

Financial Incentives and Employee Health: Literature Review

Bachelor Thesis International Bachelor of Economics and Business Economics
(IBEB)

Elif Demirci
452820
Supervisor: Drs. T.P.M. Welten
Second assessor:
Date:



Abstract

Obesity, tobacco consumption and inactivity are among the major risk factors of health. Approximately 790,000 EU citizens died prematurely because of tobacco consumption, alcohol consumption, unhealthy diets and the lack of physical activity in 2016 (OED, 2018). Financial incentives are means to encourage changes in one's behaviour. These incentives can be used to influence employees to have a healthier lifestyle. It is beneficial for the employer to encourage healthy behaviour to reduce productivity loss within a firm. This literature review analyses how health risk factors can be reduced with financial incentives in order to improve the health of employees. This study analyses the effect of financial incentives on physical activity, tobacco consumption and weight.

Keywords

financial incentives, monetary reward, motivation, CSR, health, employees, employer, tobacco consumption, BMI, weight, physical activity, productivity

The views stated in this thesis are those of the author and not necessarily those of Erasmus School of Economics or Erasmus University Rotterdam.

Table of Contents

- 1. Introduction 3**
- 2. Theoretical Framework..... 5**
 - 2.1 Health Status..... 5**
 - 2.2 Corporate Social Responsibility 6**
 - 2.3 Financial Incentives..... 6**
 - 2.4 Physical Activity 8**
 - 2.5 Tobacco Consumption 8**
 - 2.6 Body-Mass Index 9**
- 3. Methodology..... 10**
- 4. Analyses 11**
 - 4.1 Financial Incentives and Physical Activity..... 11**
 - 4.2 Financial Incentives and Tobacco Consumption..... 15**
 - 4.3 Financial Incentives and Obesity 18**
 - 4.4 Summary of Literature 22**
- 5. Conclusion and Limitations 25**
 - 5.1 Conclusion..... 25**
 - 5.2 Limitations and Suggestions for Further Research..... 28**
- 6. Bibliography..... 29**

Introduction

Over the years, health consciousness has increased among citizens. The results of the report on health of the OECD countries show the current state of health among citizens of the European Union (OECD, 2018). It is argued that the European Union (EU) needs more protection and prevention. For instance, 790.000 EU citizens died prematurely due to smoking, alcohol consumption, unhealthy diets and the lack of physical activity. Result show that one out of five adults smokes daily, at least one out of six adults is obese and more than 40% of young men aged 20-29 reported heavy episodic drinking.

Kaspin, Gorman and Miller (2013) analysed wellness programs of 20 companies to observe the effects of employees-sponsored wellness strategies. The purpose of these programs was to encourage a healthy lifestyle and to improve employees' lives. The study found that these programs have positive outcomes. For instance, results show reduced absenteeism, reduced healthcare costs and improved health of employees. Employees were motivated to improve their well-being and health, which reduces health risk factors such as smoking and obesity.

The research conducted by Mitchell and Bates (2011) observed the relationship between health of employees and the productivity loss due to the health status. They found that productivity is negatively affected by poor health conditions and lifestyle risk factors. An employee with a poor health status had a productivity cost ranging from 15 to 1601 dollar more compared to employees without health risks. This implies that an employer with 10.000 employees can have a productivity loss of 3.8 million dollar a year.

How can managers use financial incentives to motivate employees to have a healthier lifestyle?

This study analyses how health risk factors could be decreased with the use of extrinsic rewards to reduce the productivity loss within a firm. Over the years, corporate social responsibility (CSR) strategies have become more popular among firm. A firm with a CSR policy does not only consider shareholders but considers all stakeholders of the firm. One of those stakeholders are the employees. For instance, in a small country like the Netherlands with only 17 million citizens, the working workforce consisted of 8,651 million people at the end of 2017 according to the "Centraal Bureau voor Statistiek". An improvement in the lifestyle of employees might reduce healthcare costs, early retirement, sick leave and premature deaths.

This research analyses how the health and lifestyle of employees could be improved with the help of the employer. For instance, Maes, Verhoeven, Kitel and Scholten (1998) analysed the Brabantia Project, a Dutch work-site wellness-health program. The firm provided their employees with information on the implications of an unhealthy lifestyle. The employees received health education sessions together with a cafeteria project which added a variety of healthy foods to the traditional foods in the cafeteria. The results show better work conditions and a decrease in absenteeism in the experimental group. However, the absenteeism rate of this firm was high to begin with.

This study analyses how the employer can improve its employees' health with the means of financial incentives. The focus will be on behaviour related risk factors as these factors can be influenced by changes in lifestyle. The analysed papers analyse the change in behaviour after the implementation of incentives. The papers discuss the effects of financial incentives on physical activity, tobacco consumption and weight. In order to answer the research question, the following three sub-questions are answered:

Sub-question 1: Is physical activity positively affected by financial incentives?

