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The Effect of an Incentive/Disincentive
Worksite Health Promotion
Program on the Workforce

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Sana Khoury Shakour

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THE EFFECT OF AN INCENTIVE/DISINCENTIVE WORKSITE HEALTH
PROMOTION PROGRAM ON THE WORKFORCE

By

Sana Khoury Shakour

A THESIS

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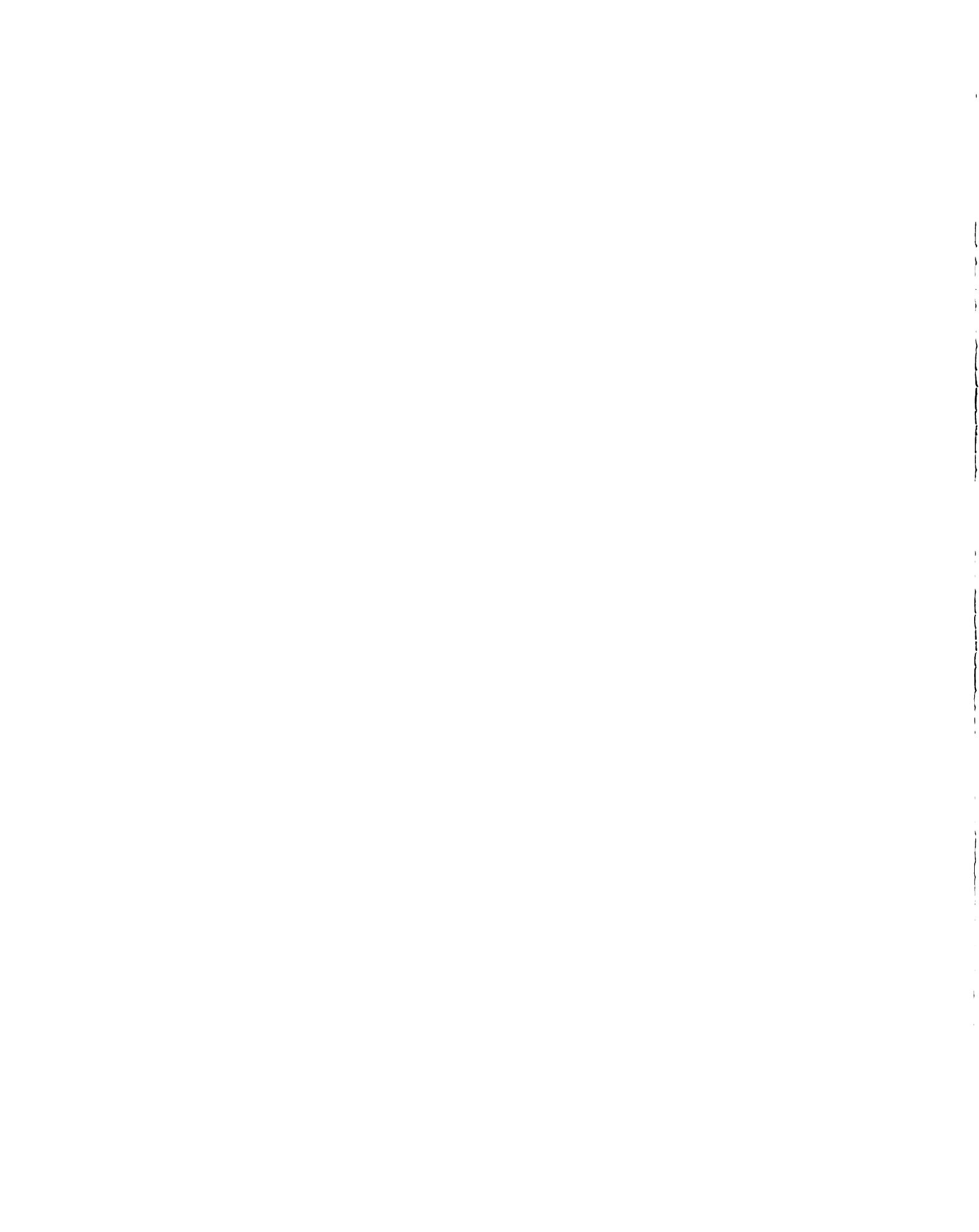

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ABSTRACT

THE EFFECT OF AN INCENTIVE/DISINCENTIVE WORKSITE HEALTH PROMOTION PROGRAM ON THE WORKFORCE

By

Sana Khoury Shakour

The aim of this thesis was to investigate whether a worksite health promotion program that took place at a hospital in western Michigan, produced employment selectivity of healthier employees. To address this question, three groups of employees were compared: those who left the workforce (leavers), those who joined the workforce (joiners), and those who stayed employed throughout the five year period of the program (stayers). The main variables of interest were: the results of an annual health screen called Health Quotient (HQ) points, health care costs, absenteeism due to illness, and absenteeism due to short-term disability. Logistic Regression analysis was used to obtain crude and adjusted odds ratios. Low HQ points were associated with leaving the workforce compared to joining the workforce, or staying employed. However the first association did not reach statistical significance. Differences in medical costs and absenteeism between the three groups did not reflect differences in HQ points. Leavers had the lowest medical costs. In conclusion, the current evaluation does not provide strong evidence of selectivity in employment, but is not in favor of widespread use of the approach.

To Elias and Yasmeen

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Chapter 1

INTRODUCTION

Wellness is defined as 'a composite of: physical, emotional, spiritual, intellectual, occupational, and social health'.[25] Health promotion is the means to achieve wellness. Health promotion programs (HPPs) mainly take place at the workplace.

Some employers have used the 'carrot' approach to motivate employees to participate in wellness programs by giving cash or other incentives. A few employers have used a 'stick' approach, using disincentives for non-participants or for negative health-related behaviors.

The combined incentive/disincentive approach is intended to distribute health care costs based on peoples' lifestyles. The underlying philosophy is that the health care costs of engaging in unhealthy lifestyles should not be shared equally among all employees. However, the effectiveness of the incentive/disincentive method and its effect on the workforce has not yet been studied.

It is important to note, that worksite HPPs are not intended to produce employment selectivity, by alienating unhealthy workers or penalizing them for existing medical conditions, but are designed to help workers improve their health by acquiring a healthy lifestyle.

The fairness of the incentive/disincentive approach is questionable for several reasons. One critical issue is the voluntaries of health related behaviors.

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Some critics argue that the decision to engage in behaviors such as smoking and drinking might be influenced by social and psychological forces. Therefore, in some instances, unhealthy actions are not completely free choices.[44,46] Also, lower socioeconomic status is known to be associated with higher prevalence of most diseases and risky behaviors, and incentive/disincentive programs ignore this fact. Another concern that has been raised, is the ambiguous definition of health risky behaviors; While in incentive/disincentive programs employees are penalized for smoking, drinking, and not wearing a seat belt, opponents of this approach argue that there is a wide range of activities that could exacerbate health risks like skiing.[46] Concisely, all the above mentioned issues raise the concern about possible discrimination against certain groups by using any sort of penalty.

Moreover, Employers using disincentives risk violating the HIPAA (Health Institute Probability and Accountability Act) of 1996 which states that *'a group health plan may not require any individual to pay a premium or contribution that is greater than such premium or contribution for a similarly situated individual enrolled in the plan on the basis of health status'.*[45] In addition, incentive/ disincentive programs could be found discriminatory under the new Americans With Disabilities Act, which was effective July 1992 and prohibits discrimination on the basis of an individual's physical or mental disability in employment and several other areas.

One strategy to test whether an incentive/disincentive worksite wellness program is socially responsible is to monitor changes that occur in the workforce during the program.

The aim of this thesis is to assess whether incorporating an incentive/disincentive component into a worksite HPP is associated with selectivity in employment. That is, selecting employees based on their health status. A comparison of the characteristics and health status of employees who joined and employees left the workforce, during the 5 years of the intervention, is undertaken. This thesis is one of a series of evaluation reports of an HPP, which took place in a hospital in western Michigan.

The Butterworth Experience

In 1993, as part of the health care reform that was being initiated both on the national and local level, Butterworth Hospital in Grand Rapids, Michigan (now Spectrum Health) started a new approach in managing the health benefits package. With the incorporation of the Wellness Center, a company equally-owned by Butterworth Ventures, Butterworth Hospital introduced the HealthPlus program. HealthPlus is an incentive/disincentive health promotion program (HPP) that rewards staff members and their spouses for healthy lifestyles and provides financial incentives to those who would like to improve.

The main drive for implementing the program was cost containment. There was a 100% increase in health plan costs at Butterworth (Spectrum Health) Hospital between the years 1988 and 1994. The HealthPlus program

was an attempt to moderate this increase in health insurance costs, while promoting the health of staff members and their spouses.

HealthPlus integrated both health promotion activities and an annual screening test. The activities included a wide variety of programs targeting several modifiable risk factors (nutrition, smoking cessation, stress management, fitness, etc). The screening test, which was conducted annually during the summer, assessed eight risk factors -- some of which were self-reported and others were measured. The screening was evaluated by credits called Health Quotient (HQ) points. According to the HQ score, employees could receive credits or have credits deducted from their overall benefits package.

A previous report that investigated determinants of participation in the program has shown that the average participation rate in the first 4 years of the program was slightly less than 30% and participants were more likely to be women, whites, full-time and managerial employees. The report also indicated that Individuals with adverse scores of body fat, cholesterol level and blood pressure were more likely to participate in activities that targeted these domains. But on the other hand, employees who scored positively in the fitness test were more likely to participate in exercise activities, than employees with zero and negative scores. Further, the HQ score was found to be a determinant of participation. Employees with low HQ scores were more likely to participate in health promotion activities. However; after the first year of other program this association was attenuated.[47]

Medical claims costs have increased through out the five-year period of the program. However, the effect of participation in health promotion activities on the mean cost per employee was not consistent. In the third year of the program an increase in cost among non-participants was observed, but in the following year the mean cost for participants in health promotion activities was higher than non-participants.

The incentive/disincentive approach is very uncommon in programs of this kind. In typical health promotion programs in which participation is optional, healthier workers are more likely to participate. Whereas in the HealthPlus program, participation was mandatory in order to benefit from the health care package. This raises the question of whether incorporating a disincentive component into a program might result in selective employment, i.e., cause less healthy employees to leave and seek another place of employment.

It is important to note that HealthPlus Health Quotient was not found to affect the turnover of the hospital noticeably, and full-year employees who obtained health insurance as an employment benefit increased from 1993 to 1996.

The effect of disincentives on health and cost outcomes has not been investigated yet. Therefore, the aim of this analysis is to detect whether the health status was a determinant of leaving or joining the workforce. Addressing this question is important in order to be able to attribute reductions in medical costs to a successful program rather than to selection of an inherently healthier workforce.

Chapter 2

LITERATURE REVIEW

Worksite HPPs are becoming more common in the United States.[1] In 1989, the National Survey of Worksite Health Promotion Activities (NSWHPA), estimated that 65.5% of all worksites offered at least one activity. In the 1992 survey, 85% of worksites with 50 or more employees were found to offer at least one health promotion activity, ranging from health education to aerobics classes.[2] These programs have grown not only in number but also in variety, and have evolved from programs that were characterized by a focus on a single intervention toward more comprehensive programs.[10] Small worksites are also promoting their employees' health; in 1998, about one in four small worksites have offered HPPs. However, the primary focus of HPPs at small worksites is job-related hazards.[29] A summary of the reviewed articles is included in Table2.1.

