

**TOTAL HEALTH-CARE COST AND POTENTIAL
LIFESTYLE-RELATED COST COMPARISON
FOR WORKSITE HEALTH PROMOTION
PROGRAM PARTICIPANTS AND
NON-PARTICIPANTS**

By

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Bachelor of Science

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Ada, Oklahoma

1993

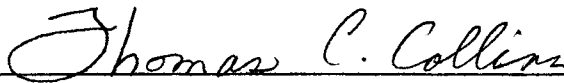
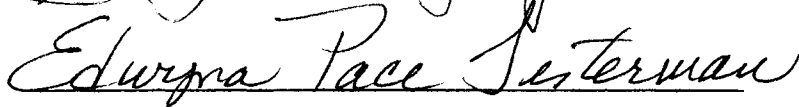
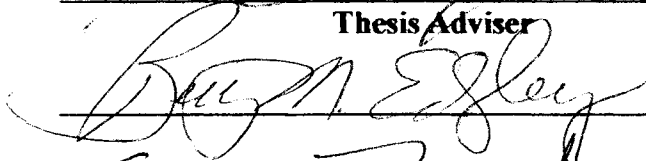
**Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
MASTER OF SCIENCE
May, 1995**

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Thesis Approved:



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ACKNOWLEDGMENTS

I would like to express by sincere appreciation to Dr. Bert Jacobson for his guidance and a door that was always open. Special thanks also to the members of my committee: Dr. Betty Edgley, for her time, support and encouragement, and Dr. Edwyna Testerman for her valuable contributions. Their constant guidance and advisement allowed a successful completion to this project. A special appreciation to Dr. Donna Cobb whose faith in me as a student motivated me to take on this endeavor.

Sincerest thanks to my family, especially my parents John and Connie Vardell, who prepared me to meet the challenges of life. Special thanks to Neva Day, my grandmother, who made the difference in so many unspoken ways. Thanks to Kathy Gregson, whose friendship and support made the moments of frustration bearable. Thanks also, to Wendee Lentz who helped me focus on the important things in life, like friendship. One last thank you goes to my four legged companion, Growly, for her patience and companionship and tolerating the lack of attention she received while I finished this project.

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CHAPTER I

INTRODUCTION

TOTAL HEALTH-CARE COST AND POTENTIAL LIFESTYLE-RELATED COST COMPARISON FOR WORKSITE HEALTH PROMOTION PROGRAM PARTICIPANTS AND NON-PARTICIPANTS

Since 1980 the cost of health-care in the United States has escalated significantly. In 1980, national health-care expenditures in the United States totaled \$250.1 billion, and in 1991, the nation spent \$751.8 billion on health-care (National Health Statistics, 1992). The cost increase per year averaged approximately \$45.6 billion. If the present trend continues, by the year 2000, the United States will be spending nearly \$1,162.2 billion on health-care annually. The rise in health-care cost is due in part to the development and use of new technology, use of defensive medicine, malpractice suits, spread of the acquired immune deficiency syndrome (AIDS), rising cost of health insurance and the increase in the total population (National Health Statistics, 1992).

In the private sector, American companies have also been heavily affected by the rising cost of health-care. According to the United States Health-care Financing Administration (HCFA), companies spend approximately 48.3% of their profits to provide medical care for their employees and their dependents, and that figure is expected to increase to over 60% by the year 2000 (Pelletier, 1993). Understandably, companies have begun to actively seek ways to control the cost related to providing health-care. Employers are being forced to find an affordable system to provide health

care to their employees. Corporations have reviewed various means of controlling costs and determined that a healthier workforce is associated with lower health-care utilization which means overall lower health-care costs (Chen, 1989). Utilization of Worksite Health Promotion Programs (WHPP) has become widespread as companies attempt to reduce health-care cost by creating a healthier workforce. The goal of WHPP is to detect disease and modify the lifestyle-related behaviors associated with the disease. This goal is attained by an onsite program for employees that provides comprehensive health screening, evaluation, counseling, activity facilities and educational programs pertaining to health issues. Commonly, WHPP provide blood pressure and cholesterol screenings with counseling for employees whose results are higher than recommended. The employees are then encouraged to modify their behavior by participating in exercise, nutrition and educational programs. Corporations utilizing WHPP are motivated by several factors including an interest in improving the health of employees, a desire to provide additional employee benefits and a commitment to controlling health-care, accident and absenteeism costs (Bly, Jones & Richardson, 1986). Companies have determined that having healthy employees within a healthy organization is the key to controlling health-care costs (Pelletier, 1993).

In the early 1900's, the most prevalent illnesses in the United States were infectious diseases (e.g., smallpox, polio). As medical technology became more adept at treating infectious disease, a shift toward the increase of chronic diseases (e.g., cancer, hypertension) developed. Americans have become more sedentary, ingest a high fat diet, smoke, consume more alcohol and have higher stress levels than ever before due to the fast paced lifestyles of most Americans. These behaviors are modifiable risk factors that have been correlated with the occurrence of chronic diseases such as coronary heart disease (CHD), hypertension, adult onset diabetes, low back pain and obesity. Employers have direct costs for routine doctor visits, outpatient care, inpatient hospitalization and

long term medical treatment for chronic diseases. In addition to direct health-care costs, there are indirect costs related to absenteeism and lowered employee productivity.

Companies implement WHPP in an effort to reduce the lifestyle-related modifiable risk factors that contribute to chronic illness and personal injury in attempt to decrease health-care costs by reducing the risk factors associated with chronic disease. Gebhardt & Crump, (1990) reported positive health effects of fitness and wellness programs on disease risk factors (e.g., high blood pressure, high cholesterol) and work related injuries (e.g., back strain). Most companies implementing a WHPP cited decreasing health-care costs (related to stress, absenteeism and injuries), changing employee health status and behavior (e.g., fitness, nutrition) and increasing productivity (e.g., job performance, reducing turnover and absenteeism) as justification for starting a WHPP (Gebhardt & Crump, 1990).

With increased interest in WHPP, comprehensive research has been conducted to determine if these programs are effective. From 1980 to 1991, there were 24 published studies evaluating the health and cost benefits of health promotion and disease prevention in the workplace. Of those, only one did not report positive health benefits and health-care cost reduction (Pelletier, 1993). In addition to the previous 24 studies, 24 new studies were conducted from 1991 to 1993. All of the most recent studies that focused on cost effectiveness or cost benefits of WHPP demonstrated positive outcomes (Pelletier, 1993).

Bly, Jones and Richardson completed the first longitudinal study on WHPP in 1986. They researched the Live for Life (LFL) program of the Johnson & Johnson companies. They reported a significant difference ($p=.001$) in health-care costs and utilization of inpatient health-care services in companies with the LFL program compared to those companies without the LFL program.

Further research by Fries, et al. (1994) studied the cost effectiveness of a health-promotion program using the California Public Employees' Retirement System (PERS).

Results of this research showed a significant reduction ($p < .001$) in health risk scores, reduction of subject reported medical utilization from baseline ($p < .05$) and a decrease in claims cost growth when compared to controls ($p = .03$). Other results from this study included a reduction in overall claims cost by participants.

The health-care crisis being experienced by Americans today is an indication of the need for continued research in the area of health-promotion. American lifestyles have been identified as a major contributor to many of the leading causes of death in the United States. The health habits demonstrated by the majority of the population are related to the high incidence of CHD, cancer and obesity. The cost of treating chronic disease is excessive, making it vital for companies to find a way to reduce the incidence of these diseases to control rising health-care costs. Existing research has demonstrated that WHPP have a positive effect on the health status of employees which in turn aids in reduction of health-care costs and profit lost associated to lowered employee productivity and absenteeism.

Purpose of the Study

The purpose of the present study was to compare the health-care cost and potential lifestyle-related cost of participants and non-participants of a worksite health promotion program.

Hypotheses

The following null hypotheses were tested at the .05 level of significance:

Hypothesis 1. There is no significant difference in health-care cost between participants and non-participants of a WHPP.

Hypothesis 2. There is no significant difference in potential lifestyle-related cost between participants and non-participants of a WHPP.