Sub-question 2: Can tobacco consumption be reduced with financial incentives?

Sub-question 3: Do financial incentives have a negative effect on the employees BMI?

A research conducted by Robroek, Van den Berg, Plat and Burdorf (2011) investigated the relation between lifestyle factors, such as obesity and smoking, and the loss of productivity and sick leave. They analysed 49 companies in the Netherlands from 2005 till 2009. A health organization investigated the work ability of the employees and the employees were asked to answer a survey on lifestyle factors, health, work demands, work ability and productivity. They found that sick leave and a higher level of productivity loss were caused by more than 10% by overweight and lifestyle behaviour. Also, the results show that the prevention of an unhealthy lifestyle is important for both physically and mentally demanding jobs.

The remainder of the paper is organized as follows. Firstly, the theoretical framework explains the concepts of this study. Secondly, the method of investigation is discussed in the methodology section. Afterwards, the literature is discussed in the analyses section. After this, the research question is answered in the conclusion section. Finally, the limitations and suggestions for further research are discussed.

Theoretical Framework

This section aims to explain the concepts of this literature review. A brief explanation is given to explain the definition of health status. Afterwards, the definition of CSR, the importance of CSR and the well-being of employees for firms is explained. This study mainly focuses on employees which are one of the stakeholders of a firm. To find an answer for the research question, three sub-questions are first answered regarding physical activity, smoking and obesity. Therefore, the definition and the importance of the concepts of physical activity, smoking and obesity are discussed.

2.1 Health Status

There are many factors that can influence the health status of a person. For instance, health can be influenced by genetics or by a particular lifestyle. In 1948, the term “health” was defined by the World Health Organization (WHO) as “A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (Bergner and Rothman, 1987). This is a very broad definition and has been criticized. For instance, Ware (1987) preferred to define health with five distinct dimensions, namely physical health, mental health, social functioning, role functioning, and general perceptions of well-being. Huber et al. (2011) argued that the definition of health of the WHO is no longer fit due to the rise of chronic diseases. They define the health status of a person by the ability to adapt and self-manage in the face of social, physical and emotional changes.

Health is a very broad term and there is not a clear common definition of health, therefore this review focuses on aspects of health that can be influenced by the employer. The WHO (2010) discussed factors that influence the health status of an individual. These factors are genetics, behavioural related risk, social and economic environment, physical environment and other factors. Factors such as education, income, gender and social support network can also influence someone’s health. In this study, only *behavioural related risk factors of health* are observed as these can be influenced by changes in the lifestyle behaviour of

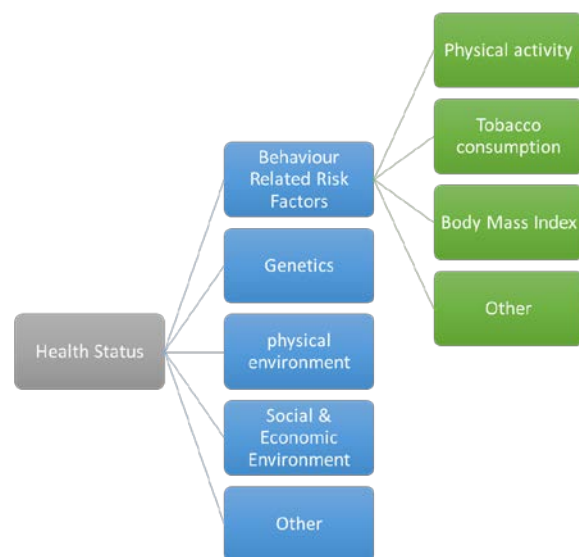


Figure 1: *Health Status*

employees. Changes in unhealthy behaviour can help to prevent from diseases and health risks. In the report of the OECD (2018), it was stated that the major risk factors of health were smoking, obesity, lack of physical activity and alcohol and drug consumption. It was stated that in 2016 approximately 790,000 EU citizens died prematurely because of tobacco consumption, alcohol consumption, unhealthy diets and the lack of physical activity. This study focuses on the risk factors discussed in this report, except for alcohol and drug consumption as employees will be less likely to share this information with their employer.

In this study, the focus is on modifiable habits that influence physical health. These factors can easily be changed by changing the lifestyle of a person. Health can be influenced by many factors, but in this research only tobacco consumption, obesity and physical activity are analysed. This study analyses how the employer can positively affect the lifestyle habits of the employee regarding his or her activity level, smoking behaviour and eating habits.

