee's interest.

Research Variables

The first ten studies produced some noteworthy data. Five of the ten studies reported cost savings in the millions and seven of the ten used direct cost data as their criterion measures. The top ten study's average evaluation period was four years. The average sample size was 11,180. It is also important to note that five of the ten articles used a QED, three of the ten even use heterogeneous samples

and six used random sampling or the entire work group.

Last Ten Ranked Studies

The last ten studies ranked (starting with the most methodologically sound) are Rozek (1991); Lorig et al. (1985); Erfurt et al. (1990); Shipley et al. (1988); Lynch et al. (1990); Bereta (1990); Tsi et al. (1988); Bernacki & Baun (1984); Blair et al. (1986); and Holzbach (1990). The Conrad, Riedel and Gibb's (1988) study is not included since the predictor variables of the study are not available. The last ten articles ranked were less methodologically sound and had less significant findings. This was due to the fact that, on the average, the last ten used limited health interventions, used only one or two criterion variables and hence, produced inconclusive results or findings indirectly related to cost savings.

Three of the last ten studies ranked used the direct cost measure of medical cost data. However, all studies reported vague savings such as " fewer medical claims were assessed," "cost savings of 2/1 was found," and "lower medical costs were obtained." Three of the last ten utilized the indirect cost measure of absenteeism. One study used the number of physican visits as an indirect cost measure, another used a worker attitude and commitment scale as an indirect measure of cost savings and still another study related increased employee exercise expenditure to industrial cost savings. Of the seven studies using only indirect cost savings or measures only related to indirect cost measures, all used HRA and/or chronic disease education, five used fitness, four used nutrition awareness and/or weight control, and three used smoking cessation interventions.

Predictor Variables

Like the first ten studies ranked and the findings from all 34 articles analyzed, the last ten articles ranked use the health promotion categories of health risk appraisals/screening and chronic disease education (70.0%), fitness (80.0%) and other (80.0%) in most of their research. However, unlike the first ten and the 34 studies analyzed, the last ten rarely used tobacco cessation (20.0%), nutrition and weight control (30.0%), stress management (20.0%), and mental health services (20.0%). Furthermore, alcohol and drug abuse (10.0%), safety (0.0%), newsletter (30.0%), and marketing (10.0%) intervention categories were not incorporated into most of the studies' health promotion programs.

Research Variables

There are many significant differences in research variables between the first ten studies ranked and the last ten ordered. First of all, only one study of the ten ranked last used criterion variables that were directly related to cost savings. Five of the ten used indirect cost measures and three of the ten used measures that provided insufficient evidence for significant cost savings. Furthermore, studies ranked last used more QED (70.0%) than those studies ranked first. The last ten studies' average evaluation period (two years) was half the time of the top ten study's average and the last ten used random sampling less (20.0%).

However, like the first ten studies the last ten used homogeneous samples (100.0%) and the average sample size (8,500) was not significantly less than the first ten studies average (11,800). Also, the first ten and the last ten both used a comparison group in about half of the studies.

Middle Twelve Studies Ranked

The middle studies are Wood et al. (1989); Caudron (1990); Yen et al. (1991); Henritz & Brammell (1989); Spilman et al. (1986); Shepard et al. (1982); Lynch et al. (1992); Harris (1986); Baun et al. (1986); Jones et al. (1990); Stral & Johnson (1990); & Tsai et al. (1987). The data found from the middle articles is similar in nature to the data found from all 34 articles. However, when looking at some of the research variables from the middle studies, it is difficult to assess whether the data is more similar to the first ten or to the last ten studies ranked. Basically, the middle articles shared some of the same characteristics as both the first and last ten articles.

Seven of the 12 middle studies used direct cost savings data such as medical cost or medical claims to evaluate the company's cost effectiveness. Out of these 7, 5 used HRA and/or chronic disease education, three used fitness, and and 3 use smoking cessation programs. Five of the studies used absenteeism or sick leave as indirect measures of cost effectiveness. Out of these 5, 3 used HRA and/or chronic disease education, 3 use smoking cessation and and 3 used weight control and/or nutritional awareness. Cost savings of three to one, savings of $1.9 million in health care costs, estimated annual savings of $3.7 million, fewer sick hours and lower absenteeism were reported for the studies using the direct and indirect criterion measures mentioned above.