This enthusiasm for health promotion is increasing as research continues to suggest that primary prevention is more cost-effective than secondary or tertiary prevention within managed health care.[32] In addition, there is a mounting body of evidence linking HPPs with positive health and cost outcomes.[25] Further, many employers are recognizing that approximately one half of the health-care costs are a direct result of lifestyle-related illnesses.[31]

All programs cited in the literature target modifiable risk factors such as: cholesterol management, weight control, exercise, tobacco use, blood pressure

management, alcohol use, motor vehicle safety, nutrition, and stress management. As to the type of health promotion activities, the most available activities are health education, screening tests and smoking cessation programs, whereas programs that require more resources like exercise are among the least offered programs[3].

To measure health outcomes, some of the behaviors may be self-reported, such as seat belt use, level of exercise, or nutrition practices. A series of tests such as a blood test for cholesterol levels, blood pressure, or physical fitness assessment, is usually required to verify measures. However, the type of health outcomes, and the ways to measure them vary widely among programs.

Why the workplace?

The worksite is a logical place for health promotion marketing, and it serves as a key channel for delivering health promotion interventions. More than 60% of adults in the United States can be reached at the workplace.[30] workplaces tend to include diverse populations in terms of race, gender, age and health status. In addition, communication is organized, and peers may have a supportive and competitive impact.[2]

Moreover, employers pay an estimated 30% of the national healthcare bill, and with health care spending still on the rise, employers are promoting ideas to moderate the growth of health insurance costs.[25,27] It is evident that employees with risk factors such as obesity and smoking have higher healthcare costs, more illnesses and absenteeism.[1] Analyses of the financial effect of risk factors on

health care costs in DuPont company, revealed that smoking costs $960 per year for each smoker, whereas alcohol abuse cost the company $389 per year per employee, and high cholesterol levels incur $370 per employee per year.[25,26] These lifestyle choices also impact the costs associated with lost productivity and absenteeism. In short, health promotion seems to make sense to the employer from many different perspectives, including: improving employees' health; optimizing productivity; and most importantly, reducing health care costs.[13]

Health outcomes

During the last two decades, the value of worksite health promotion has been widely acknowledged. A summary of the reviewed studies is included in Table 1. Most of the evaluations reveal small but favorable impacts on health outcomes. Some research suggests that positive outcomes can be best achieved if comprehensive programs are provided with one-on-one counseling to high-risk employees.[20] The Live for Life program is a good example. It included a health screen, health promotion activities and personal consultation in addition to a newsletter. The Live for Life program has been shown to reduce employee health risks and health care costs, both at Johnson & Johnson and at Duke University.[13, 20,32] In the Working Healthy Project, a multiple risk factor intervention implemented in 26 manufacturing worksites, participants significantly increased their consumption of fiber from 8.3 grams per kilocalories at baseline to 9.2 at the final assessment, compared with the control group (t=3.5;P<. 001).[30] Similar changes in dietary habits were observed in the WellWorks study, a

randomized controlled trial that included 24 worksites, in which intervention sites had consultation and educational activities.[8] Intervention sites in the WellWorks study experienced a 10% increase in fruit and vegetable consumption vs. a 4% increase in the control sites, and a reduction of the percentage of calories consumed as fat (2.3% vs. 1.5% kcal). In DuPont intervention, 48 intervention sites were compared to 19 control sites. The level of health-related behaviors was improved over a two-year period, and the percentage of employees with three or more risk factors decreased by 14% at intervention sites.[32,37] Additionally, absenteeism due to illness was decreased to a greater degree in intervention sites over a six-year period.[20]

Cost outcomes

As mentioned above, a principal reason for the employer's interest in health promotion is decreasing or at least moderating the growth of health cost expenditures. According to one survey, about one half of the health care costs are a direct result of life-style-related illnesses.[31] Research data on the cost benefit of worksite wellness are promising, although conflicting and limited. For instance, although an association between health promotion and lower health costs was demonstrated in some programs,[31] most programs have minimal change in health care costs in the initial stages. In a three-year period program in a major corporation in Cincinnati that included high-risk screening and one-on-one counseling, health care cost reductions were only evident in the third year of the program (29% lower in total and 36% lower in lifestyle-related costs). The

authors referred to the importance of commitment for long-term programs, and suggest that three-years is the minimum time period needed for potential lifestyle-related medical costs to be reduced.[24]

Cost analysis of the Johnson & Johnson Live for Life program over a five-year period indicated that participants had lower rates of increase in medical costs than the control groups. By the fifth year of the program at Johnson and Johnson, the average inpatient cost per employee was $265 in sites were the program was operating as oppose to $403 in sites with no Live for Life (P=. 005), no significant difference in outpatient costs was found.[13]

Not all programs have been found to be cost-effective. A seven-year evaluation of the Blue Cross Blue Shield of Indiana found that program participation was not associated with reduced medical costs.[32] In the Adolph Coors brewery, even though respondents to a health hazard appraisal were at lower risk and perceived their health as better than non-respondents, they had significantly greater claims costs than non-respondents at any given percentile in the distribution below the 90th. Interestingly, among employees falling in the 90th percentile, non-responders had greater costs than responders.[11] Apparently those in good health tend to seek medical services regularly as a preventative measure and confirm their positive health status.

Another measure for reduced costs is reduction in absenteeism days. A number of studies suggest that health promotion at the work place may be associated with changes in absenteeism.[14,17,18,19] In a randomized trial that included 32 worksites, the prevalence of illness-related absenteeism was

reduced by three to four percent over a period of two- years.[16] Also, at Duke University participants in the Live for Life had an average of 4.6 fewer absentee hours than non-participants.[17]

A recent review of the literature found that the most consistent positive outcome of the multi-component programs is reduced absenteeism.[20] The authors explain this finding as an indicator of a reduction in the overall risk, since absenteeism is a nonspecific indicator of well-being, and different employees benefit from a multi-component program in different ways.

Who participates?

The question remains, whether these programs are reaching the at-risk workforce. A primary concern is that the concept of wellness might alienate workers who engage in unhealthy life styles, who could benefit most from HPPs. Unfortunately, there is some evidence in the literature that participants are healthier than non-participants and those who most need the programs are least likely to participate. [6,9,11,12] Responders to a health risk appraisal at Adolph Coors were less likely to smoke, and controlling for age and gender had lower systolic blood pressure (2.8 mm/hg, $P<. 01$) and lower serum cholesterol (5.8mg/dl, $P<. 01$). However, this pattern is not consistent in all studies. A survey conducted at the University of Oregon, in which employees expressed an interest in attending a worksite HPP, revealed that both groups that intended and did not intend to participate in the program had similar health-related characteristics.[7] Another study that analyzed the response to a pre-program questionnaire found no

difference between participants and non-participants in self-reported health status and only slightly more positive health habits were noted among participants.[5]

In a petrochemical research company in New Jersey, behavioral risks were measured by a health risk appraisal and employees were offered a series of on-site wellness programs. Evaluation of this program indicated that most activities attracted 10% to 40% of the employees at increased risk for the health behavior addressed by the activity.[6] Fitness activities were found least likely to attract employees at increased risk for fitness-related problems, whereas the participants tended to be more fit and less obese. For educational programs, on the other hand, (i.e. smoking cessation, weight management and blood pressure) significantly greater participation of high-risk groups was observed.

Another concern is that worksite HPPs may not equally reach all segments of the workforce. Participation patterns vary widely among employees' sub-populations. Therefore, understanding the variables that influence participation is essential for assessing the effectiveness of current programs as well as for the planning of future ones. One factor that influences participation is gender. Women had higher participation rates in most studies,[4-7] reported more positive health-related behaviors[4] and the magnitude of post-screening positive change or adoption of positive health behaviors was higher for women than for men.

In the Total Life Concept of AT&T, [21,22] women were more likely to join weight loss programs than men even if they were not overweight, which suggests

that the motivations that influence participation differ by gender. In the above mentioned petrochemical research company, the proportion of women in high risk groups who participated was substantially higher than that of men at similar risk .[6] Excluding the fitness center, the average participation rate in wellness programs for women in high-risk groups was 35% compared with 20% for men in high-risk. However, this pattern is not consistent. In a recent investigation that examined the association of individual and organizational variables with the availability of and participation in worksite HPPs,[3] participation differed very little across most variables. The results indicated that the overall participation did not differ by gender. However, an apparent interaction of gender with other factors influenced participation. Participation varied slightly by the category of health promotion with men reporting higher participation rates in exercise and screening tests.

Occupational status and educational level, two highly correlated factors were also found to influence participation. In the WellWorks study, participants were less likely to have a college degree.[8] Non-college graduates were less likely to be recruited in a program for independent school district employees in Dallas, Texas.[23] In an HPP at the University of Oregon, participants were more likely to be in classified positions than faculty members .[7] Similarly, in the Michigan State University wellness program, faculty members were least likely to participate.[15]

The effect of demographic differences on participation patterns is less significant in more homogeneous worksites,[12] and is influenced by organizational factors.[9] Although other demographic variables like age and race have been

cited in the literature, there is very little evidence that these variables influence participation in HPPs.

Methodological critique

Worksite health promotion programs are not planned for research purposes and therefore some studies lack methodological rigor. However, some of the methodological limitations are common to all health promotion research whether at the worksite or not.

Several limitations should be considered in the interpretation of worksite health promotion research. Of some concern is the reliance on participants' self-report as measures of program-related behavioral change. Health practices such as nutrition, tobacco use, and alcohol use were self-reported in all the studies using different types of questionnaires, and the validity of these measures were not tested. In the Healthy Worker Project, the number of sick days was self-reported too.

It is important to note that participation had diverse definitions. At the Working Healthy Project,[30] the Total Life Concept at AT&T,[36] and the Adolph Coors program,[11] employees were considered to be participants if they completed a baseline health survey. In a New Jersey Petrochemical company program employees were considered to be participants if they participated in any one health promotion activity. On the other end of the spectrum, Procter & Gamble Company program participants had to complete a health risk questionnaire and participate in follow-up high-risk interventions. It is important to

note that the definition of participation did not take into account the frequency or duration of participation.

As can be seen in Table 2.1, participation rates ranged from 30% to 75%. Participants almost inevitably differed from non-participants. Participants are self-selected in the vast majority of the studies. Many of the evaluations overlook this fact, and lack any assessment of its impact on the results. Evaluations that focus on behavior change in active participants overlook the fact that if participants are different than non-participants, the findings may not be representative of all employees.

Another limitation is the lack of a control group in most evaluations. This presents a threat to the internal validity. On the other hand, a considerable percentage of the quasi-experimental studies, which do include controls such as the Working Healthy Project, have demonstrated positive results.

An additional limitation of health promotion research is the difficulty of differentiating interventions effects from other variables such as secular trends and changes in health policy.

On a positive note, a review of the recent literature reports that more rigorously- designed evaluations revealed more favorable health and cost outcomes and tended to support, rather than refute, previous studies.[32]

The impact of incentives and disincentives on participation

Although there is an increased interest in fitness and wellness among Americans,[21] personal motivation is needed to drive individuals to participate in

health promotion activities. One approach is to give monetary incentives for meeting wellness goals, and penalties for failing to meet goals; the first method is the more common one.