Operational Definitions

1. Participants are defined as employees who appeared on the HRA database prior to 1993.
2. Non-participants are defined as not appearing on the HRA database prior to 1993.
3. WHPP attempt to detect disease and modify the lifestyle-related behaviors associated with the disease. A WHPP is an onsite program for employees that provides comprehensive health screening, counseling, evaluation, activity facilities and educational programs on health issues such as hypertension and high cholesterol. Employees whose results are higher than recommended are encouraged to modify their behavior by participating in the various programs offered within the WHPP.
4. Lifestyle risk factors are any behavior that is correlated with the development of chronic disease.
5. High behavioral risk factors are defined as: 1) Seatbelt use less than 75% of the time, 2) 20% more than ideal weight, 3) Cholesterol levels greater than 221 mg/dl, 4) Alcohol consumption exceeding fifteen drinks per week, 5) Blood pressure 90 mm Hg or more, 6) Smoking and 7) Aerobic exercise performed less than three times per week (Bertera, 1991).
6. Insurance plan is defined as the insurance plan that the participants and non-participants had to be enrolled in to be included in the data base.
7. Lifestyle-related behaviors include tobacco use, elevated blood pressure (hypertension), inadequate vehicle (ie. not using seat belts) and home safety, abuse of drugs other than alcohol and tobacco, excessive stress, poor dietary habits, alcohol abuse, elevated serum cholesterol, excess body fat, inadequate exercise and unsafe sexual behavior.

Extent of the Study

Delimitations

1. Inclusion criteria for the insurance plan data base was for the continuously active employees under 65 years of age.
2. Inpatient and outpatient data base criteria included only claims incurred between January, 1990 through December, 1992 that were paid through June, 1993.
3. Data bases used excluded all maternity claims.
4. Data bases included only active employees under the age of 65 who were continuously active from 1990 through 1992.
5. There were 8,234 employees that satisfied the inclusion criteria.
6. All monetary figures were statistically adjusted to 1992 dollars.

Limitations

1. The participants were limited to only those completing all relevant questions on the HRA.
2. The subjects were self-selected, meaning that enrollment in the WHPP was voluntary.
3. There may have been an artificial inflation of alpha due to multiple records per subject.
4. There was no baseline period.
5. There was no randomization of subjects.
6. There was no measure of the strength of the treatment.

Assumptions

1. The HRA is valid and reliable.
2. The subjects answered the questions accurately and honestly.
3. The subjects were representative of the population.
4. The subjects were similarly motivated.

CHAPTER II

REVIEW OF LITERATURE

A Review of Worksite Health Promotion Programs

Cost Effectiveness of WHPP

An interest in worksite health promotion and disease prevention has been occurring across the nation for the last 15 years. Many companies, both small and large have developed WHPP and many more appear to be interested. National health promotion objectives for the year 2000 include the goal that at least 85% of all workplaces with 50 or more employees will offer employee health promotion activities. The advantages of WHPP range from access to a large portion of the adult population and effective internal communication channels to stable social support, convenient access for employees and an opportunity to create an environment that is conducive to healthy behaviors (Sciacca, Seehafer, Reed & Mulvaney, 1993). Other reasons cited for pursuing WHPP include reduction of time and travel barriers to employee participation, the fact that employees are a captive audience, availability of existing facilities such as an employee health department, efficiency of administration, availability of an on site existing health staff and the stability of the target population that facilitates follow-up (Warner, Wickizer, Wolfe, Schildroth & Samuelson, 1988).

In 1985, the Office of Disease Prevention and Health Promotion (ODPHP) of the U.S. Public Health Service (PHS) funded a survey to assess WHPP activity in worksites with fifty or more employees. Baseline data was collected with this survey to help establish the objectives in Healthy People 2000. In 1992, the ODPHP funded a second survey to determine the direction of WHPP since 1985. General results from the 1992 study showed an increase in worksite-health-promotion activities since 1985. Data from this survey noted an increase in worksites that offered nutrition, weight control, physical fitness, high blood pressure and stress management information or activities from 1985 to 1992 [U.S. Department of Health and Human Services (DHS), PHS, 1993]. Worksites offering education on back care and smoking cessation remained approximately the same and fewer worksites offered information or activities about off-the-job accidents than in 1985.

Companies offering WHPP believe there are financial and health related benefits that include reduced absenteeism, improved morale, increased productivity, a better public image and overall improved employee health. However, the rationale most companies have for implementing a WHPP is a reduction in total health-care costs (Sciacca, Seehafer, Reed & Mulvaney, 1993).

A 1988 review of literature that encompassed research from 1974-1986 by Warner, et al. examined the intellectual and empirical basis for the belief that WHPP save money on health-care cost. They reviewed 298 articles chosen for their specific topic areas including public health, medical literature and safety programs. A search of five major data bases produced approximately 650 abstracts. From that compilation, 400 abstracts were chosen to be included in the literature review. The articles were chosen on the basis of relevance and apparent importance to the review. Further, the articles were categorized by subject area and ten subjects were chosen for the intense review of the particular articles. The specific topics of concern included hypertension control, employee assistance programs, smoking cessation, worksite-smoking-restriction policies,

nutrition and weight loss, exercise, stress reduction, motor-vehicle safety belt use, back-injury prevention and health risk appraisals. An additional 85 general review articles were also selected for examination. For the literature published through 1986, meaningful cost-effectiveness information was found for only the hypertension control and individual smoking cessation programs. Defensible results were almost nonexistent in all other subject areas reviewed. Warner, et al. (1988) stated that the lack of support for their study included: 1) Lack of useful findings from few attempts by researchers to examine economic issues and 2) Relatively little formal evaluation of WHPP interventions. Final comments by Warner et al. (1988) suggest that there are considerable health promotion opportunities available at the worksite. Research presented in this review of literature did not provide evidence of cost savings or health risk reduction from 1974 to 1986. This does not mean that WHPP should not be considered effective, but should be considered with a degree of skepticism.

Other reviews of literature are not in agreement with the findings reported by Warner et al. (1988). Pelletier (1993) reported 24 published studies between 1980 and 1991 that evaluated the health and cost-benefits of WHPP and disease prevention programs. All 24 reported positive cost effectiveness. Twenty-four additional studies published from 1991 through early 1993 suggested the obvious popularity and influence of WHPP. All but one of those studies demonstrated positive outcomes in disease prevention, and all reported positive outcomes when cost effectiveness was the focus of the research.

Specific research studies on the effectiveness of WHPP have been conducted for almost 15 years. During this time, the procedures have become more sophisticated and have used randomized, controlled trials more often. This progress in research methods may prove early research efforts in the area of WHPP insufficient (Pelletier, 1993).

A case in point would be the 1985 study by Blue Cross and Blue Shield of Indiana which reported lowered health-care costs for participants than for non-participants of a

WHPP. The same data was reanalyzed in 1993 and reported that participation in the WHPP was not associated with reduced medical care cost . Based on this examination of the data, the authors suggested that, "It would be prudent to remain guarded about the health cost savings effects of worksite health promotion programs (Sciacca, Seehafer, Reed & Mulvaney, 1993)." Suspected reasons for the change in results after the data was reanalyzed consisted of less than adequate statistical design and evaluation techniques used in the 1985 study. The main issue of statistical design focused on the use of parametric designs that may be insufficient due to the assumptions that must be made concerning the variables being measured (Sciacca, Seehafer, Reed & Mulvaney, 1993). When the data was reanalyzed using nonparametric methods, the assumptions of normality of data distributions and homogeneity of variance necessary in parametric statistics were not required.

Utilization Versus Non-utilization of WHPP and Employee Absenteeism

Research suggests that healthier employees (employees with fewer health risks that practice healthy lifestyles or participants of WHPP) have lower absenteeism rates and lower health-care costs (Yen, Edington & Witting, 1992). Further comments by Yen, Edington & Witting (1992) state that most of the studies presented thus far in research have been bivariate models that explore only one health risk and its effect on absenteeism and health-care cost instead of the many variables that may actually contribute to absenteeism. The research presented by Yen, Edington and Witting (1992) suggests that multivariate regression models be developed to better predict the economic impact for the employer that implements a WHPP by considering the many variables that contribute to absenteeism.

The cost associated with employee absenteeism is a significant motivator for the implementation of WHPP. Bertera (1991) found that employees had higher absenteeism rates when they exhibited any of seven behavioral risk factors (seatbelt use less than 75%

of the time, employees weighed 20% more than their ideal weight, cholesterol levels were greater than 220 mg/dl, alcohol consumption exceeded fifteen drinks per week, blood pressure was 90 mm Hg or more, the employee was a current smoker and aerobic exercise was performed less than three times per week) when compared to employees that did not exhibit any of the risk factors. Additionally, the research by Bertera (1991) stated that the differences in absenteeism rates was related to higher costs for employees that exhibited any of the behavioral risk factors.