2.2 Corporate Social Responsibility

Traditionally, firms used to be only focused on shareholders. The main goal of a firm was to create profits for the shareholders. Over the years, the focus shifted to all stakeholders. The strategy that focuses on all stakeholders instead of only the shareholders is called the corporate social responsibility (CSR) strategy. Over the years, CSR became a popular strategy among companies. CSR considers all stakeholders, such as customers, government, environment, employees etc. All businesses are responsible for the ethical conduct of their operations and for their impact on all their stakeholders now and in generations to come (Collier and Esteban, 2007). Collier and Esteban argued in their paper that it is important for firms to consider the importance of their employees and to have employees whose values and vision are aligned with those of the firm.

2.3 Financial Incentives

The objective of this study is to analyse whether incentives motivate employees to improve their behaviour in order to have a healthy lifestyle. In this research there is a focus on financial incentives, such as a bonus or reward. The analysed journals granted monetary rewards towards the employees that managed to complete the given task successfully. For instance, Patel et al. (2016) gave a monetary reward to the participants that were able to achieve the goal of 7000 steps a day. Individuals can be intrinsically or extrinsically motivated to change their behaviour or actions. Employees are intrinsically motivated if they have a certain behaviour because they are internally motivated to do so. Employees are externally motivated if they behave in a certain way because they expect an external reward in return. Providing financial incentives is a method

to externally motivate employees. Financial incentives are monetary rewards that are rewarded with the intention to encourage a certain behaviour. These incentives can be given by a company to encourage the employees to change their behaviour.

Financial incentives can have various forms and can be rewarded with different methods. Employers can motivate their employees with, for instance, cash rewards, bonuses, salary increases, vouchers and discounts. Employees can receive individual or group based financial incentives. An individual based incentive system only takes into account the achievements of the individual, whereas a group-based incentive system considers the achievements of all the individual within the group. There are various ways employers can decide to give financial incentives. Employers can give a fixed reward if employees achieve a certain goal. They can also allow employees to participate in a lottery if they achieve a certain goal. Moreover, they can organize a competition among individuals or groups. The best performing individual or group will then receive the reward. Furthermore, employers can also decide to give penalties in case the goal is not achieved. In this case, the employees are encouraged to achieve a certain goal because of loss-aversion. Employees can be requested to pay a fee to participate, which they will only receive back if they achieve the goal. Employees can also receive a pay-check deduction if they fail to improve their behaviour.

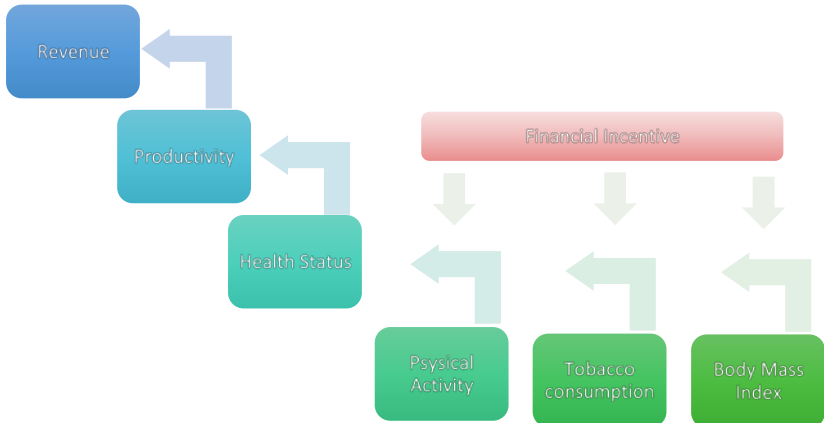


Figure 2: The Influence of Financial Incentives

2.4 Physical Activity

The first sub-question helps to analyse whether the manager can positively affect the amount of physical activity of the employee with financial incentives. Macera, Hootman and Sniezek (2003) analysed in their study the benefits of physical activity for 3 specific conditions: Coronary Heart Disease (CHD), diabetes and arthritis. They concluded that physical inactivity has high individual and societal costs in terms of direct medical expenditure and disability. Physical activity is important as prevention and to slow the progressions of chronic disease. They concluded that physical activity has great value for people with and without an existing chronic condition. Patel et al. (2016) used financial incentives to increase the physical activity among overweight and obese adults. The participants were given financial incentives if they achieved the goal of 7000 steps a day. Each participant was assigned to one of the four groups, which were the control group, the gain-incentive group, the lottery-incentive group and the loss-incentive group. They found that the loss-incentive group was the most effective system to increase the physical activity. Pronk and Kottke (2009) argued that organizations should consider implementing physical activity promotion into their overall business planning process. Firms should convince employees in its health policy to create supportive environments inside the workplace as employers represent a powerful stakeholder group. Workplace physical activity programs have been shown to be successful in improving health and productivity outcomes.