An incentive based health promotion program can be an effective means of increasing participation. Sometimes, an incentive provides the motivation to move an employee from a stage of thinking about a behavior change to a stage of action,[27] while the basic idea behind disincentives is to get individuals to take responsibility for their negative health-related behaviors.

The percentage of employers giving some sort of incentive or disincentive has risen from 14% in 1992 to 39% in 1997.[28] In the past, incentives have been successfully used to enhance participation and desired behavior change,[39,40] but has not been found to be cost-effective.[39] Also, a more recent quasi-experimental study, that compared outcomes of smoking cessation programs with and without cash incentives, revealed that incentives may help achieve higher quit rates in the short term. In the long term, however, it was more cost effective to invest the money in counseling and health promotion activities, rather than to give it away as cash incentives.[31] In 1993, Baker Hughes, an oil field equipment manufacturer, with 12, 500 employee in the U.S. implemented a program that ranged from a $120 penalty to a $100 reward for health lifestyles.[31] Baker Hughes estimated a $3 million cost avoidance savings produced by the program.[41] No further evaluations of the program were located.

Among the programs cited in the literature, very few incorporate a disincentive component. Supporters of this method argue that giveaways and

cash incentives do not work and estimate that 80% of the health care bills are for 20% of the employees that are often high-risk individuals who neglect their health.[28] Therefore, this financial burden should not be shared equally among all employees, but should be borne by individuals who engage in such behaviors.[38] The incentive/disincentive approach has not been looked at in the literature.

The literature search for this review included a bibliographic database search, manual search of specific journals, a reference list search. Databases, which were searched for the period 1980 to 2000, included Medline, Health Star, and Eric. Among the key word combinations used in the database search were: health promotion and worksite, worksite health promotion and participation, health promotion and rewards, health promotion and incentives, health promotion and penalty, health promotion and disincentives.

Thesis rationale

The aim of worksite HPPs is to contain health care costs while improving the health of the employees. In order to attain this goal, employees in need of health improvement have to participate. It is evident that worksite HPPs suffer from low participation rates of high-risk employees. Some critics claim that such programs "are preaching to the choir."[7] Hence, employers are seeking alternative strategies to attract more employees to participate and encourage them to improve their health practices.

Butterworth (Spectrum Health) was among the first employers to adopt an incentive/disincentive approach. Although the literature indicates that the

disincentive approach has been used in few other workplaces, its consequences have not been looked at.

A previous evaluation report has shown that the HealthPlus Health Quotient program has yielded limited but desired results.[38] However, the question remains whether the incentive/disincentive approach used in the program alienated less healthy employees, or whether this approach produced selective employment. This thesis is an attempt to address this question

Table 2. 1 Summary of the literature review

Study	Intervention design	Participation rate	Definition of participation	Sample size	Purpose of evaluation
Evaluations of health outcomes					
Working Healthy Project (30)	A multiple risk factor intervention implemented in 26 manufacturing worksites. The program targeted physical activity, nutrition and smoking.	63%	Completion of a baseline health survey	2055	To examine the extent to which individuals changed their physical activity, diet, and smoking behaviors over the course of the intervention
AT&T's Total Life Concept (36)	A 2 phase intervention: 1) an orientation session, biometric measurements and a wellness planning session. 2) participation in lifestyle changing activities.	31%	Completion of a health risk appraisal in 1983 and in 1987	629	To evaluate the impact of the program on employee's health risks
Evaluations of cost outcomes					
Johnson&Johnson Live for Life (13)	Comprehensive program consisted of: health screens, lifestyle improvement programs, quarterly newsletter, personal health consultation and monthly programs in the cafeteria.	70%	Completion of an initial health screen	11,406	To explore the relationship between the HPP and health care costs
Duke University Live for Life (17)	Same program as above	30%	Participation at any program activity at any time during the year	4972	To examine the effect of the program on absenteeism
Healthy worker project (16)	A series of 11 behavior change classes on weight control and smoking cessation scheduled at 2-week intervals	75%	Acceptance by the worksite to be randomized to treatment or to control condition after completion of a baseline survey	32 (worksites)	To assess the effectiveness of HPPs in reducing absenteeism.

Table 2.1 (cont'd)

Evaluation strategy	Outcome parameters evaluated	Duration of follow-up	Main results	Critique
Randomized matched pair design	Physical activity, nutrition, smoking	2.5	There was a significant increase in exercise behavior (P< .0001), fruit and vegetable consumption (P< .0001), and fiber consumption (P< .0001). No differences were found in regard to fat consumption or smoking cessation	A weakness of this study is loss to follow-up
Longitudinal analysis. Change in health risks of the participants group compared to a control group over a 5 year period	Blood pressure, cholesterol level, exercise, alcohol consumption, smoking, heart attack morbidity, heart attack mortality, stroke morbidity, stroke mortality, cancer morbidity, cancer mortality, and health attitude variables	5yrs	Employees improved their blood pressure. Alcohol consumption, smoking and in six of seven morbidity/mortality risk calculations. But, became worse in diastolic blood pressure and total cholesterol. The study group scored higher than the comparison group in health attitude measures	Comparison group data was only available for the last year of the intervention. So the change in the intervention group over the 5 years could not be compared to a control group
3 groups were compared.1-sites with >30 months program. 2-sites with 18 to 30 months and 3-sites with no LFL	Inpatient and outpatient costs	5yrs	Lower inpatient costs for participants (P= .01). No significant difference in outpatient costs	Rigorously designed and was one of the first longitudinal studies to include a control group
Participants and non participants were compared on changes in mean absentee hours over the intervention period adjusting for baseline numbers	Number of absentee hours	4 yrs	Number of absentee hours increased in both groups. However, participants had 4.6 fewer absentee hours than non-participants in the third year (P< .001)	No comparison of the cohort of participants with the general workforce
Randomized trial of 32 worksites. with the worksite as the unit of analysis.	Self-reported number of sick days in the last month	2yrs	Reporting of sick days was reduced by 3.7% in intervention cites (P= .04) and that was found to be positively associated with participation in smoking cessation programs (P= .09)	A primary weakness of the study is that the main outcome of interest (number of sick days) was obtained by self-report. On the other hand, results of this study may be generalized to the general population, since a wide range of occupations was included

Table 2.1 (cont'd)

Study	Intervention design	Participation rate	Definition of participation	Sample size	Purpose of evaluation
Adolph Coors Brewery (11)	An incentive cardiovascular risk reduction program including a sequence of health screening and health promotion activities	37%	Responding to health hazard appraisal	699	To investigate the differences in health risk between responders and non-responders in a health risk appraisal and determine whether participation had any impact on health care costs
Procter & Gamble Company (24)	The program included a health profile questionnaire, one to one counseling, and follow-up high risk interventions	34%	Completion of a health risk questionnaire and participating in follow-up high risk interventions	8,334	Comparing total and lifestyle-related medical care utilization and costs between participants and non-participants
Evaluation of Determinants of participation					
University of Oregon (7)	A survey on the interest in attending a HPP. (No intervention)	48%	Returning the survey	743	Determining whether employees who expressed interest or disinterest in a worksite HPP differ on health behaviors and health status
A New Jersey Petrochemical company (6)	A health risk appraisal measured the behavioral risks of employees and a series of on-site health promotion activities were offered in addition to an on-site fitness center	64%	Participation at any one of the wellness activities offered	843	Identifying factors associated with participation in worksite HPPs

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Table 2.1 (cont'd)

Evaluation strategy	Outcome parameters evaluated	Duration of follow-up	Main results	Critique
Participants and non-participants were compared on demographic characteristics, health risks, perception of health, and health care costs in the previous 5 years	Body mass index, physical activity, tobacco consumption, and blood pressure, annual health care costs, and perception of own health	6yrs	Participants had fewer health risks than non-responders, lower blood pressure (P<.01), lower serum cholesterol levers (P<.01). A higher percentage of participants reported being physically active Despite that, responders were more likely to have had medical costs in any given year. However, when the highest 10% of all costs were compared, non-participants had greater costs	No information on preprogram health risks was provided. So, there is no way to tell whether health behaviors changes as a result of participation
Cross-sectional analysis of the health care costs data. The analysis was restricted to participants who were continuously employed for three years	Annual health care costs	3 yrs	Non-participants medical costs were 29% higher than participants. (P<.05) (adjusted for age and gender)	No description of participants and non-participants was provided
The two groups who were interested and not interested in a HPP were compared on their demographic and health related characteristics	Tobacco use, exercise, nutrition, and dental health	-	Two thirds of responders expressed interest in participation. Employees who were not interested in a HP had a higher percentage of smokers (20% vs. 15%) and less likely to exercise. The tow groups reported similar alcohol consumption, similar dietary habits, and similar dental practices	Intention to participate rather than actual participation was studied
Participants were compared on their demographic and behavioral risks	Tobacco use, stress, fitness, nutrition, blood pressure, cholesterol and obesity. The employee behavior was categorized as excellent, good, caution or danger for each one of the measures	2 yrs	Women were more likely to participate than men in all activities. Differences in participation by race and education were not significant and most programs attracted 10% to 40% of the employees at risk for the particular behavior addressed by the program	Risk was assessed by self-report in a health risk appraisal

Table 2.1 (cont'd)

Study	Intervention design	Participation rate	Definition of participation	Sample size	Purpose of evaluation
Bill Northern Research Laboratory (5)	An initial health screen was undertaken followed by a counseling session to discuss plans to improve health then numerous health promotion programs were available, many of them were free and on site.	34%	Enrollment in the health promotion program	505	To examine the association of demographic characteristics and self-reported health behaviors and health status with participation in a HPP at a research and development worksite
California aerospace companies (31)	3 different smoking cessation programs were assigned to 3 separate worksites. Site one was assigned a multicomponent program, a similar program plus cash incentive was assigned to	Not available, since number of smokers was not known	Participation at any one activity any time during the year	11,743	Evaluating the effectiveness of incentives in a multicomponent program of smoking cessation at the workplace
Chemical manufacturing company (43)	A wellness center including fitness equipment, exercise room and an indoor track was opened for employees during weekdays. In addition, health education classes were provided in the center	30%	Weekly participation in the wellness center	202	Assess determinants of participation among blue-collar employees
Dallas independent school district (23)	After the completion of a baseline health screen, a 10-week health promotion program of activity classes and health education was offered, and then participants completed a second health screen.	33%	Completion of baseline assessment	3,873	To examine the association of sociodemographic characteristics with recruitment and retention rates in a worksite HPP

Table 2.1 (cont'd)

Evaluation strategy	Outcome parameters evaluated	Duration of follow-	Main results	Critique
A questionnaire on health status and health related behaviors was sent to the entire workforce, demo-graphic data was obtained from personnel files, and the occupational nurse provided records of participation	Body mass index and healthy habits (no details reported)	Not reported	Healthy habits were associated with greater participation but the associations were week and reached statistical significance only for seat belt use; participants were 1.65 times as likely to wear seat belts than non-participants. Whites were more likely to participate OR=2.67	Not adjusting for gender was one weakness in this test. Also, two strengths are worth mentioning. Firstly, validating the information collected by the questionnaire by sending a smaller questionnaire to a random sample and conducting a test-retest. And secondly, prospective evaluation as opposed to retrospective in many studies
Quazi-exprimental design was used to compare the effectiveness of the three programs	Quitting smoking defined as not smoking in the last month	1 yr	At 12 months no significant difference was found between the multicomponent group and the incentive competition one, but the multicomponent group had significantly higher quit rates than the traditional program (p=.006)	A Major weakness is the failure to obtain number of smokers. A survey that was conduced for the purpose had a very low response rate to give a reasonable estimate
A randomly selected group of participants and non-participants were interviewed. Principle component analysis was performed on the data	Perceived benefits, perceived barriers, health status, convenience, social support and motivation	Not reported	The six factors resulting from factor analysis accounted for 60% of the variance. Self efficacy best distinguished between participants and non-participants	The use of principle component analysis was useful in explaining the factors associated with participation
Recruitment and retention rates were compared between different demographic groups	Gender, age, education, race	10 weeks	The data suggested that demographic characteristics are related to recruitment and retention in HPPs. Although there was no significant difference in recruitment rates by gender, but it varied among ethnic (22% blacks, 38% whites, 27 Hispanics), age (27%<+35, 35% 36-50, 33%>50), and education groups (20% non degree, 31% bachelor	This study stressed the importance of retention

Chapter 3

METHODS

The first part of this chapter includes a description of the annual health screening. In the second part, the chapter includes a detailed description of the methods used in the thesis analysis.