A study by Lynch, Golaszewski, Clearie, Snow and Vickery (1990) examined the relationship between participation and non participation in WHPP and the number of days absent from work. The research found that participants in the study had fewer days absent than employees that did not participate in the WHPP. Jones, Bly and Richardson (1990) established that even though supporters of WHPP feel that healthier lifestyles can reduce the number of absences, current research has failed to show these results consistently. The failure of research to firmly determine the effects of WHPP on absenteeism may be due to the fact that companies may not release sensitive information. Therefore for the time, results in this area should be considered carefully before final conclusions are drawn about the relationship between WHPP and absenteeism (Jones, Bly & Richardson, 1990).

Health Risk Reduction with WHPP

Healthy People 2000: National Health Promotion and Disease Prevention Objectives sets measurable health related targets for the worksites for the decade. Objectives for expanding policies on smoking, alcohol and drugs, increasing activities in physical activity and fitness, nutrition and weight control, stress management, back care, blood pressure, cholesterol and using occupant protection systems during work related travel are included for this decade (U.S. DHS, PHS, 1993). A 1992 survey by the ODPHP assessed several preventive services offered by WHPP. There has been an

overall increase in preventive services offered by worksites since 1985. More worksites are now offering activities that measure employee health status and/or health risk than in 1985. Activities such as periodic physical exams, questionnaires that measure employee health status (HRAs), blood sugar tests, blood pressure screening, cholesterol and cancer screenings are offered in various forms in most WHPP. Additional programs include smoking cessation, physical fitness, nutrition education, weight control, drug abuse prevention and treatment, stress management and general safety in the workplace. The majority of these activities target risk factors for chronic diseases such as CHD, cancer, diabetes and hypertension.

Bertera (1991) identified seven behavioral risk factors related to lifestyle. This study included 46,976 employees of a large industrialized workforce. The employees completed an HRA which was administered as part of the comprehensive WHPP. The HRA provided baseline data for the behavior risk factors which were defined as high risk when: 1) Seatbelt use less than 75% of the time, 2) Employees weighed 20% more than their ideal weight, 3) Cholesterol levels were greater than 221 mg/dl, 4) Alcohol consumption exceeded fifteen drinks per week, 5) Blood pressure was 90 mm Hg or more, 6) The employee was a current smoker and 7) Aerobic exercise was performed less than three times per week (Bertera, 1991). These seven behavioral risk factors were used as independent variables to determine the effects of the program intervention on days absent from the workplace due to illness. A participant was classified as high risk if three or more of the behavioral risk factors were identified as high. The results of this study showed significant excess of illness days for high risk participants as compared to low risk participants. After the number of excess illness days were determined, each behavioral risk was then combined with an illness cost per person which included cost incurred for compensation, health-care claims, and non health-care benefits. The total estimated cost attributable to behavioral risks was reported to be over \$70 million. This cost is great enough to justify implementation of WHPP that will reduce the behavioral

risk factors which will in turn reduce illness days and result in reduced health-care cost (Bertera, 1991).

For WHPP to be successful, the program must find a way to identify and reach high risk employees. Research by Henritze, Brammell and McGloin (1992) focused on the LIFECHECK program at Coors Brewing Company. Even though Coors has had a comprehensive onsite wellness center since 1991, many of the employees had never used it. The LIFECHECK program worked to identify high-risk employees and get them involved in a modification program. The LIFECHECK program was successful at reaching high risk employees that had not been participating in the wellness center programs. The participation rate of this study included over fifty percent of the eligible employees. The modification program was successful in reducing short-term risk factor status of participants. The research found that focusing health promotion efforts on employees with three or more risk factors may have long-term effects on reducing total health-care costs.

Stress and Employee Health

According to the American Psychological Association/National Institute for Occupational Safety and Health (APA/NIOSH, 1992) psychological disorders are one of the ten leading work-related disorders. Included in the list of work-related disorders is unresolved stress, which has been identified as a behavioral and psychosocial risk factor for chronic disease (APA/NIOSH, 1992). The research presented by the APA/NIOSH (1992) concluded that employers should work to educate employees about warning signs of stress and depression as it is related not only to work, but to other social and family life issues as well. Stress is primarily a lifestyle-related risk factor that can be managed when the proper skills are learned.

Cole, Tucker and Friedman (1987) identified stress in the workplace as a leading cause of health related problems. Stress-related illness costs companies an estimated 75

to 100 billion dollars annually due to absenteeism, medical claims and lowered productivity (Goodspeed & DeLucia, 1990). The price associated with stress-related illness makes it easy to identify the need for stress management in the workplace. Onsite stress-management training has many advantages beyond reducing health-care costs. The advantages of worksite stress management training include: 1) It can be established and evaluated without disturbing the employees work, 2) The program can be tailored to individual differences and needs, 3) It can be effective when dealing with not only work related stressors, but outside stressors as well and 4) It can be easily incorporated into existing programs (Goodspeed & DeLucia, 1990). These programs can be easily implemented and included in existing WHPP. Learning to manage stress can help employees have more success with other aspects of comprehensive programs such as smoking cessation or weight loss.

Hypertension and Employee Health

Hypertension is another of the risk factors for CHD that was identified by Bertera (1991). Hypertension or high blood pressure is often called the "silent killer" because it can go undetected until irreversible damage to the vascular system has occurred. Screening and early detection of hypertension is an important factor in prevention and control of this disease (Fielding, Knight, Goetzl & Laouri, 1991). Health promotion activities that include health screenings almost always include blood pressure screenings. Those employees that are identified with hypertension are usually referred to a physician for further treatment (Henritze, Brammell & McGloin, 1992).

Foote and Erfurt (1991) examined the cost of health-care claims for hypertensive employees for seven years after a blood-pressure-control program had been implemented to determine if worksite monitoring and counseling produced a reduction in health-care costs. Hypertensives at three sites were compared to a control site and matched with normotensive employees. The researchers reported a reduction in health-care costs for

the hypertensive employees that received the screening and counseling compared to the control group and the matched group of normotensive employees. This result, could have been due to other factors that are influenced by a WHPP rather than the hypertension treatment alone. It is common for WHPP to offer a comprehensive program that targets a wide range of wellness behaviors, not just those directly associated with hypertension. Benefits other than reduction of health-care costs included overall improved employee health (Foote & Erfurt, 1991).

Exercise Programs and the Reduction of CHD

Regular physical activity can help prevent and manage CHD, hypertension, non-insulin dependent diabetes mellitus, osteoporosis, obesity and mental health problems (DHS, PHS 1993). WHPP offer activities that promote exercise and fitness at the worksite. Most programs offer facilities with equipment, information, health screening, consultation and recreational activities for employees and their families.

Research has shown that WHPP offering exercise classes and consultations on topics such as weight loss, smoking, stress management and other wellness issues resulted in an improvement of fitness levels, body composition, overall feelings of well-being and decreases in coronary risk factors (Blair, Piserchia, Wilbur & Crowder, 1986). Employees of an insurance company participated in a structured physical fitness program and demonstrated an overall improvement in cardiorespiratory fitness, a decrease in body fat percentage and decreased medical costs (Bowne, Russell, Morgan, Optenberg and Clarke, 1984). Bowne, et al. (1984) concluded that for better educated, white-collar workers, a higher level of fitness is associated with a decrease in major medical costs and reduction in disability days.

Exercise as a part of a health promotion program is being viewed as a key to reduction of health risk. The medical profession has recognized and now prescribes exercise as a preventive strategy for illness, especially illness associated with CHD

(Hatziandreu, Koplan, Weinstein, Caspersen & Warner, 1988). Hatziandreu, et al. (1988) examined the cost effectiveness of regular exercise (physical activity that consumed 2,000 kcal per week) in 1,000 men 35 years of age followed for 30 years. According to this research, exercise is a cost effective method for lowering the risk of CHD. Exercise used as a modifier of CHD development may be more cost effective for persons who enjoy exercise than for persons who find exercise less desirable. For those persons for whom exercise is not desirable, the cost effectiveness may be less because they place more value on their time and assume that the cost of exercise is comparable to some drug therapies and surgical interventions (Hatziandreu, et al. 1988).

Nutrition Education and Weight Management Strategies as Part of WHPP

Dietary factors are associated with five of the leading causes of death which have been identified as CHD, cancer, stroke, non-insulin dependent diabetes mellitus and atherosclerosis (U.S. DHS, PHS, 1993). Various nutrition and weight control strategies have been employed as part of many WHPP to offer preventive measures for these diseases. These measures include counseling, workshops and classes in nutrition education and weight management as well as low fat choices in cafeterias or vending machines.