Predictor Variables

With the exception of the "fitness" category, the middle study's division of it's predictor variable categories was similar to the total 34 article's division of it's predictor variables. Ten of the 12 studies used health risk appraisals or screening

(HRA/HRS) and chronic disease (CD) education. Eight of the 12 used tobacco cessation programs and 7 implemented nutrition awareness and weight control classes. The middle 12 also had many interventions held in it's "other" category (n=19). However, unlike the data from the total sample of 34 articles, the middle 12 infrequently used health information newsletters (25.5%), marketing techniques (16.6%), mental health programs (33.3%), alcohol and drug abuse interventions (16.6%) stress, (33.3%) or safety interventions (0.0%).

Research Variables

As mentioned previously, the middle 12 shared some of the same characteristics as both the first and last 10 studies with respect to research variables. Like the first 10, the middle articles ranked used mainly direct cost criterion variables (8/12). Furthermore, just as the first 10, many of the middle articles used random sampling or the entire work force(41.6%) for selecting subjects.

Like the last ten, the middle articles ranked produced indirect cost effective findings. Furthermore, the average evaluation period (two years) was the same as the average duration of the last 10 studies. The middle articles also used primarily QED's (50.0%), and homogeneous samples, much as the last ten studies did.

However, the middle 12 articles were different than the articles that precede and follow them. The middle 12 used comparison groups less (75.0%) than both the first and last 10. Furthermore, the middle studies had smaller average sample sizes (3,094) than both of the other groups.

Comparative Analysis

By comparing all three groups, it is possible to identify similarities and differences between methodologically sound studies that produce significant findings and methodologially weak studies that produce inconclusive results. However, most studies fall somewhere in between. The results of the current meta analysis enable one to observe what factors are related to sound research and which characteristics are found within weak studies so that it is possible to associate particular variables with the development of sound studies. Also, by observing which health promotion predictor variables are associated with sound cost effective studies one is able to appreciate the impact health promotion interventions have on industrial cost savings.

To completely understand how health promotion interventions relate to direct and indirect cost savings, all studies must be assessed. It has been shown that most direct measures of cost effectiveness were found within the first 10 studies (60.0%) and the middle 12 (58.3%). Most direct cost measures used medical cost data or medical claims data. The health promotion interventions most often associated with these cost measures are HRA and/or chronic disease education, fitness, and smoking cessation interventions. Some of the cost savings that relate to these direct cost measures are $1.6 to $3.7 million saved in health care costs and 60% to 76% reduction in health care cost.

Indirect cost measures and measures only related to indirect cost savings were found primarily in the last 10 studies (70.0%) and the middle 12 (41.6%). Most of these measures used absenteeism and sick leave data. The health promotion interventions that related to these indirect measures are HRA and/or

chronic disease education, nutritional awareness and/or weight control and smoking cessation. Notice that fitness interventions were less often implemented in these cases.

By observing what experimental designs were used by the studies assessed it is possible to see what designs relate to the most methodological sound and cost effective studies. Out of the 3 TED used, 2 were found in the first 10 and one in the middle 12. The WED were distributed evenly, producing 3 WED in the first 10, middle 12 and last 10. The QED used were also found with in all 3 categories. Five were used in the top 10, 8 in the middle 12 and 7 in the last ten.

All true experimental designs used were randomized pretest- posttest control group designs. Most WED used were one group pretest- posttest designs with random assignment or use of an entire work group, or one shot case studies. Lastly, the QED used were mainly matching only pretest- posttest control group designs, or matching only posttest only control group desings. It is obvious that it is not the type of experimental design used that relates most closly to cost savings but instead it is the health promotion intervention programs implemented and criterion measures used. Most studies used the sound experimental designs of TED, WED, and QED. The studies that produced weak results implemented less health promotion programs and many times used indirect criterion measures that were weakly associated with cost savings.

All 34 studies assessed attempted to evaluate the impact a health promotion program had on company costs. It is apparent that the first ten studies ranked were of better methodological quality than the middle twelve and last ten, however, the articles CEI scores were very close in range. The first study ranked

recieved a score of 27, while the last study ranked recieved a score of 13 (see Appendix). This reveals that all the studies are of notable quality. However, it is especially difficult to assess the last ten studies' cost effectiveness because some of these articles do not give enough information to evaluate their impact on the organization. This shows that one of the major reasons businesses cannot make predictions about the cost effectiveness of health promotion programs is that the data pertaining to many program's cost effectiveness is inconclusive due to weak research designs.