Groups of interest

In order to address the thesis question, three groups are defined (See Figure 3.1):

1) Stayers: Those long-term employees who were employed the whole five years.

2) Leavers: 1993 whole year employees who were not employed in 1997.

3) Joiners: 1997 whole years employees who were not employed in 1993.

Research questions

Specific questions this thesis seeks to answer are:

1) Did the leavers have more adverse HQ scores and/or higher medical costs than the stayers?

2) Did the joiners have better HQ scores and/or lower medical costs than present time employees?

3) Did the joiners have better HQ scores and/or lower medical costs than the leavers?

Answers to these questions are important for present and future assessment of the use of the incentive/disincentive method. It will be of special importance for planning future HPPs.

We expect that the group of leavers is the least healthy while the group of joiners is the healthiest. But, we hypothesize that any differences in the health status of these groups would be attributed to differences in demographic characteristics, especially age.

Health screening and Health Quotient

Every year during the summer, the Wellness center staff members conducted a health screening. The screening assessed eight risk factors. Risk factors were chosen by consensus of the planning team, which included staff members from the Wellness Center, (a company equally-owned by Butterworth Ventures), a representative from a consulting company (Gelman Consulting, Inc., Southfield MI), and Butterworth (Spectrum Health) representatives. Some of the risk factors were measured and some were self-reported. Self-reported data were collected by a questionnaire that was filled before or at the time of the screening (see Appendix 1). Following is a brief description of the eight risk factors assessed by the screening:

1) Nutrition: a self-report of food servings from 11 different foods was considered to reflect nutritional behavior. The HQ scoring reflected adherence to the Food Guide Pyramid.

2) Alcohol consumption: a self-report of weekly consumed amount of alcohol.

3) Tobacco use: a self-report of daily use of tobacco products over the previous 12 months.

4) Motor vehicle safety: a self report of percentage of time wearing a seat belt and helmet use, points on driving record and drunk driving.

5) Exercise: a self-report measure in the first 2 years of the program. Beginning in 1995, it was determined by a Fitness Walking Test.

6) Body fatness: skin fold and bioelectrical impedance analysis were used as methods to measure body fatness. The lower of the two measurements was used as an estimate for the percentage of body fatness.

7) Blood pressure: the lower blood pressure reading of the two arms determined the HQ score.

8) Total cholesterol/HDL ratio: non-fasting serum lipids.

Each of the components above was weighted based on:

1. Objectivity: self-reported variables were not weighted as heavily as measured ones.

2. Its contribution to disease burden derived from a model that predicted 'disease burden'.

The above-mentioned model was developed for the HealthPlus program. The planning team weighed the risk factors and determined risk stratification based on previous literature. The HQ point range for each component and its impact on the benefits package are listed in Table 3.1.

The points earned for each of the eight components reflected the deviation from the recommended healthy value. For example, the cutoff for a negative blood pressure score was 140/90; the common determinant of hypertension. A more detailed description of the HQ point system is included in Appendix 2.

The sum of the scores across components determined the Health Quotient (HQ), which in turn affected the benefit package by $1 per HQ points per 2-week pay period. Although the theoretical range for HQ score is -80 to +25. Butterworth set -25 as the maximum number of credits to be deducted per pay period.

Table 3. 1 Health Quotient point range for each of the risk factors and its impact on the benefits package.

Components	Point-range	Maximum deductions yearly	Maximum credit yearly
Measured components			
Blood pressure	-12 to +5	-$288	+$120
Cholesterol	-12 to +5	-$288	+$120
Body fat	-12 to +5	-$288	+$120
Physical fitness	-8 to +5	-$192	+$120
Self-reported components			
Tobacco usage	-12 to +1	-$288	+$24
Alcohol usage	-8 to +1	-$192	+$24
Motor vehicle safety	-12 to+1	-$288	+$24
Nutrition	-4 to +2	-$96	+$48

*The physical fitness measure was initiated in 1995. In the first two years of the program, a self-reported physical activity measure was used.

Participation in the screening was strongly recommended for all benefit-eligible staff members (those who worked 32 hours or more per pay period) and their spouses. Benefit-eligible members who did not participate in the health screening were assigned the score of -25.

To avoid penalizing employees for existing medical conditions, the HQ score was adjusted to reflect such conditions. In the first two years of the program, employees with medical conditions had the choice of accepting their HQ score or changing it to neutral, which is an HQ of "0." Starting in 1995, each medical condition was evaluated individually on its' own merit, and an HQ score was determined according to health history and previous HQ scores.

Plan of thesis analysis

Attrition and exclusion

Three groups of interest were included in the analysis:

1) Stayers: defined as employees who worked continuously for five full years 1993-1997 years and received benefits (n=1681).

2) Leavers: employees who worked a full year in 1993 and received benefits and were not employed in 1997 (n=206).

3) Joiners: employees who joined the workforce at any time between 1994 and 1997 worked a full year and received benefits (n=1008).

In order to simplify the interpretation of costs and days absent from work, part-year employees were excluded from the analysis. Also, benefit eligible employees who underwent the screening and chose not to receive the benefit package were not included in the analysis. Spouses were also excluded, for they were not of interest for this analysis.

Description of variables

All variables included in the analysis are listed in Table 3.2. For this analysis, the HQ score was used as a proxy measure for health status. The initial HQ score is the sum of the points across all components of the screening. The final HQ score is the initial score adjusted for existing medical conditions. Liability amount reflects the medical care costs.

Employment status is a variable that was created in order to classify the employees according to their hire and term dates. Employment status is a categorical variable with four categories: whole year, hired in the year, terminated during the year, hired and terminated during the year.

Over 90% of the workforce was white, in all years. Therefore, race was categorized as white/non-white for the purpose of this analysis.

Table 3. 2 Description of variables

Variable name	Categories
Age	<=25, >25, <=35, >35, <=45, >45, <=55, >55
Gender	male female
Race	white, non-white
Part/full time	part time, full time
Employment grade	exempt, non-exempt
Employment status	Whole year employee, hired in the year, terminated in the year, hired and terminated in the year
Illness days	0, 1-5, 6+
Short term disability days	0, 1-5, 6+
Liability amount	0, 1-99, 100-499, 500+
Insurance status	None, HMO, other
Benefit status	Any benefit, no benefit
Tobacco points	<-1, 0, +1
Alcohol points	<0, >=0
Motor vehicle safety points	<-1, -1, 0, +1
Nutrition points	<-1, -1, 0, +1
Blood pressure points	<0, +1-+3, +4-+5
Fat points	<-3, -3-+1,>+1
Fitness points	<-4, -4--1, 0, +1-+3,
Cholesterol points	<-2, -2--1, +1-+2, >+3
Initial HQ score	-25--11, -10--3, -2-+2, +3-+10, >=+11
Final HQ score	-25--11, -10--3, -2-+2, +3-+10, >=+11

All continuous variables were made into categorical variables. Grouping of the variables was data driven, based on the frequency of the values. However, in the comparison of stayers with joiners in the second question, age was used as a continuous variable, since only 7 stayers were under the age of 25. Also, all sequence variables were converted into numerical.

Analytical methods

The analysis was performed in two phases. An initial phase included description of the demographic and employment characteristics of the three study groups, in addition to preliminary comparison between them. The second phase addressed the thesis questions adjusting for all potential confounders. Analysis were performed in SPSS, version 7.5

Routine summary statistics were used to identify the demographic and health-related characteristics of the three groups of interest. Cross tabulations were used to obtain proportions. Chi-square tests were performed to test for significant differences in proportions and t-tests for comparison of means.

Logistic regression models were developed to address the thesis questions. The independent variable in all the models was the employment group, according to the two groups compared in the question. For example in the first question the independent variable was leavers vs. stayers.

The logistic regression analysis was performed in two steps. First, crude odds ratios (ORs) were derived from univariate models. Each one of the univariate models included one of the following exposure variables: age, sex,

race, initial HQ scores, liability amount, number of illness days, number of short term disability days, part/full-time status, and employment grade. The second step was four multivariate logistic regression models, each one included one of the main variables of interest (HQ score, liability amount, number of illness days, number of short term disability days) adjusted to age, sex, race, employment status, and employment grade. In addition, a test for trend for the crude and the adjusted odds ratios was undertaken. Similar models were developed for each one of the three research questions.

The employment group was coded as stayers=1, leavers=2 in the first question, stayers=1, joiners=2 in the second question, and leavers=1, joiners=2 in the third question. So the results are interpreted as the odds of leaving in the first question and the odds of joining in the second and third questions.

The first question was based on the 1993 data, the second question was based on the 1997 data and for the third question data was combined from both years 1993 for leavers and 1997 for stayers.
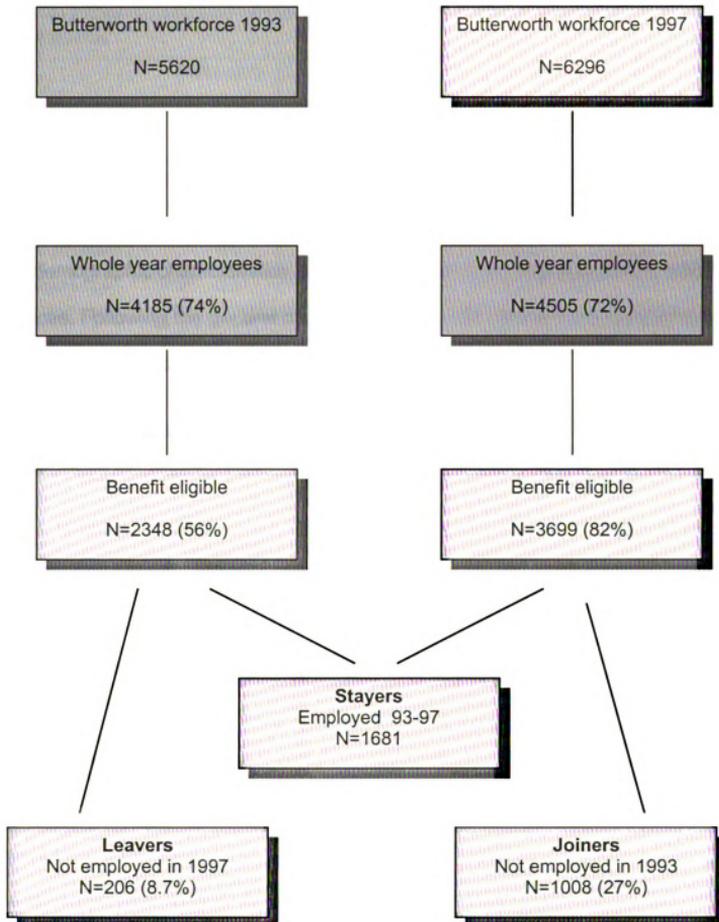
Figure 3. 1 Butterworth (Spectrum Health) Workforce Flow Chart

Chapter 4

RESULTS

This chapter presents the results of the previously described analysis. The chapter will start with a general description of the three studied groups in term of their demographic characteristics, their employment rank, and their health-related practices. Following the general description, the results of the three comparisons between the studied groups will be presented.