High cholesterol (>221 mg/dl) which may be controlled by modifying the diet, has been identified as a risk factor for CHD. Most WHPP include some type of educational courses and healthy food options in cafeterias. Coors' LIFE CHECK program that was designed to identify and modify risk factors for CHD in their employees used nutrition education classes, healthy food choices in the cafeteria, as well as tours of local supermarkets for the employees and their spouses (Henritze, Brammell & McGloin, 1992). There were 692 participants in the LIFE CHECK study, of those, 340 had a cholesterol level (>221 mg/dl) that was considered a risk factor for CHD. Those employees were then scheduled for a second screening and educational classes.

Smoking Cessation Programs and Health Risk Reduction

Smoking control programs are now the most prevalent type of WHPP. This is probably due to the disability, absenteeism and early death of smokers that have been documented to be contributing factors to the cost of health-care (Serxner, et al., 1993). The type of programs vary from smoking prohibition to behavior change strategies. There has been varied success rates reported with different programs. Depending on the type and success rates of the smoking cessation programs, saving estimates ranged from \$175 to \$345 per smoker annually (Serxner, et al., 1993). In addition to the health-care related savings, additional benefits of smoking cessation programs included reduced absenteeism and increased employee productivity.

Smoking-cessation programs in industry primarily attempt to reach the blue collar workforce of which 47% are smokers (Dawley, Dawley, Correa & Fleischer, 1991). The approximate cost of a comprehensive smoking cessation program is \$29 per employee, an amount that employers easily spend on safety education programs. Dawley, Dawley, Correa and Fleisher (1991) stated, "The addition of worksite-smoking control, discouragement and cessation programs is clearly a cost effective approach for improved employee health and productivity".

Review of Literature Summary

The literature presented here includes two areas of WHPP. First, the cost effectiveness of WHPP has been researched for approximately fifteen years. Early studies may have lacked the intense planning necessary to have valid and reliable outcomes (Pelletier, 1993). There has been extensive research published concerning the cost effectiveness of WHPP, and the majority of it does demonstrate positive cost effective outcomes (Bertera, 1991; Foote & Erfurt, 1991; Pelletier, 1993). Research presented prior to approximately 1990, however, may have had a greater number of results that demonstrated negative outcomes (Warner, et al., 1988). Sciacca, Seehafer,

Reed and Mulvaney (1993) analyzed the same data twice, using different methods, and reported opposite results. The researchers attributed the differences to the statistical design which questions the validity of using parametric statistics with the data that is commonly used to measure cost effectiveness (medical claims, HRA's).

The effects of WHPP on absenteeism rates were also briefly discussed. Yen, Edington and Witting (1992) suggested that healthier employees have lower absenteeism rates and consequently, lower health-care costs. The common theory behind research focused on absenteeism and its relationship to WHPP was that healthier employees will theoretically have lower health care costs. Bertera (1991) reported that employees who exhibited any of seven behavioral risk factors led to higher costs to employers than employees who exhibited none of the risk factors. A study presented in 1990 (Jones, Bly & Richardson) however, suggested that even though the relationship between WHPP and absenteeism is significant, the results should be considered carefully before final conclusions should be drawn concerning effectiveness.

Second, is the effect of WHPP on certain risk factors for chronic disease. This area of WHPP research has reported significant positive results concerning risk several factors when a WHPP was implemented. Early research in this area may be misleading due to inadequate design and analysis (Sciacca, Seehafer, Reed & Mulvaney, 1993). Programs that focused on smoking cessation and hypertension have both proven to be very effective in reducing the health risks associated with chronic disease. Dawley, Dawley, Correa and Fleisher (1991) reported that smoking cessation programs in the worksite is an effective method to improve employee health and productivity. Foote & Erfurt (1991) followed a group of employees for seven years after a hypertension control program had been implemented and found that a program that focused on monitoring and counseling could be very effective at reducing health-care cost related to hypertension. Other WHPP focus on other risk factors of chronic disease such as fitness and exercise

programs, nutrition education and stress management. Programs in these areas have demonstrated a significant decrease in health risks and reduced health-care cost as well.

CHAPTER III

METHODOLOGY

Selection of Subjects

Subjects meeting the criteria for this study were 8,234 self-selected employees of a large U.S. corporate company. Of those 3,993 were participants in the WHPP and 4,241 were non-participants in the WHPP. Age, gender, education level and marital status was evenly distributed between participants and non-participants. Criteria for inclusion in this study were: 1) Subjects had to be included in the Johnson and Johnson Health Risk Appraisal (J&JHRA) database prior to 1993, 2) Non-participants could not appear in the J&JHRA database prior to 1993, 3) All subjects had to be enrolled in the insurance plan and appear in the insurance plan database and 4) All subjects had to be continuously active employees under 65 years of age.

Subjects voluntarily completed the J&JHRA that was administered by Johnson and Johnson Advanced Behavioral Technologies, Inc. (J&JABT). All subjects completing the survey were assured confidentiality and anonymity.

Database Development

Data for this study was obtained from the J&JHRA and insurance plan medical claims databases. The two databases used were merged to form one database that included: 1) Medical claims for insurance plan enrollees that were continuously active employees from 1990 through 1992 and were under 65 years of age, 2) Inpatient and

outpatient claims incurred between January, 1990 through December, 1992 and paid through June, 1993, 3) Demographic information for the participant group from the J&JHRA, 4) Participants who appeared on the J&JHRA database prior to 1993 and 5) Non-participants not appearing on the J&JHRA database prior to 1993. There was a total of 1,091 admissions included in the insurance plan database for the three year period of this study.

Instrumentation and Procedure

The HRA included 108 items. Demographic data obtained from the J&JHRA included age, gender, ethnicity, educational background and work type. For every subject each medical claim was analyzed to determine if the cost was due to lifestyle or non-modifiable behavior. The claims were analyzed to identify the cost relating to the specific lifestyle behaviors of tobacco use, elevated blood pressure, inadequate vehicle and home safety, abuse of drugs other than alcohol and tobacco, excessive stress, poor dietary habits, alcohol abuse, elevated serum cholesterol, excess body fat, inadequate exercise and unsafe sexual behavior. The items were further divided into 46 Lifestyle Diagnosis Groups (LDG's). Each LDG had a diagnosis, which based on published research, has demonstrated a correlation with one or more of the lifestyle behaviors listed. For example, the Trachea Bronchus Lung Cancer LDG consists of lung cancer and certain related diagnoses which may be caused by smoking.

Questionnaires were written on an eighth grade reading level and designed to be completed in 30 minutes. The HRA has been offered annually since 1991 to employees of a large U.S. corporate company and their spouses in both worksite and community locations, during work and evening hours. The HRA service was offered to employees free of charge. All surveys were manually inspected by staff members and were then scanned by computer on-site to ensure completeness and accuracy. If items were missing, the J&JABT staff member sought clarification or additional information. The

HRA information was then entered in the J&JHRA database. Participants received a 24-page report that outlined their health status in relation to eight risk areas. A professional summary was also provided for participants to use for consultation with a primary care physician. A copy of the professional summary was sent to the health services department of the company for inclusion in a medical file with permission of the employee. Employees that were determined to be at high risk were contacted by the health services department and offered an opportunity for individual consultation.

Intervention methods included fitness center use for a small monthly fee with operation hours Monday through Saturday. Discounted YMCA membership programs were also offered with local YMCAs. The employees were allowed flex-time to use the facilities during work hours. Other programs were offered for additional charges such as after-work and lunch time aerobic classes, weight management programs offered to employees and spouses during lunch hours at discounted rates and smoking cessation programs for employees and their dependents at discounted rates were also available. Brown Bag educational seminars on various topics were offered at all corporate and technical building locations during lunch time on a monthly basis free of charge. Educational series were offered to employees and their spouses about prenatal education. Other activities included exercise incentive programs such as an annual family fun run/walk and National Employee Health and Fitness day, and voluntary health screenings, annual flu shot programs paid for by health-care carriers and mammography screenings for employees and their spouses at worksite locations with results forwarded to a designated physician.

Statistical Analysis

After the databases were merged a repeated measures analysis of variance (ANOVA) was used to analyze the data. All maternity cases were excluded from the data bases. All dollars amounts were adjusted to 1992 dollars to control for inflation. Results

were adjusted for age and gender. Statistical analyses were performed on the SAS system. Statistics were computed for total medical care cost, potential lifestyle-related cost and hospital-utilization rates for participants and non-participants. Descriptive analysis of medical care costs and utilization by participant group by year were performed. Analysis of the effects of time and participation were analyzed with a 2x3 repeated measures ANOVA. Comparison of participants and non-participants was completed with a repeated measures ANCOVA controlling for age and gender. Previous research has demonstrated the reliability and validity for the Live for Life HRA as a measurement instrument (Knight, et al., 1994; Fielding, Knight, Goetzel & Laouri, 1991).