CHAPTER 4

DISCUSSION

The results of the present study clarify that health promotion programs hold promise for businesses in the area of cost savings. This is especially important given the current battle in the United States against the negative effects of rising health care costs. It is also easy to discern the types of health promotion programs which are associated with significant cost savings. This is very important since most workplace health promotion studies are not generalizable and there is limited literature on general theories of worksite health promotion cost effectiveness.

The present study highlights two conclusions in answering the first research question of what health promotion interventions are related to direct and indirect cost savings. First, the health promotion programs most often related to direct cost savings were nutritional awareness and weight control (32.3%), tobacco cessation (32.3%), fitness (35.2%), and health risk appraisals/screening (HRA/HRS) and chronic disease education (29.4%).

Second, the health promotion programs related to indirect cost savings most frequently were HRA and/or chronic disease education (44.1%), fitness (52.9%), tobacco cessation (47.1%), and nutritional awareness and/or weight control(44.1%). Obviously, the same variables are predominant whether one is assessing direct or indirect cost savings.

It is important to point out that health promotion interventions may not be the variable that directly influences whether a study produces significant cost savings. It is more plausible that specific facets of the research project affect a

study's ability to provide evidence for cost effective outcomes. The facets most closely associated with methodological rigor were criterion variables directly related to cost data, random sampling or use of an entire work group population, a adequate sample size and a study duration of four years.

It is slightly more complex to answer the second research question of what health promotion programs are most commonly implemented. As previously mentioned the largest health promotion intervention category is that of "other." Some examples of the interventions in this category were: parenting, health care system utilization, incentives, lifestyle behavior change, support groups, health fairs, back care, positive thinking, orthopedic and cardiac rehabilitation and dental information.

Even though the category of "other" is diverse, it is very important in understanding what health interventions are most commonly used. This category shows that one of the most common interventions used by a company is an intervention that is specific to a particular company's needs. Therefore, before one implements a health promotion program, it is imperative to assess the company's population needs if one is interested in cost effective outcomes.

The next most frequently implemented health promotion intervention within the current sample was fitness. Even though many health promotion programs are broadening their intervention to include mental and social health, most companies still base their program on fitness. Fitness is one of the interventions that is related to both direct and indirect cost savings. HRA and/or chronic disease education was the category found to be implemented second most frequently. Tobacco cessation, and nutrition & weight management followed closely behind.

Like fitness, these programs are frequently associated with direct and indirect cost savings. Stress management is the next category most frequently found in health promotion programs. These findings are understandable since all interventions listed above help to reduce individual risk factors that lead to cardiovascular diseases, cancer and accidents which are the leading causes of death in this country (Prokop et al., 1991). Furthermore, when employees obtain these diseases the company pays a high price in medical costs.

Research Implications

By answering the current study's research questions, it is possible to gain a more complete understanding of worksite health promotion program cost effectiveness. It has been established that certain research facets and health promotion interventions are necessary if one wants to gain direct or indirect cost savings. Furthermore, the current study's findings support the idea that psychologists and other researchers, businesses, health professionals and concerned employees should begin to work together to produce a preventive solution to rising health care costs.

All interventions have flaws. That is why most of the 34 studies reviewed opted to use QED. Like the research articles studied, the current review needed to work within a particular set of limitations. First, qualitative research is subjective. The categories ranked in the current study are only some of the necessary variables for health promotion implementation.

Also, it is difficult to find health promotion research studies in the literature. Most health promotion programs are not research-based and, therefore, cannot be assessed on methodological soundness or direct and indirect cost effectiveness

results. However, many companies have health promotion interventions and attribute their success in monetary terms without using research techniques. It is fortunate that these companies are gaining cost savings, however, this style of intervention does not aid in the progress of the health promotion field and it is difficult for others to learn from a program that is not evaluated. As our society is service oriented which fosters sedentary lifestyle, it is imperative that businesses learn to implement cost effective health promotion programs (Gebhart & Crump, 1990).

Therefore, the present study is only generalizable to a point. More exploration is needed within research and non-research-based health promotion programs. However, until this point most investigations conducted on health promotion have not reviewed health interventions and research variables in as much detail as the current study. Since the literature holds limited cost effective health promotion program data, the present study's findings can be used as a base to build a theory about the cost effectiveness worksite health promotion programs.