Characteristics of the studied groups

As shown in Table 4.1, the Butterworth workforce consisted of mostly whites, females, full-timers, and non-managerial (hourly positions) employees. A total of 2897 employees were eligible for inclusion in this analysis, 1681 stayers, 208 leavers and 1008 joiners. Clearly the three groups had some differences. Joiners were the youngest group. Joiners also included a higher proportion of non-exempt employees and a higher proportion of non-white employees than the other two groups. Stayers were found to be the oldest group, with the lowest percentage of non-whites, and highest number of absenteeism days. Leavers had the highest percentage of females, highest percentage of exempt employees, lowest mean HQ score and lowest mean liability amount.

Table 4. 1 Characteristics of the studied employment groups at Butterworth.

	Leavers	Stayers (1993)	Stayers (1997)	Joiners	P-value
Mean age	36.7	37.1	41.1	33.54	0
% Female	78.2	77.4	77.4	77.2	NS
% White	91.3	93.1	93.1	87.9	S
% Full time	64	83.5	78.2	70.9	S
% Exempt	69	70.3	76.9	85.7	S
Mean HQ	-2.19	1.59	0	1.189	0
Mean liability	869.867	1226	1648.74	1237.5	.663
Mean illness days	2.5	2.94	2.6	2.26	0
Mean short term disability	2.44	3.84	2.87	2.42	0

* When comparing stayers to leavers 1993 data was used, and for the comparison of stayers with joiners 1997 data was used, in order for the groups to be more comparable.
*For comparisons of means one-way ANOVA was used, and for the comparison of proportions Chi-square tests were used.
*S=significant differences between the groups, NS=non-significant differences between the groups.

Table 4.2 compares health-related behaviors among the studied groups. In general, the three groups reported similar health behaviors. A slightly higher percentage of stayers smoked, and a higher percentage of leavers did not wear seat belts all the time. However, the major difference between the groups was fruit and vegetable consumption. Leavers had the lowest intake of fruits and vegetables and stayers seemed to have increased their intake of fruits and vegetables between 1993 and 1997.

Table 4. 2 Health-Related Practices of the Studied Employment Groups at Butterworth.

Health-related practices		Leavers	Stayers (1993)	Stayers (1997)	Joiners (In 1997)
Alcohol consumption (drink/week)	<=7	100	99.1	99.1	99.8
	>7	0	.9	.9	.2
Smoking (% Smoked in the last year)		11.1	15.3	11.3	13.4
Seat belt use (% Time wearing seat belt)	<100%	11.1	6.4	3.9	6.5
	100%	88.9	93.6	96.1	93.5
Consumption of fruits (Servings/week)		19	15	35	28
Consumption of vegetables (Servings/week)		13	14	35	28

Research question 1

Did the leavers have more adverse HQ scores and/or higher medical costs than the stayers?

Preliminary comparison

Results of the analysis of the first research question are summarized in Tables 4.3 - 4.6. Leavers and stayers were of different age groups. Leavers had a higher proportion of employees under 34 and over 55 years of age than did

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stayers. Two thirds of the stayers were between 25 and 44 years of age. The two groups had comparable HQ scores. But, they differed in the distribution of their medical costs. Slightly less than one-half of the leavers had no medical expenditures in 1993 as opposed to less than one third of the stayers. Consequently, stayers had a significantly higher proportion of employees in each one of the remaining three categories of liability amount. Also, stayers had a higher proportion than leavers of employees who had more than 6 illness days, but this difference did not reach statistical significance (p=. 09).

Adjusted associations

HQ score
Overall, HQ scores were not associated with leaving the workforce. Wald score P-value for this variable was not significant (p=. 21). However, it is note worthy that subjects in the lowest category of HQ scores were more likely to be leavers (OR=1.77) (Table 4.3), which was not statistically significant, but had a tight confidence interval with a lower bound of .96 (95%CI=. 96-3.25). In addition to that, the trend test indicated that there was some negative association between HQ scores and the odds of leaving the workforce (p-value=. 05).

Liability amount paid
Having any liability amount was negatively associated with leaving the workforce. Owing to the fact that around one half of the leavers had zero liability amounts in 1993, having any liability amount was negatively associated with leaving the workforce. Both the wald score and the trend test p-values were significant (p<. 001).

Number of illness days
In the adjusted model, the number of days lost to illness in 1993 was not associated with leaving the workforce. This lack of association was also confirmed by the test for trend (p=. 127).

Number of short-term disability days
Similarly to the number of days lost to illness, the number of short-term disability days was not associated with leaving the workforce (p=. 25), and there was no significant trend in this variable.

Demographic and employment factors
Although there is a slight variation in the effect of demographic and employment factors in the different models, employees over the age of 55, non-whites, and part-time employees were more likely to be leavers in the four models. Subjects in the oldest group were twice more likely to leave, non-whites had an odds ratios that ranged from 1.5 to 1.86, part-time employees were two to three times more likely to leave the workforce than white employees.

Table 4. 3: Research question 1. Comparison of leavers and stayers with respect to HQ scores in 1993, and selected demographic characteristics.

Variables	Categories	Leavers (%)	Stayers (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7	7		1.5	1.88	.98-3.59		
	25-34	42.7	38.5		-	-	-		
	35-44	23.3*	34.7*		.6*	.57*	.35-.93		
	45-54	13.6	15.9	.002	.77	.92	.53-1.59	.00	
	55+	8.7*	3.9*		2*	2.6*	1.34-5	02	
Sex	Male	21.8	22.6		-	-	-		
	Female	78.2	77.4	.80	1.04	1	.64-1.58	.97	
Race	White	91.3	93.1		-	-	-		
	Other	8.7	6.9	.33	1.29	1.86**	1.03-3.4	.03	
Employment Status	Full –time	64	83.5		-	-	-		
	Part-time	36*	16.5*	<.001	2.83*	1.8**	1.13-2.8	.012	
Employment Grade	Exempt	31	29.7		-	-	-		
	Non-Exempt	69	70.3	.69	.93	.61**	.41-.91	.016	
HQ score 93	Adjusted	4.6	7.2		.74	.61	.23-1.56		
	-25—11	19.8	14.3		1.62	1.77	.96-3.25		
	-10—3	20.16	17.6		1.36	1.34	.73-2.44		
	-2-+2	16.8	19.6		-	-	-	.21	.05
	+3-+10	26.7	27.8	.40	1.12	1.08	.61-1.9		
	>=+11	11.5	13.4		1	1	.5-2.01		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

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Table 4. 4: Research question 1. Comparison of leavers and stayers with respect to the liability amount in 1993, and selected demographic characteristics.

Variables	Categories	Leavers (%)	Stayers (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7	7		1.5	1.66	.98-2.8		
	25-34	42.7	38.5	.00	-	-	-	<.001	
	35-44	23.3*	34.7*	02	.6*	.54**	.37-.80		
	45-54	13.6	15.9		.77	.80	.50-1.28		
	55+	8.7*	3.9*		2*	2.09**	1.15-3.78		
Sex	Male	21.8	22.6		-	-	-		
	Female	78.2	77.4	.80	1.04	.89	.61-1.3	.56	
Race	White	91.3	93.1		-	-	-		
	Other	8.7	6.9	.33	1.29	1.6	.93-2.7	.08	
Employment Status	Full-time	64	83.5	<.001	-	-	-	<.001	
	Part-time	36*	16.5*		2.83*	2.72**	1.94-3.8		
Employment Grade	Exempt	31	29.7	.69	-	-	-	.14	
	Non-Exempt	69	70.3		.93	.77	.55-1.09		
Liability	$0	47.6	29.1		-	-	-		

Table 4. 5: Research question 1. Comparison of leavers and stayers with respect to days lost to illness in 1993 and selected demographic characteristics.

Variables	Categories	Leavers (%)	Stayers (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7	7		1.5	1.69**	1.01-2.83		
	25-34	42.7	38.5		-	-	-		
	35-44	23.3*	34.7*	.0002	.6*	.58**	.39-.65	.0001	
	45-54	13.6	15.9		.77	.82	.52-1.3		
	55+	8.7*	3.9*		2*	2.11**	1.17-3.8		
Sex	Male	21.8	22.6		-	-	-		
	Female	78.2	77.4	.80	1.04	.85	.58-1.25	.43	
Race	White	91.3	93.1		-	-	-		
	Other	8.7	6.9	.33	1.29	1.52	.89-2.61	.12	
Employment Status	Full – time	64	83.5	<.001	-	-	-	<.001	
	Part-time	36*	16.5*		2.83*	2.9**	2.08-4.06		
Employment Grade	Exempt	31	29.7		-	-	-		
	Non-Exempt	69	70.3	.69	.93	.82	.58-1.15	.25	
Illness days 93	None	89.8	85.2		-	-	-		
	1-5	1.9	2.6	.05	.33*	.87	.62-1.23	.31	.127
	6+	8.3	12.2		.63*	.69	.43-1.10		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

Table 4. 6: Research question 1. Comparison of leavers and stayers with respect to days lost to short-term disability in 1993 and selected demographic characteristics.

Variables	Categories	Leavers (%)	Stayers (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7	7		1.5	1.61	.29-2.69		
	25-34	42.7	38.5		-	-	-		
	35-44	23.3*	34.7*	.0002	.6*	.57**	.39-.83	.001	
	45-54	13.6	15.9		.77	.83	.52-1.3		
	55+	8.7*	3.9*		2*	2.11**	1.17-3.80		
Sex	Male	21.8	22.6		-	-	-		
	Female	78.2	77.4	.80	1.04	.83	.57-1.21	.34	
Race	White	91.3	93.1		-	-	-		
	Other	8.7	6.9	.33	1.29	1.5	.87-2.58	.13	
Employment Status	Full-time	64	83.5	<.001	-	-	-	<.001	
	Part-time	36*	16.5*		2.83*	3.04**	2.18-4.22		
Employment Grade	Exempt	31	29.7		-	-	-		
	Non-Exempt	69	70.3	.69	.93	.79	.56-1.11	.17	
Short term disability 93	None	89.8	85.2		-	-	-		
	1-5	1.9	2.6	.20	.33*	.77	.27-2.23	.25	.105
	6+	8.3	12.2		.63*	.64	.37-1.09		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

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Research question 2

Did the joiners have better HQ scores and/or lower medical costs than
stayers?