CHAPTER IV

RESULTS

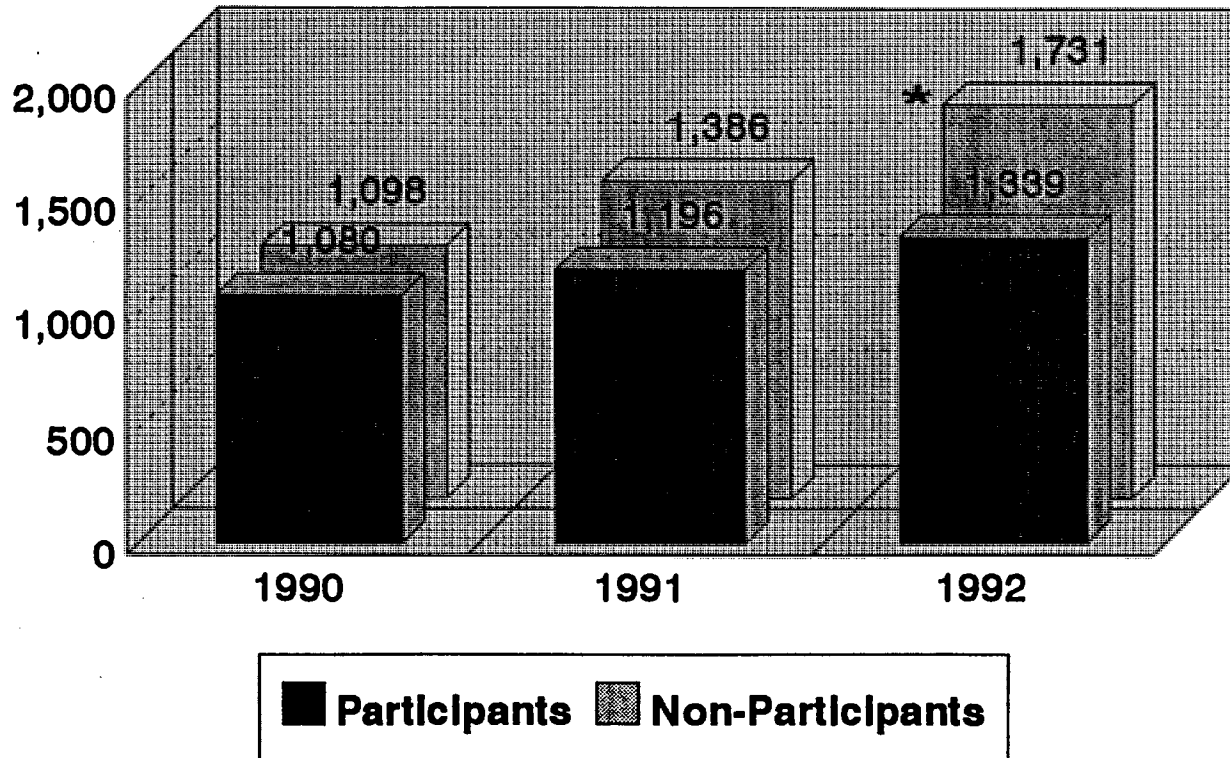
TOTAL HEALTH-CARE COST AND POTENTIAL LIFESTYLE-RELATED COST COMPARISON FOR WORKSITE HEALTH PROMOTION PROGRAM PARTICIPANTS AND NON-PARTICIPANTS

The result of a repeated measures analysis of variance provided a significant ($P=0.0326$) difference between the total medical care cost of participants and non-participants. Net charges, after controlling for age and gender, for the participants in 1990 was \$1,080 compared to \$1,098 for non-participants. In 1992, the total cost for participants had risen to \$1,339 for participants and \$1,731 for non-participants (See Figure 1). This demonstrated a difference of \$392 between groups after a three year period and a \$18 difference in 1990 when the program was implemented. Inpatient cost comparisons demonstrated over a two fold increase from 1990 to 1992 for non-participants. In 1990, \$112 less was paid for participants than non-participants and in 1992 the difference between groups was \$272 less paid for participants (See Figure 2).

After total medical care cost and inpatient only cost comparisons, potential lifestyle-related cost experience between groups was compared. Total potential lifestyle risk related cost in 1990 was \$375 for participants and \$382 for non-participants, a difference of \$7. In 1992, the potential lifestyle-related risk was \$445 for participants and \$604 for non-participants, a difference of \$159 (See Figure 3). Inpatient c

Figure 1. Total medical costs participants and non-participants.

\$ Charges / Each Employee

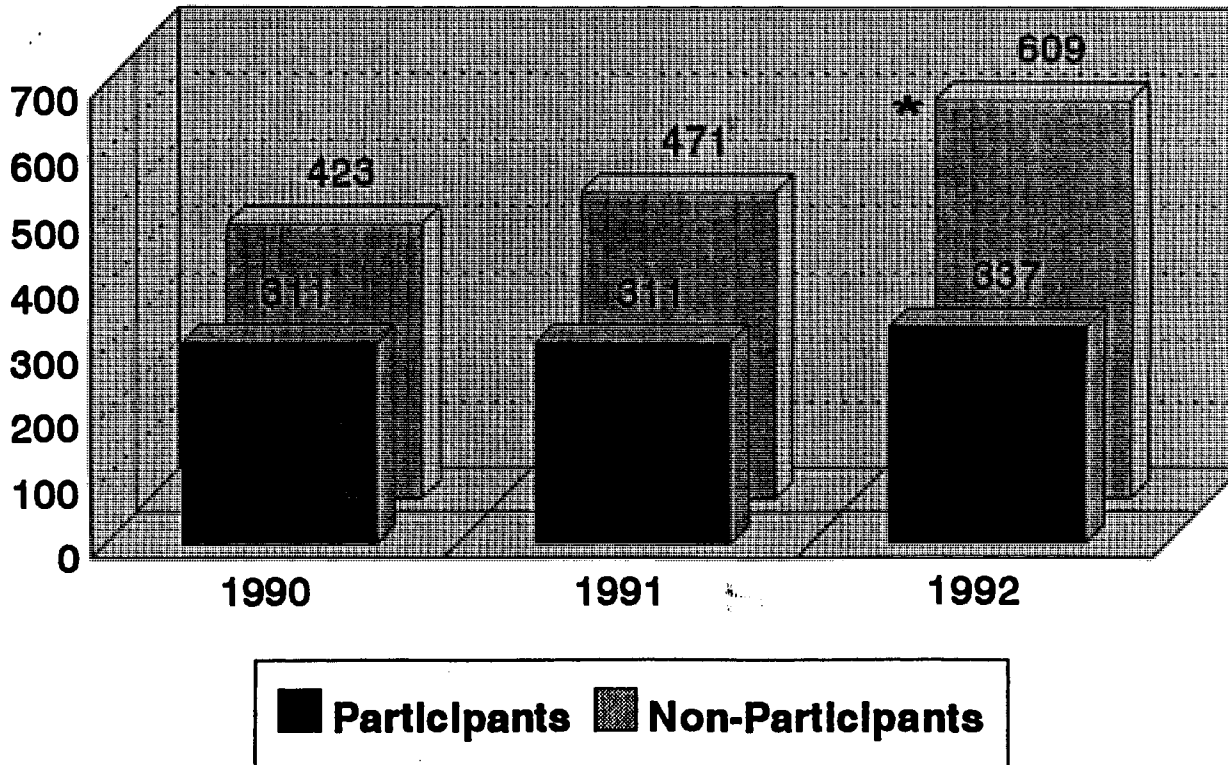


Participants N=3,993
Non-Participants N=4,341

* Significant at $0 < .05$

Figure 2. Total Inpatient Medical costs participants and non-participants.