Theoretical Implications

A comprehensive theory of the cost effectiveness of worksite health promotion programs would be difficult to construct. However, it is possible for researchers to use the data from the current study to develop a workable theory or model. By examining the direct and indirect cost data that relates to significant cost savings, developing sound experimental designs, and manipulating health promotion programs that relate to cost savings, it is possible to state what facets a health promotion program needs to utilize to produce significant cost savings for a particular business.

The present study suggests that a company should use health care cost data, health claims data and/or absenteeism data as criterion measures, any solid experimental design (QED, WED or TED) and health promotion interventions such as HRA and/or chronic disease education, fitness, tobacco cessation, nutrition and/or weight control, the specific interventions associated with a particular workplace and promotional and incentive devices such as newsletters and marketing techniques. More research is needed to produce a solid theory of cost effective worksite health promotion programs. It is suggested that the present study be used as a theoretical base in the building of such a theory or model.

Practical Implications

The current inquiry can also be used as an educational tool for businesses, psychologists and other education-oriented personnel, the medical health field and employees. Companies need to understand the importance of evaluating health promotion programs. It is only in this way that corporations can understand the benefits of implementing such a system and the ethical rewards of providing preventive care to a business's most valuable resource, its employees.

Health promotion has been and sometimes still is considered a benefit, a fad or unable to produce real long term cost savings. Fortunately, health promotion can be much more than a promotional device, but it needs to be taken seriously and a real commitment to quality intervention must be bore by all persons associated with cost effective comprehensive worksite health promotion programs. The field of worksite health promotion will continue to grow in public importance and demand recognition. It is recommended that one takes a

proactive approach to health promotion by continuing to research its cost effectiveness, produce workable theories and models, and implement such programs into organizations across the nation.

Conclusions and Future Direction

The next steps needed to further develop the present research are complex. First, more comprehensive and specific worksite health promotion programs should be analyzed in the areas of cost effectiveness, health promotion interventions, criterion measures and methodological soundness. The current study was limited in scope and did not evaluate programs that focused on only one health promotion intervention. It may be that one intervention alone can impact cost effectiveness significantly.

Next, health promotion programs specific to a particular company must be researched in greater detail. It is apparent that different industries have specific needs and a health promotion program must meet those needs to produce cost savings. Further research must examine how to best find these specific company needs and assess the effectiveness found in implementing them.

Furthermore, future research should be more specific in stating cost savings. It may be necessary to incorporate financial analysis into research on cost effective worksite health promotion programs. Once cost data is expressed in detailed form, it will be possible to shed light on what percentages of cost savings can be expected after implementing health promotion programs. Issues of cost effectiveness will remain unsettled until companies apply cost analysis and other evaluation techniques to worksite health promotion programs (Hollander & Lengerman, 1988).

Finally, it is important to note that health promotion programs can influence more than employees' lives and industrial cost savings. Health promotion may be implemented in educational institutions, communities, and households. By being proactive towards an individual's health, the health care costs in the United States can be greatly diminished. It is time do more than cure the ill. We must help individuals achieve high quality health and wellness.

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Appendix

The CEI of all Thirty-four Articles Ranked

Study	CEI
Goetzel et al., 1990	27
Baily, 1990	26A
Dalton & Harris, 1990	26B
Bellingham et al., 1987	25A
Jeffery et al., 1993	25B
Bly et al., 1986	24A
Gibbs et al., 1985	24B
Bowne et al., 1984	23A
Golaszewski et al., 1992	23B
Erfurt et al., 1991	23C
Jose et al., 1986	22A
Wood et al., 1989	22B
Caudron, 1990	22C
Yen et al., 1991	22D
Henritze & Brammell, 1989	22E
Spilman et al., 1986	21
Shepard et al., 1982	20A
Lynch et al., 1991	20B
Harris et al., 1986	19A
Baun et al., 1986	19B
Jones et al., 1990	18A

Appendix

The CEI of all Thirty-four Articles Ranked

Study	CEI
Stral & Johnson, 1991	18B
Tsai et al., 1987	18C
Rozek, 1990	17A
Lorig et al., 1985	17B
Erfurt, 1990	17C
Shipley et al., 1988	17D
Conrad et al., 1988	16A
Lynch et al., 1990	16B
Bertera, 1990	16C
Tsai et al., 1988	14A
Bernacki & Baun, 1984	14B
Blair et al., 1986	13
Holzbach et al., 1991	13

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