Preliminary comparison

As can be seen in Tables 4.7 - 4.10, joiners were a younger group with a
higher proportion of non-whites, a higher percentage of part-timers and hourly
employees than stayers. The two groups had comparable HQ scores, except for
a higher percentage of stayers with adjusted HQ scores. Overall, joiners had
lower medical costs than stayers, 40.9% of them had no medical costs in 1997
as opposed to 22% of the stayers. In each one of the three categories for liability
amount the percentage of joiners was significantly lower. Joiners had also less
illness and short-term disability days than did stayers.

Adjusted associations

HQ scores
The HQ score was a significant determinant of being a joiner (p=. 01). However,
there was no trend in this variable (p=. 34). Looking at the stratum specific odds
ratios, it seems that joiners were less likely to have an adjusted HQ score (OR=.
73).

Liability amount paid
The liability amount variable reached statistical significance both in the crude and the adjusted models (p<. 001), and had a significant negative trend (p<. 001). Given that a significantly higher proportion of the joiners than stayers had no liability amount, subjects in the remaining three categories of the variable were less likely to be joiners (Table4.8). The odds ratios were .47, .4, and .38 for the first, second and third category respectively.

Number of illness days
Subjects that had one or more illness days were less likely to be in the joiners group (p=. 0025)(Table 4.9). This association was also confirmed by the trend test (p=. 028).

Number of short-term disability days
Similarly to the number of illness days, the number of absenteeism days due to short-term disability was negatively associated with joining the workforce (.0037) (Table 4.10). The test for trend was significant too, (p-value=. 0037).

Demographic and employment factors
Older employees were less likely to be joiners, this association was weak (OR=.9), but reached statistical significance in all four models. In addition to age, race was another significant factor, non-whites were twice more likely to join the workforce than whites.

Table 4. 7: Research question 2. Comparison of stayers and joiners with respect to the HQ scores in 1997, and selected demographic characteristics.

Variables	Categories	stayers	joiners	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age		41.1* %	33.54* %	<.001	.91*	.9*	.89-.91	<.001	
Sex	Male	22.6	22.8		-	-	-	.82	
	Female	77.4	77.2	.89	.82	1.02	.81-1.3		
Race	White	93.1*	87.9*		-	-	-		
	Other	6.9*	12.1*	<.001	1.85*	2.15*	1.5-4-3	<.001	
Employment Status	Full – time	78.2	70.9		-	-	-		
	Part- time	21.8*	29.1*	<.001	1.47*	1.02	.8-1.3	.82	
Employment Grade	Exempt	23.1	14.3		-	-	-		
	Non- Exempt	76.9*	85.7*	<.001	1.79*	1.2	.93-1.55	.15	
HQ score 93	Adjusted	13.2*	8.7*		.63*	1.54*	.37-.8		
	-25—11	8.1	8.3		1.33	1.2	.8-1.8		
	-10—3	17.9	15.5	.0054	.83	.9	.65-1.25	.01	.34
	-2-+2	19	19.7		-	-	-		
	+3-+10	30.7	36.2		1.13	1	.76-1.32		
	>=+11	11.2	11.6		1	.9	.63-1.28		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

Table 4. 8: Research question 2. Comparison of stayers and joiners with respect to the liability amount in 1997, and selected demographic characteristics.

Variables	Categories	Stayers	Joiners	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age		41.1 * %	33.54 * %	<.001	.91*	.91**	.9-.92	<.001	
Sex	Male	22.6	22.8	.89	-	-	-	.50	
	Female	77.4	77.2		.82	1.08	.85-1.36		
Race	White	93.1 *	87.9*	<.001	-	-	-	.0001	
	Other	6.9*	12.1*		1.85*	1.9**	1.39-2.59		
Employment Status	Full – time	78.2	70.9	<.001	-	-	-	.84	
	Part-time	21.8 *	29.1*		1.47*	.97	.78-1.22		
Employment Grade	Exempt	23.1	14.3	<.001	-	-	-	.11	
	Non-Exempt	76.9 *	85.7*		1.79*	1.22	.95-1.56		
Liability amount	$0	22	40.9		-	-	-		
	$1-99	14.3 *	12.2*	<.001	.45*	.47**	.35-.63	<.001	<.001
	$100-499	29.9 *	22.6*		.4*	.42**	.33-.55		
	$500+	33.8 *	24.3*		.38*	.43**	.34-.55		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

Table 4. 9: Research question 2. Comparison of stayers and joiners with respect to days lost to illness in 1997 and selected demographic characteristics.

Variables	Categories	Stayers	Joiners	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age		41.1* %	33.54 * %	<.001	.91*	.91*	.89-.92	<.001	
Sex	Male	22.6	22.8		-	-	-		
	Female	77.4	77.2	.89	.82	.94	.75-1.18	.63	
Race	White	93.1*	87.9*	<.001	-	-	-	<.001	
	Other	6.9*	12.1*		1.85*	2.07*	1.52-2.81		
Employment Status	Full – time	78.2	70.9	<.001	-	-	-	.13	
	Part-time	21.8*	29.1*		1.47*	1.18	.95-1.46		
Employment Grade	Exempt	23.1	14.3	<.001	-	-	-	.012	
	Non-Exempt	76.9*	85.7*		1.79*	1.38*	1.07-1.79		
Illness days 93	None	35.3	41.1	.01	-	-	-	.0025	.028
	1-5	48.8*	44.4*		.78*	.7*	.56-.86		
	6+	15.9*	14.5*		.78*	.67*	.51-.9		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

Table 4. 10: Research question 2. Comparison of stayers and joiners with respect to days lost to short-term disability in 1997 and selected demographic characteristics.

Variables	Categories	Stayers	Joiners	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age		41.1*%	33.54*%	<.001	.91*	.91**	.90-.92	<.001	
Sex	Male	22.6	22.8	.89	-	-	-	.63	
	Female	77.4	77.2		.82	.94	.75-1.18		
Race	White	93.1*	87.9*	<.001	-	-	-	<.001	
	Other	6.9*	12.1*		1.85*	2.05**	1.5-2.8		
Employment Status	Full-time	78.2	70.9	<.001	-	-	-	.04	
	Part-time	21.8*	29.1*		1.47*	1.24**	1-1.54		
Employment Grade	Exempt	23.1	14.3	<.001	-	-	-	.09	
	Non-Exempt	76.9*	85.7*		1.79*	1.22	.96-1.56		
Short term disability 93	None	87.2	90.5	.01	-	-	-	.0017	.0037
	1-5	2.6*	1.2*		.45*	.43*	.20-.89		
	6+	10.3	8.3		.78	.63*	.46-.86		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

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Research question 3

Did the joiners have better HQ scores and/or lower medical costs than leavers?

Preliminary comparison

Tables 4.11–4.14 summarize the results of research question 3. It is evident that Joiners were a younger group than leavers. A significantly higher percentage of joiners were under the age of 25, and a higher percentage of leavers were over the age of 55. Joiners were also more likely to be hourly employees than leavers. Some differences in health related variables were also evident. A significantly higher percentage of leavers had a low score of -25–11, but at the same time a higher proportion of joiners had liability amounts of $500 or more. No differences were evident between the two groups in respect to absenteeism.

Adjusted associations

HQ scores
Although Wald score p-value (p=. 78) and the trend test for the HQ score variable (p=. 18) were not significant, subjects that had a score of -25 to -11 were less likely to be joiners (OR=. 38) (CI: .19-.75).

Liability amount paid
Having a liability amount over $500 was associated with being a joiner, (OR=1.6)

(CI=1-2.57). Also, the test for trend indicates a positive trend in this variable (p=.

0003).

Number of illness days
No association was observed between the number of illness days and joining the

workforce (p=. 35), and the test for trend did not yield significant results (p=. 16).

Number of short-term disability days
Likewise, the number of short-term disability days was not associated with joining

the workforce (p=. 7). The test for trend yielded a p-value of .70.

Demographic characteristics and employments factors
Subjects in the youngest group were more likely to be joiners; the odds ratios

ranged from1.53 to 1.71 in the different models. Hourly employees were three

times more likely to be joiners. Employees over the age of 55 and part-time

employees were less likely to be joiners, with odds ratios of .28 for the first and

.58 to .82 for the second.

Table 4. 11: Research question 3. Comparison of leavers and joiners with respect to HQ scores in 1993 and 1997, and selected demographic characteristics.

Variables	Categories (%)	Leavers (%)	Joiners (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7*	20.7*		1.85*	1.53	.80-2.92		
	25-34	42.7	41		-	-	-		
	35-44	23.3*	24.8	<.001	1.1	1.32	.79-2.20	.0096	
	45-54	13.6	11		.84	.75	.40-1.38		
	55+	8.7*	2.5*		.29*	.28	.12-.82		
Sex	Male	21.8	22.8		-	-	-		
	Female	78.2	77.2	.76	.94	.70	.42-1.15	.17	
Race	White	91.3	87.9		-	-	-		
	Other	8.7	12.1	.17	1.43	1.16	.61-2.19	.10	
Employment Status	Full – time	64	70.9	.05	-	-	-	.79	
	Part-time	36	29.1		.73	.82	.50-1.34		
Employment Grade	Exempt	31	14.3		-	-	-		
	Non-Exempt	69*	85.7*	<.001	2.68*	3.15*	1.97-5.02	.0005	
HQ score 93	Adjusted	4.6	8.7		1.62	1.67	.62-4.47		
	-25—11	19.8*	8.3*		.355	.38	.19-.75		
	-10—3	20.16	15.5		.64	.69	.36-1.31		
	-2-+2	16.8	19.7-	.92	-	-	-	.78	.18
	+3-+10	26.7	36.2.61		1.15	1.24	.66-2.20		
	>=+11	11.5	11.6.69		.86	.88	.42-1.84		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

Table 4. 12: Research question 3. Comparison of leavers and joiners with respect to liability amount in 1993 and 1997, and selected demographic characteristics.

Variables	Categories	Leavers (%)	Joiners (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7*	20.7*		1.85*	1.71**	1.03-2.83		
	25-34	42.7	41		-	-	-		
	35-44	23.3*	24.8	<.001	1.1	1.22	.81-1.83	.0002	
	45-54	13.6	11		.84	.87	.53-1.45		
	55+	8.7*	2.5*		.29*	.29**	.15-.58		
Sex	Male	21.8	22.8		-	-	-		
	Female	78.2	77.2	.76	.94	.81	.54-1.22	.64	
Race	White	91.3	87.9		-	-	-		
	Other	8.7	12.1	.17	1.43	1.26**	.82-2.18	.20	
Employment Status	Full – time	64	70.9	.05	-	-	-	.013	
	Part-time	36	29.1		.73	.63**	.43-.92		
Employment Grade	Exempt	31	14.3		-	-	-		
	Non-Exempt	69*	85.7*	<.001	2.68*	2.87**	1.94-4.25	.04	
Liability amount 93	$0	47.6	40.9		-	-	-		
	$1-99	9.2*	12.2		1.53	1.42	.80-2.53		
	$100-499	28.2*	22.6	.024	.93	.79	.52-1.2	.03	.03
	$500+	15*	24.3*		1.87*	1.60**	1-2.57		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

Table 4. 13: Research question 3. Comparison of leavers and stayers with respect to the number of days lost to illness in 1993 and 1997 and selected demographic characteristics.