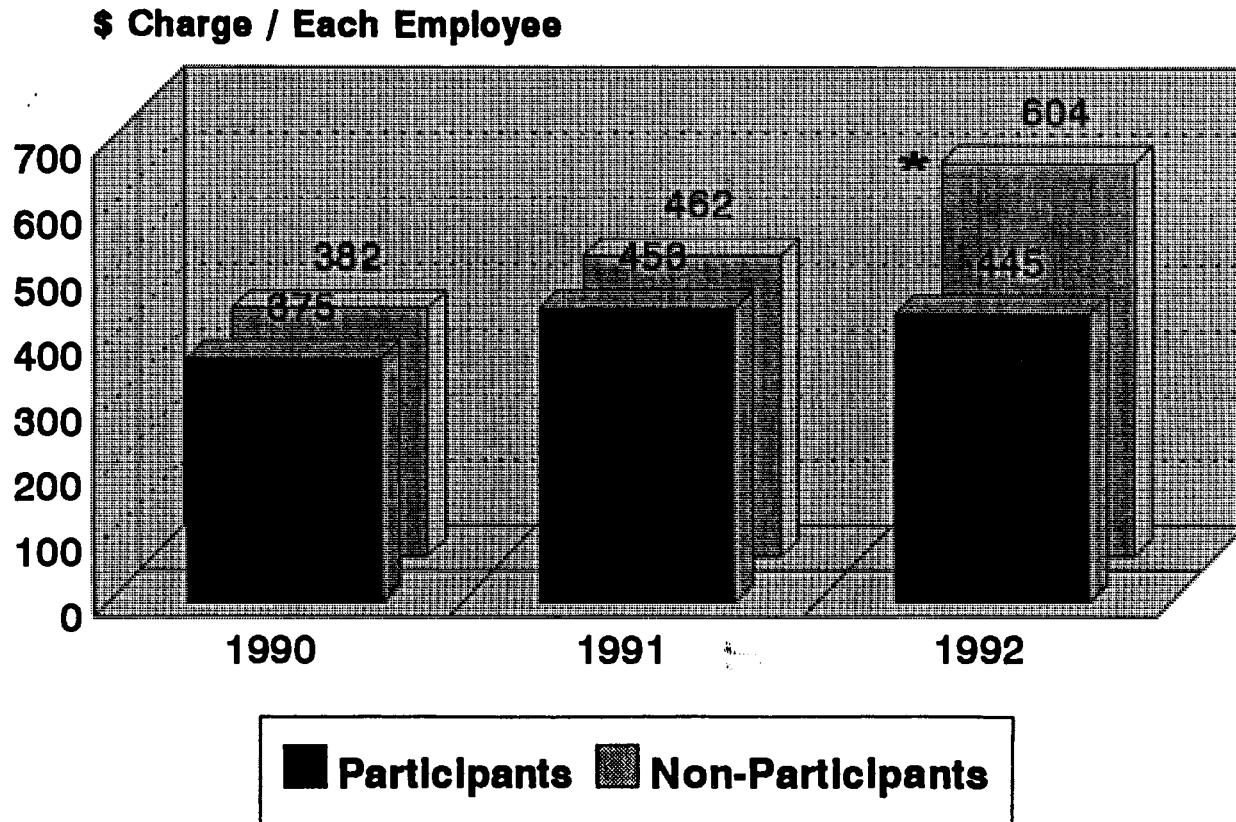
\$ Charges / Each Employee



Participants N=3,993
Non-Participants N=4,341

* Significant at $0 < .05$

Figure 3. Potential lifestyle related cost participants and non-participants.



Participants N=3,993
Non-Participants N=4,341

* Significant at $0 < .05$

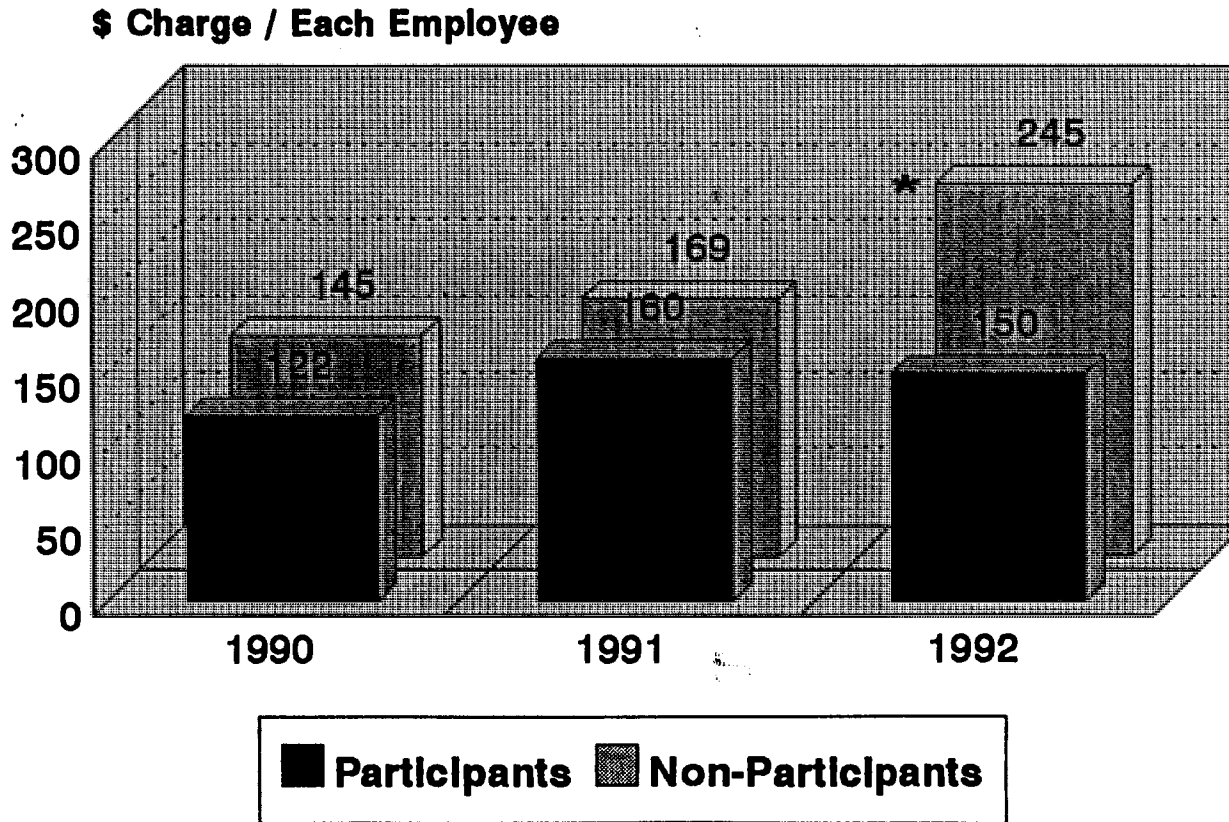
comparisons of potential lifestyle-related cost in 1990 was \$122 for participants and \$145 for non-participants. In 1992, the difference between participants and non-participants was \$95 for the potential lifestyle-related cost with \$150 paid for participants and \$245 paid for non-participants (See Figure 4).

Total hospital utilization rates for participants was 41.32 admissions per one thousand employees in 1990, 37.06 in 1991 and 42.07 in 1992. Non participant admission rates per one thousand employees were 43.86, 46.22 and 53.76 in 1990, 1991 and 1992 respectively. This demonstrates a difference (between participants and non-participants) of 2.54 admissions per one thousand employees in 1990, 9.16 admissions per one thousand employees in 1991 and 11.69 admissions per one thousand employees in 1992 (See Figure 5).

Lifestyle-related inpatient utilization rates for participants were 13.27 admissions per one thousand employees in 1990, 14.53 in 1991, 17.03 in 1992. Non participant lifestyle-related inpatient admissions per one thousand employees were 17.68, 17.21 and 21.69 in 1990, 1991 and 1992 respectively. This is a difference in admissions per one thousand employees of 4.41 in 1990, 2.68 in 1991 and 4.66 in 1992 (See Figure 6).

A summary of total medical care cost compared to potential lifestyle-related cost and other medical cost showed a total medical cost of \$6.6 million in 1990. Of the \$6.6 million total medical cost, \$2.3 million was potential lifestyle cost and \$4.3 in other medical cost. The total cost in 1991 was \$7.4 million, of which \$2.5 million was potential lifestyle and \$4.9 other medical costs. In 1992, a total of \$8.9 million was spent. Lifestyle-related cost was \$3.0 million and other medical cost was \$5.9 million (See Figure 7).