Variables	Categories	Leavers (%)	Joiners (%)	P	Crude OR	Adjusted OR	95% CI	P	Trend P
Age	<25	11.7*	20.7*		1.85*	1.67**	1.01-2.77		
	25-34	42.7	41		-	-	-		
	35-44	23.3	24.8	<.001	1.1	1.19	.79-1.78	<.001	
	45-54	13.6	11		.84	.83	.50-1.36		
	55+	8.7*	2.5*		.29*	.28**	.14-.56		
Sex	Male	21.8	22.8		-	-	-		
	Female	78.2	77.2	.76	.94	.82	.55-1.22	.64	
Race	White	91.3	87.9		-	-	-		
	Other	8.7	12.1	.17	1.43	1.24	.72-2.15	.35	
Employment Status	Full – time	64	70.9	.05	-	-	-	.001	
	Part-time	36	29.1		.73	.58**	.40-.83		
Employment Grade	Exempt	31	14.3	<.001	-	-	-	.001	
	Non-Exempt	69*	85.7*		4.52	3.09**	2.03-4.7		
Illness days 93	None	89.8	41.1		-	-	-		
	1-5	1.9	44.4	.90	1.06	.93	.64-1.34	.35	.16
	6+	8.3	14.5		.98	.75	.45-1.25		

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

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Table 4. 14: Research question 3. Comparison of stayers and joiners with respect to the number of days lost to short-term disability in 1993 and 1997 and selected demographic characteristics.

Variables	Categories	Leavers (%)	Joiners (%)	P	Crude OR	Adjusted OR	95% CI	P	P
Age	<25	11.7	20.7		1.85*	1.68**	1.01-2.77		
	25-34	42.7	41	<.001	-	-	-	<.001	
	35-44	23.3*	24.8		1.1	1.20	.80-1.81		
	45-54	13.6	11		.84	.84	.51-1.38		
	55+	8.7*	2.5		.29*	.28**	.14-.57		
Sex	Male	21.8	22.8		-	-	-		
	Female	78.2	77.2	.76	.94	.82	.55-1.23	.62	
Race	White	91.3	87.9		-	-	-		
	Other	8.7	12.1	.17	1.43	1.23	.71-2.13	.38	
Employment Status	Full –time	64	70.9		-	-	-		
	Part-time	36*	29.1	.05	.73	.60**	.42-.85	.0023	
Employment Grade	Exempt	31	14.3		-	-	-		
	Non-Exempt	69	85.7	<.001	4.52	2.89**	1.95-4.26	<.001	
Short term disability 93	None	89.8	90.5		-	-	-		
	1+	10.2	9.5	.76	.92	.92	.54-1.56	.7	.70

Crude ORs are derived from univariate logistic regression model.

Adjusted ORs are derived from a multivariate logistic regression model that included all the variables listed in the table.

(-) Reference category.

*Univariate logistic regression model, p<. 05

**Multivariate logistic regression model, confidence interval for the OR does not include one

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Chapter 5

DISCUSSION

The aim of this thesis is to investigate whether incorporating an incentive/disincentive approach in a worksite health promotion program (HPP) produced any selectivity in employment. The strategy used to address this question was a parallel comparison of three groups: those who left the workforce after implementing the HPP, those who joined the workforce, and those who stayed employed throughout the five-year period of the program. The underlying assumption was that if the program produced any selectivity in employment, employees with poor health would be more likely to leave the workforce and joiners would be in better health status than the existing workforce.

Four main outcomes of interest were considered to reflect the health status of the employees: 1) HQ score derived from the annual health screening 2) the liability amount paid by the hospital for the health insurance, which reflected health care costs of the employees 3) number of absenteeism days due to illness 4) number of absenteeism days due to short-term disability.

The first research question was: did the leavers have more adverse HQ scores and/or higher medical costs than stayers?

The analysis revealed that when adjusting for all other variables, low HQ scores had a weak association with being a leaver (OR=1.77). However, this association did not reach statistical significance (95%CI=. 96-3.25). As for the medical costs, leavers did not seem to have higher medical costs than stayers.

On the contrary, high liability amounts were negatively associated with leaving the workforce, the number of absenteeism days due to illness or short-term disability was not associated with leaving the workforce. Age was a significant predictor of leaving the workforce. The youngest and oldest employees were most likely to leave. Race is another demographic characteristic that was significantly associated with leaving the workforce; non-whites were more likely to be leavers. Part-timers were also more likely to leave the workforce, whereas hourly employees were less likely to leave the workforce.

The second research question was: did the joiners have better HQ scores and/or lower medical costs than stayers?

The two groups had similar HQ scores, except for a higher proportion of stayers with adjusted HQ scores. Further, it is evident that joiners had lower medical costs than leavers. In the multivariate model, having any liability amount from $1 to over $500 was negatively associated with joining the workforce. The numbers of illness days and short-term disability days were negatively associated with being a joiner. Non-whites were twice as likely to join the workforce, and age had a weak but statistically significant association with joining the workforce (R=. 9).

The third research question was: did the joiners have better HQ scores and/or lower medical costs than leavers?

Subjects that had low HQ scores of -25 to -11 were less likely to be joiners (OR=. 38). On the other hand, having a liability amount in the highest category ($500+) was also associated with joining the workforce. Employment grade was

another factor that differentiated the two groups; Joiners were 4 times more likely to be hourly employees than leavers. No relation was observed between the number of absenteeism days and joining the workforce.

Overall, the results indicate that leavers had poorer health than the other two groups, which was reflected by a high percentage of leavers having low HQ scores of -25 to -11. However, medical costs differences between the three groups were not correlated with their HQ scores. On the contrary, leavers had the lowest liability amounts. One potential explanation for this finding is that employees who are undergoing a medical treatment, for example, are more likely to stay employed than others due to their need for health insurance benefits.

The number of illness days is another measure of general well-being that was used in many evaluations of worksite HPPs, and was found to be the most consistent positive outcome of comprehensive worksite HPPs.[17,20] In this analysis, The only significant difference in absenteeism was between joiners and stayers; joiners had significantly lower numbers of illness and short-term disability days, which was consistent with having lower medical care costs than stayers. Further, absenteeism is a measure of costs, but in the first and the third comparisons there was no correspondence between the effects of the two variables.

Medical costs were found to be reduced by participation in worksite HPPs in many studies.[11,24] Yet, some studies indicate that health care costs are not always correlated with health status; a person with good health may seek medical care frequently to confirm his health status, a phenomenon described as

the "worried well syndrome."[13] Which might explain in part the conflicting results of the current analysis.

The main drive for conducting this analysis was the concern that a disincentive approach might alienate employees with health problems, or who engage in negative health practices, instead of urging them to improve. But the three groups had comparable health-related behaviors and HQ scores, and not only did the leavers not have higher health care costs, they had the lowest mean health care costs, despite higher mean HQ score than the stayers.

One potential explanation for the lack of correlation of HQ scores with medical costs is that risk-factors such as high cholesterol levels or unhealthy nutrition may not be manifested as diseases within a five year period as opposed to motor vehicle safety factors that might have an immediate impact.

Strengths and weaknesses of the HeatlhPlus program

The literature indicates that, extending the lengths of follow-up was associated with a positive measurable impact of interventions.[13,42] HealthPlus had a five-year follow-up period, which is a reasonable length for assessing the effect of the intervention.

Another strength of the HealthPlus program was the inclusion of a biometric fitness test among other objective measures. The vast majority of programs reviewed relied on self-report of physical activity as a measure of fitness. Further, unlike many of the programs, HealthPlus was evaluated independently from the planning team.

Nevertheless, it is important to note that HealthPlus had some weaknesses too. The reliability of the measurement methods used in the screening was not tested, nor was the validity of the self-reported data.

Moreover, the use of a complex prediction model to determine point value of the measured risk factors was very new to risk-rated programs. However, the model failed to take into account the ease of modification. For example, modifying the blood pressure is harder than wearing a seat belt or a helmet, but the two components had the same amount of maximum annual deductions (see Table 3).

Limitations of this analysis

Several limitations should be considered when interpreting the results of the current analysis. A major problem was the lack of screening data for the group of leavers. A total of 63% of leavers had valid HQ scores in 1993. It is not clear whether the unavailable data were truly missing or simply reflected non-participation in the health screening. The data that was sent to us from the Wellness Center in Grand Rapids did not include non-participants in the screening. In addition, subjects that elected not to participate in the screening were defaulted to a score of -25. Yet, replacing the missing HQ scores with -25 would have seriously biased the results; the HQ score was considered to reflect the health status of employees. Therefore, a low score of -25 may not reflect the health status of non-participants. Therefore, for the purpose of this analysis invalid HQ scores, for any of the subjects, were dealt with as missing data.

An additional limitation of the current analysis is the lack of a control group. It is difficult to attribute any observed changes in the workforce to the HealthPlus program, without comparing the results to a similar workforce over the same period of time. Which presents a threat to the internal validity of the study.

Chapter 6

CONCLUSIONS

The three studied groups clearly differed in health-related factors, but the results are conflicting. The data suggests that Leavers had poorer health evaluations than stayers and joiners. Nevertheless, these differences in health status were not reflected in health care costs or the number of absenteeism days. The data further indicates that Joiners had lower medical costs and less absenteeism days but did not have higher HQ scores.

Given the current results and the limitations mentioned in the previous chapter, one cannot draw firm conclusion. Then again, one cannot reject the hypothesis that the incentive/disincentive approach may result in selectivity in employment. Thus, this aspect of the HealthPlus Health Quotient program should be further studied- using a control group- to determine which of the observed differences are truly due to the program.

The current results as well as previous reports on the HealthPlus Health Quotient program[47] are not in favor of widespread use of the incentive/disincentive approach. However, this approach needs to be studied more extensively in order to resolve what is ethical and what is not.

APPENDICES

APPENDIX A

BUTTERWORTH QUESTIONNIAR

Please note: The numbers on the following two pages should be entered from top to bottom. **All digits must be complete.** If your answer is "3" for a 2-digit answer, you must record "03". See example.

Example

INCORRECT

CORRECT

---

1. AGE *(as of January 1 of next year)*

2. GENDER Male Female

---

3. TOBACCO USE

How would you describe your use of tobacco products? (Complete either "a" or "b"; not both. Include all forms of tobacco use: cigarettes, cigars, pipes and smokeless tobacco).

a. *I do not use tobacco products.*
   I have never used tobacco products or quit using tobacco products for at least one or more years.

   I recently quit using tobacco products (quit for at least 1 month, but not more than 12 months).

b. *I presently use tobacco products or have recently quit within the past month.*

   On the average, how many cigarettes, cigars, pipes and/or smokeless tobacco do/did you smoke/chew per day?

---

4. ALCOHOL USE

How many drinks of alcoholic beverage do you consume in a typical week? If you never drink, use "00"; if you only drink once in awhile or less than once per week, use "01". (Note: one drink equals one 12 oz. can of beer, one 12 oz. wine cooler, one 6 oz. glass of wine or one ounce of hard liquor).

Average drinks per week:

---

5. MOTOR VEHICLE SAFETY

a. What percentage of the time do you wear your seatbelt when riding in a motor vehicle?
   (Example: 100 = 100% of the time; 095 = 95% of the time; 050 = 50% of the time).

   Percentage:

b. Do you ride a motorcycle? Yes No
   If yes, do you wear a helmet? Yes No

c. How many points do you currently have on your driving record?
   (Examples: speeding 11-15 mph over limit: 3 pts; 15+ mph over limit: 4 pts. If you have questions regarding point values for specific offenses, guidelines will be available at the time of your screening).

   Points:

d. How many times in an average month do you drive or ride in a motor vehicle when the driver has been under the influence of alcohol and may be impaired? (Generally, this would be defined as 2 or more alcoholic drinks within one hour of driving.)

   Times:

2

Figure A.1 (cont'd)

---

1. AGE *(as of January 1 of next year)*

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

2. GENDER

Male
Female

---

3. TOBACCO USE

How would you describe your use of tobacco products? (Complete either "a" or "b"; not both.
Include all forms of tobacco use: cigarettes, cigars, pipes and smokeless tobacco).

a. I do not use tobacco products.
- I have never used tobacco products or quit using tobacco products for at least one or more years.
- I recently quit using tobacco products (quit for at least 1 month, but not more than 12 months).

b. I presently use tobacco products or have recently quit within the past month.

On the average, how many cigarettes, cigars, pipes and/or smokeless tobacco do/did you smoke/chew per day?

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

---

4. ALCOHOL USE

How many drinks of alcoholic beverage do you consume in a typical week? If you never drink, use "00"; if you only drink once in awhile or less than once per week, use "01". (Note: one drink equals one 12 oz. can of beer, one 12 oz. wine cooler, one 6 oz. glass of wine or one ounce of hard liquor).

Average drinks per week:

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

---

5. MOTOR VEHICLE SAFETY

a. What percentage of the time do you wear your seatbelt when riding in a motor vehicle? (Example: 100 = 100% of the time; 095 = 95% of the time; 050 = 50% of the time).

Percentage:

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

b. Do you ride a motorcycle?
If yes, do you wear a helmet?

Yes   No
Yes   No

c. How many points do you currently have on your driving record? (Examples: speeding 11-15 mph over limit: 3 pts; 15+ mph over limit: 4 pts. If you have questions regarding point values for specific offenses, guidelines will be available at the time of your screening).

Points:

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

d. How many times in an average month do you drive or ride in a motor vehicle when the driver has been under the influence of alcohol and may be impaired? (Generally, this would be defined as 2 or more alcoholic drinks within one hour of driving.)

Times:

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

2

Figure A.1 (cont'd)

6. NUTRITION

How often do you consume foods in the following categories? For each of the categories listed, please estimate to the best of your ability the number of servings you eat *per day* or *per week*. The sample food items and serving sizes are intended to be guidelines only. Other food items that you may consume from each of the groups should also be included in your estimations.

Sample Food Items	Serving Sizes	Number of daily or weekly servings: Example:		Is this the amount you eat per...
		0 ● 1 2 3 4 5 6 7 ● 9		
		8 0 1 2 3 4 5 6 7 ● 9		Day? Week?
a. Bread, cereal, rice, noodles, crackers, pretzels, dinner rolls, bagels, potatoes, flour tortilla, air or lite popcorn	1 slice of bread, 1/2 cup cooked rice or noodles, 1/2 cup cooked cereal, 1 ounce ready-to-eat cereal, 1 roll, 3 cups popcorn	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		○ ○
b. Fruits or 100% fruit juices	1 small piece fresh, 1/2 cup canned, 1/4 cup dried, 3/4 cup juice	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
c. Vegetables	1/2 cup chopped raw or cooked, 1 cup leafy raw	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
d. Lowfat dairy products (skim, 1/2% or 1% milk, lowfat yogurt or frozen yogurt, ice milk, lowfat cheese)	1 cup of milk or yogurt, 1.5-2 ounces of cheese, 1/2 cup ice milk	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
e. Lean meat, skinless poultry, fish, dry beans, egg substitute, lean & trimmed beef and pork, tuna, wild game	3 ounces cooked meat, poultry or fish, 1/2 cup cooked beans, 1 egg substitute	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
f. Whole milk dairy products (whole or 2% milk or yogurt, ice cream, cheese, pudding)	1 cup of milk or yogurt, 1.5-2 ounces of cheese, 1/2 cup ice cream	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
g. Eggs & high fat meats (sausage, luncheon meats, salami, bologna, corned beef, hot dogs, hamburger, ribs); peanut butter	3 ounces cooked meat, poultry or fish, 1 egg, 1 tablespoon peanut butter	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
h. Deep fried foods (meat, poultry, fish, vegetables, potatoes)	3 ounces cooked meat, 8-10 fries	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
i. Butter, margarine, oils, sour cream, dressings, and cream cheese (not including fat free), bacon, gravy, nuts/seeds	1 teaspoon butter, margarine or oil; 1 tablespoon dressing, nuts or seeds; 1 slice bacon	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
j. Cakes, cookies, pastries, doughnuts, chips, regular popcorn (include "fat free" snacks)	1/8 pie, 2 inch square of cake, 1 handful of chips (approx. 15), 2 cookies	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		
k. Candy, sugared drinks (pop, Kool-aid, fruit punches)	12 ounce sugared pop or drink	0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9		

Figure A.1 (cont'd)

The information on the preceding pages accurately and honestly reflects my health and lifestyle. I understand that any misrepresentation on my part will result in an adjustment of my Health Quotient.

_____   _____
Signature (must be in ink)   Date

STOP
DO NOT COMPLETE THE NEXT SECTION. THESE TESTS WILL BE MEASURED DURING THE HEALTH SCREENING PROCESS BY WELLNESS CENTER PERSONNEL.

---

7. EVALUATION DATE:
Month Day Year

8. BLOOD PRESSURE
SBP DBP

9. BODY COMPOSITION
Skinfold BIA Height Weight

10. FITNESS WALK
Mile Time min. sec. Heart Rate (bpm)

11. CHOLESTEROL
Total HDL

12. OTHER
PHYSICIAN CODE COMPANY CODE

Employee
Spouse
Dependent

00135

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HEALTH QUOTIENT POINT SYSTEM
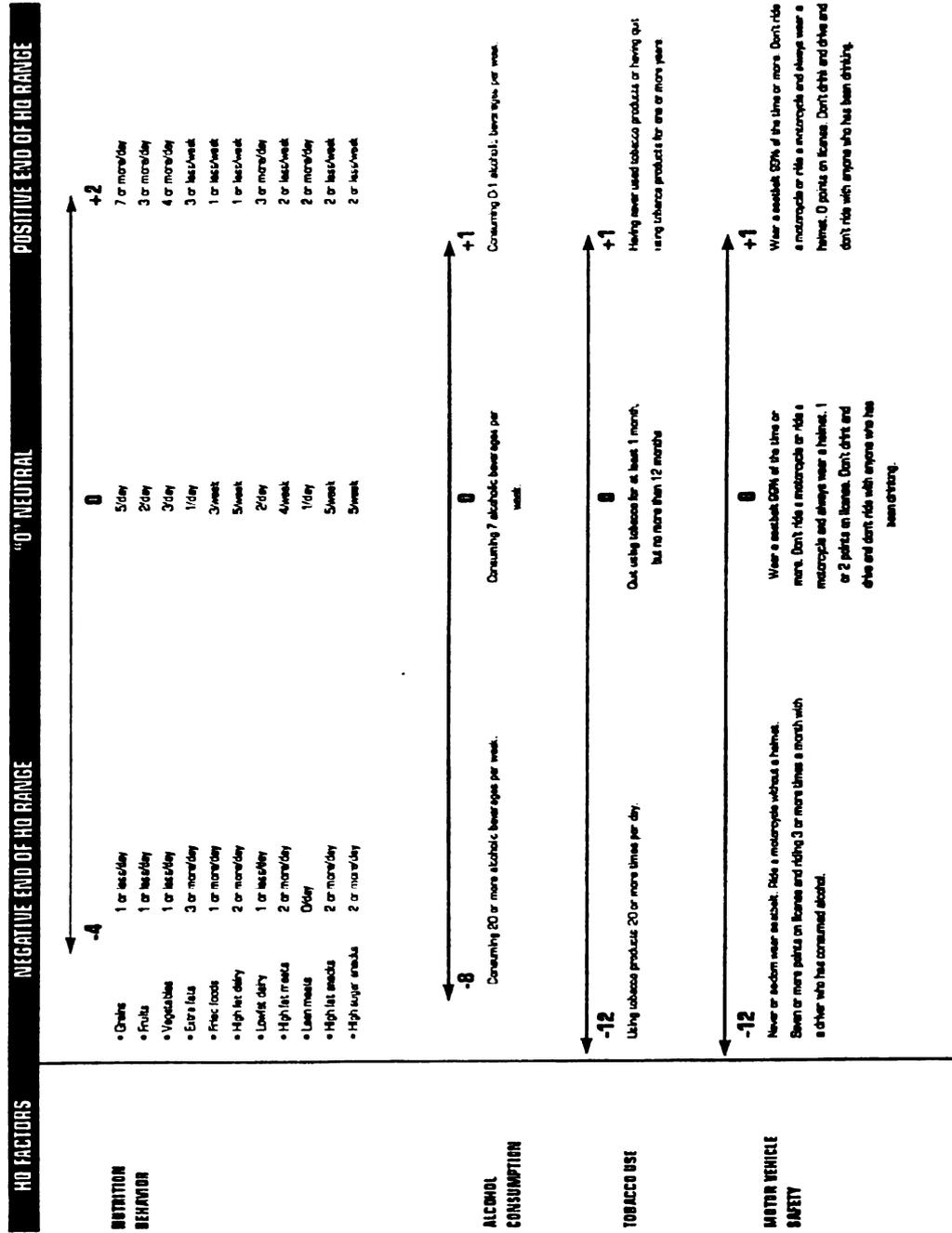
Figure B.1 Health quotient system

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HQ FACTORS	NEGATIVE END OF HQ RANGE	"0" NEUTRAL	POSITIVE END OF HQ RANGE
EXERCISE BEHAVIOR/ CARDIORESPIRATORY FITNESS	-8	0	+5

To understand the behaviors associated with the points for this factor, refer to pages one through three of this document. Details of the Fitness Walk Test are provided.

BODY FATNESS — -12 / 0 / +5

Age	Man	Woman		Man	Woman		Man	Woman
<30	35% or more	41% or more		15% or less	21% or less		10% or less	16% or less
30-49	37% or more	43% or more		17% or less	23% or less		12% or less	18% or less
50+	39% or more	45% or more		19% or less	25% or less		14% or less	20% or less

BLOOD PRESSURE — -12 / 0 / +5

Systolic: 175 or higher
and
Diastolic: 110 or higher

Systolic: 120 - 139
and
Diastolic: 80 - 89

Systolic: 110 or lower
and
Diastolic: 65 or lower

CHOLESTEROL/ HDL RATIO — -12 / 0 / +5

Males: 8.0 or higher
Females: 7.0 or higher

Males: 4.5
Females: 3.5

Males: 2.8 or lower
Females: 1.8 or lower

TOTAL POINTS — -80* / +25

HQ SCORE — -25 / +25

*Even though the total negative HQ impact could be -80, the maximum negative was kept at -25. Butterworth continues to evaluate the HQ point system and the behaviors associated with each factor; changes may be made as the HealthPlus program continues to develop.

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