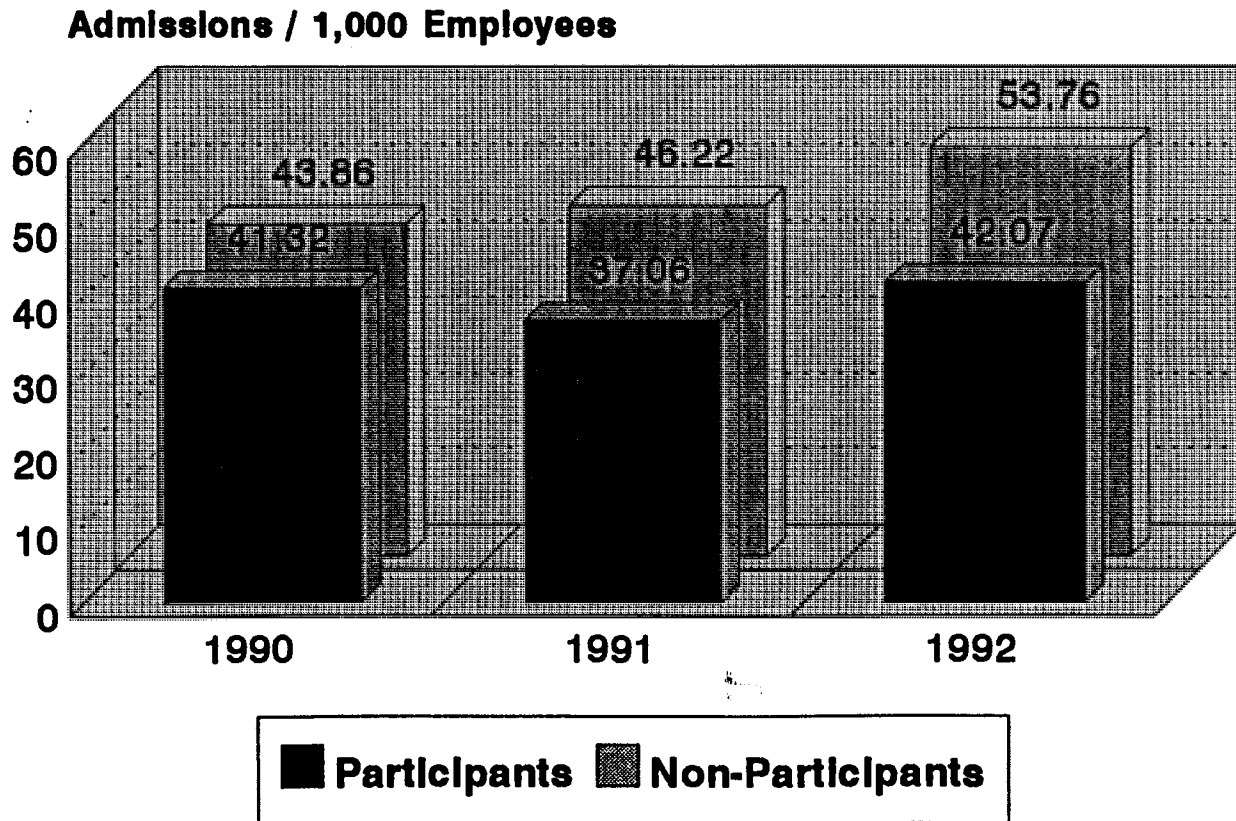
Figure 4. Potential lifestyle related inpatient cost participants and non-participants.



Participants N=3,993
Non-Participants N=4,341

* Significant at $0 < .05$

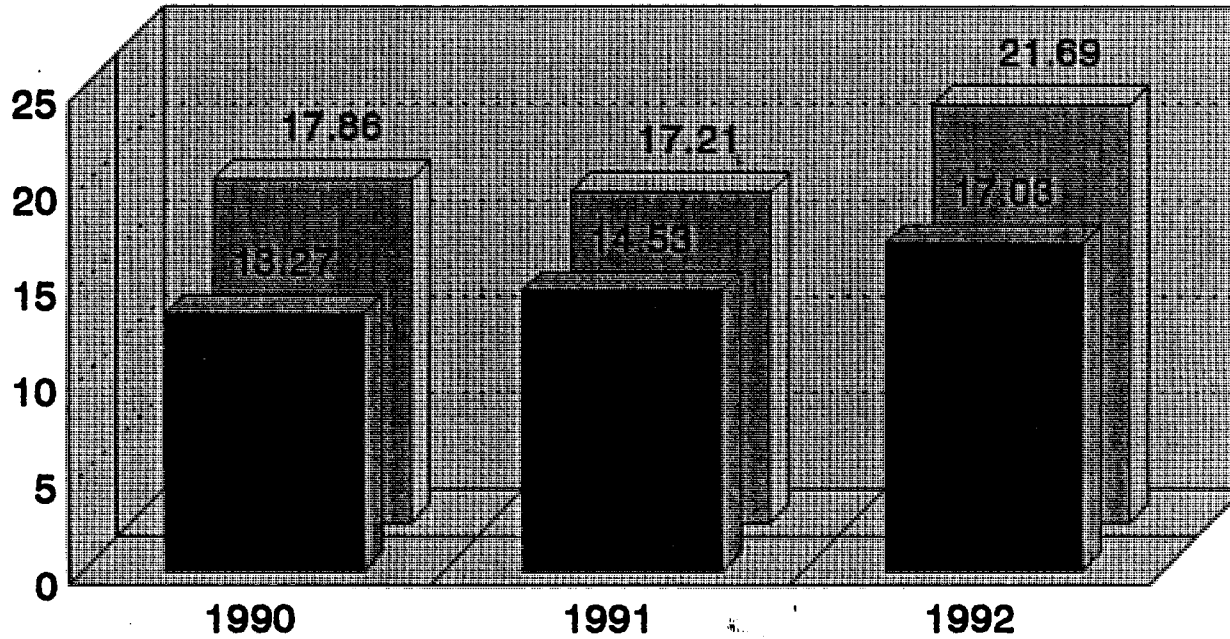
Figure 5. Total inpatient hospital utilization experience participants and non-participants.



Participants N=3,993
Non-Participants N=4,341

Figure 6. Lifestyle related inpatient hospital utilization experience participants and non-participants.

Admissions / 1,000 Employees

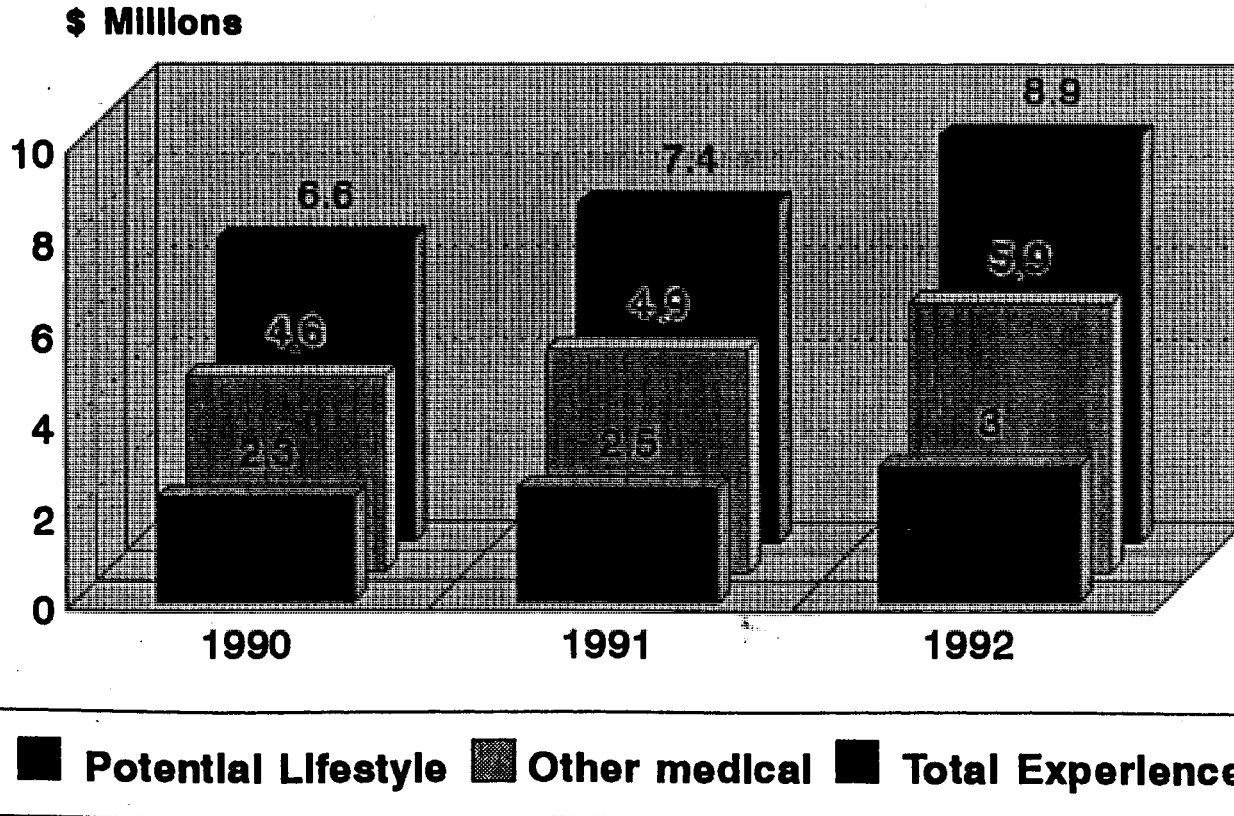


■ Participants ■ Non-Participants

Participants N=3,993

Non-Participants N=4,341

Figure 7. Total medical cost vs potential lifestyle cost participants and non-participants.



Participants N=3,993
Non-Participants N=4,341

CHAPTER V

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Discussion of Results

Comprehensive worksite health promotion programs have been shown to offer a wide range of benefits for both employers and employees (Sciacca, Seehafer, Reed & Mulvaney, 1993). There has been substantial and significant research that demonstrates both cost effectiveness and improved employee health through the reduction of the risk factors for chronic disease (Pelletier, 1993). The most recent research cited previously has consistently shown a pattern of support for WHPP, however, the researchers in this area have recommended that the findings should be reviewed skeptically until better design and implementation are developed for measuring the benefits of WHPP (Warner, et al., 1988).

The results of the present study have demonstrated significant differences in total health-care costs and health risk reduction (see Figure 1) between participants and non-participants of WHPP. These findings are supported by a review of literature by Pelletier (1993) who reported that of 24 studies focused on cost effectiveness of WHPP, all 24 showed positive outcomes. However, these observations should be considered carefully before final conclusions concerning cost effectiveness of WHPP can be made. The results of the current study demonstrated an insignificant difference between participants and non-participants in health-care cost for the first two years. It was not until the third

year following implementation of the WHPP that a significant difference in health care cost was reported between participants and non-participants. From these data, it would appear that the cost effects of WHPP may take at least three years to develop, and possibly longer before cost reduction trends stabilize.

Total-inpatient-medical costs for participants in the WHPP varied little from 1990 through 1992 (see Figure 2). Non-participants however, had a steady and significant increase in inpatient-medical-care cost. Potential lifestyle inpatient-medical-cost increased significantly for non-participants the third year of the current study. Seemingly, this relationship may be related to the fact that chronic illness associated with the presence of lifestyle risk factors identified by Bertera (1991) involve more intensive treatment and possible hospitalization than does treatment for acute illnesses.

The medical cost for potential lifestyle causes was significantly ($p < .05$) different between participants and non-participants (see Figure 3), however, the trend is not well established and may have shown further fluctuation had the study been conducted for a longer period of time. The potential lifestyle-related cost for inpatient treatment did not show a significant difference until 1992, the final year of the study. This may be because the development of chronic disease occurs slowly over a long period of time. Consequently, significant reversals of the effects of a chronic illness may not be possible in the period of time included in the current study.

Utilization rates for total inpatient medical care presented in this study (see Figures 5) demonstrated a significant difference between participants and non-participants in 1992, the final year of the study. Lifestyle related inpatient hospital utilization (see Figure 6) did not show a significant difference until 1992 as well. Neither total or lifestyle related inpatient utilization demonstrated a consistent trend for the first two years of the study. The findings connected to hospital utilization related to potential lifestyle-related causes varied over the three years for both participants and non-participants, even though the non-participants were reported to have consistently higher

costs. This fluctuation could be related to factors such as screenings that identified illnesses related to lifestyle and in providing treatment for those diseases.

Limitations of the current research include self-selection of subjects which may have resulted in subject bias. It could be possible that those subjects volunteering to participate in the non-mandatory WHPP were more interested in their health prior to the onset of the study. Some subjects may have been more motivated to change the underlying paradigms related to their health behaviors. Also, some subjects may have been more goal oriented or had an attitude that was more conducive to initiate behavior change as well. There was not a significant difference in total health-care cost at the initiation; a significant difference was not reported until the final year of the study (see Figure 1). Other limitations may include the lack of baseline data for health-care cost prior to the beginning of the study and that there was no measure for the strength of the treatment.

The findings of this research are consistent with the previous research that has demonstrated a significant reduction in health-care cost and that reported higher medical care costs for lifestyle factors for non-participants than participants in WHPP. The current study tested two null hypotheses at the .05 level of significance and found:

1. There was a significant difference ($<.05$) between total health-care cost for participants and non-participants of a WHPP after three years.
2. There was a significant difference ($<.05$) between potential lifestyle related health-care-cost for participants and non-participants of a WHPP after three years.

Conclusions

Based on the findings of this research, WHPP development and implementation should be encouraged. Future research in the area of WHPP should be supported to provide information to help develop the most effective methods and programs.

Recommendations for Involving Employees in WHPP

WHPP have demonstrated both cost effectiveness and health risk reduction in employees that participate in the programs (Pelletier, 1993). The task now, is to get more employees involved. The WHPP at Coors Brewing Company had been in existence since 1991, however, many of the employees had never used the facility (Henritze, Brammell & McGloin, 1992). The LIFECHECK program worked to identify high risk employees and get them involved in a behavior modification program. An extensive health promotion campaign that uses posters, flyers, speakers, onsite screenings during work hours, educational programs during the lunch hour and offering reduced rates at local fitness facilities can be effective at reaching employees that are currently not participating in the program (Henritze, Brammell & McGloin, 1992). The use of financial incentives (days off, reduced insurance premiums, bonuses) could be used to encourage participation, however, this may lead to a lack of dedication to behavior change and result in reduced benefits of participation. It is vital that WHPP become more proactive in their health promotion efforts to reach employees that may not be as motivated to change their behavior as current participants. By involving a larger percentage of the workforce a greater influence on health care cost and health risk reduction could be expected.

Recommendations for Future Research in WHPP

Future longitudinal studies are needed to improve the validity of the research and to refine the research methods. Researchers should work diligently to control for

extraneous variables and develop data bases that control for subject duplicity that may confound the results. By careful planning, strategies could be designed to create data bases used specifically for research purposes rather than modifying existing data bases. This would prevent many of the limitations that are currently seen in most research in the area of WHPP. The use of multivariate models could be an alternative to bivariate models as well as employing nonparametric techniques to analyze the data (Yen, Edington & Witting, 1992; Sciacca, Seehafer, Reed & Mulvaney, 1993).

Studies in the area of cost effectiveness of WHPP should attempt to expand the research duration well beyond the three years included in the current study to allow for a true trend in the reversal of the effects of chronic illness to develop. It takes an entire lifetime for the process of chronic disease to become severe enough to affect the health of an individual. It should not be expected that a few short years of healthy living will demonstrate a reversal in the chronic disease process. The current research has plans for longitudinal follow-up at five and seven years. It could still be expected to take a longer period of time for reversals in the chronic disease process to occur. Findings after seven and possibly ten years may not be as exaggerated at those found after the first three years, but could none the less be significant.

The relationship of potential lifestyle costs compared to inpatient medical care cost was not analyzed in this study, however, there may be a relationship that future research in the area of WHPP might discover. There is a wealth of possible research topics in WHPP and further research in this area is needed before any final conclusions about the effectiveness of WHPP can be drawn. Until a consistent pattern of cost and lifestyle risk reduction develops, which may take a significantly longer period of time than the current study, the relationship between lifestyle causes and inpatient utilization rates cannot be clearly determined. Never the less, this remains an important field of inquiry considering the significant differences in total health care cost between participants and non-participants of WHPP.

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VITA

Kristan D. Vardell

Candidate for the Degree of

Master of Science

Thesis: TOTAL HEALTH-CARE COST AND POTENTIAL LIFESTYLE RELATED COST COMPARISON FOR WORKSITE HEALTH PROMOTION PROGRAM PARTICIPANTS AND NON-PARTICIPANTS

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OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 03-06-95

IRB#: ED-95-052

Proposal Title: COST EFFECTIVENESS OF WORKSITE HEALTH PROGRAMS

Principal Investigator(s): Bert Jacobson, Kristan D. Vardell

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

APPROVAL STATUS SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.

APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.

ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

Signature:



Chair of Institutional Review Board

Date: March 7, 1995