2.5 Tobacco Consumption

The second sub-question helps to analyse effect of financial incentives on smoking. Tobacco consumption is the largest avoidable health risk in the European Union. Also, smoking is estimated to be the cause of 300.000 premature deaths per year. Countries with stricter tobacco control policies tend to have a higher reduction in smoking (OECD, 2018). Volpp et al. (2006) analysed whether financial incentives could promote smoking cessation. The experiment tested two groups, a control group and an incentive group. They provided 20 dollars for each smoking cessation session attended and 100 dollars if the participant quit smoking. They found that financial incentives had significant positive effect on smoking cessation. Halpern and Taylor (2010) conducted a survey to observe the workplace attitude towards smoking cessation programs. Workplace smoking cessation programs have the objective to reduce smoking rates and exposures of non-smokers to second-hand smoke, and to improve employee health. The study concludes that the majority of both employees and employers recognized that smokers should be helped to quit smoking. Also, employers were more likely to indicate that the

company should support smoking cessation. On the other hand, they are also more likely to indicate that the company is providing support for smoking cessation. Furthermore, smoke-free workplaces were considered an effective strategy to reduce smoking.

2.6 Body-Mass Index

Obesity has become a major health issue in the past years. It is considered a very important risk factor for many health problems such as hypertension, high cholesterol, diabetes, cardiovascular diseases and cancer. Obesity is associated with higher healthcare cost, but also with lower employment and a loss of work productivity. Since the year 2000, the obesity rate has increased in most European countries. In 2014, 14% of the adolescent citizens in Europe were obese (OECD, 2018). Barkin, Heerman, Warren and Rennhoff (2010) argued in their paper that the obesity rate among children is concerning. One out of three children (10-17 years old) are obese in thirty states of the United States. They suggested that obesity will decrease the earnings of these children in the future with an average of 956 billion dollars for women and 43 billion dollars for men. Obesity can negatively affect the productivity and economic prosperity of these children. Ries (2012) examined the effect of financial incentives on weight loss and healthy behaviours. She studied if weight of Canadian citizens could be improved with financial incentives. She concluded that longer-term incentive programs are more effective. Incentive can be very effective with additional assistance, such as personal training and counselling. She stated that people know how to lose weight, but they need incentives to change their lifestyle. Weight will be measured with the body mass index (BMI). BMI is a measurement tool that considers weight and length, which helps to estimate whether individuals have a weight within the normal range.

Methodology

This part aims to explain the methods used in this study. This study analyses how managers can motivate employees to improve their health and lifestyle using extrinsic motivation. The three sub-questions help to answer the research question. These questions are related to the effects of financial incentives on the weight, smoking and physical activity of a firm's employees. This study is a literature review that analyses several academic papers regarding physical activity, smoking and BMI. Prior research is reviewed to analyse the effects of financial rewards given by the employer on the behaviour of employees regarding their health.

The first sub-question analyses the effect of financial incentives on physical activity. The time spent on physical activity, such as daily number of steps or hours spent in the gym, before and after the implementation of incentives are compared in the analysed reviews. The second sub-question observed the relationship between financial incentives and smoking. Journals regarding smoking behaviour help to estimate whether monetary rewards can decrease smoking and create smoking cessation. The third sub-question analysed whether financial incentives can motivate weight loss among employees to maintain a normal range of BMI. Journals regarding the effects of financial incentives on weight have been analysed to obtain an answer to this sub-question.

Analyses

4.1 Financial Incentives and Physical Activity

Herman et al. (2006) tested whether the health status of employees of IBM corporation could be improved with financial incentives along with an online physical activity program. Financial incentives were associated with increased employee participation and improved health status among participants. The experiment was conducted among 126,372 IBM employees employed in 2004. IBM offered \$150 cash rebate to the employees that participated in the Virtual Fitness Centre (VFC) program. Employees were required to join the VFC and log their minutes of activity online in order to receive the rebate. To qualify for the rebate, participants needed to engage in at least 20 minutes of physical activity, 3 days per week, for at least 10 weeks. Afterwards, the rebate would be issued in the employee's pay check as taxable income. The study found that 53.8% of the eligible employees participated in the program and reduced their risk for physical inactivity with 8.4%. In the years prior to the incentive program, only approximately 13% of the eligible employees participated in the VFC program. The rebate also significantly reduced the high-risk status (1.3%), weight risk (0.2) and physical inactivity risk (4.4%). The authors concluded that monetary rewards are effective in encouraging participation and improving the health status of employees.

Positive results regarding incentivizing physical activity were also found by Charness and Gneezy (2009). They conducted a research on the effects of implementing incentives to motivate people to exercise. They investigated the post-intervention effects of providing financial incentives to attend a gym several times in a month. The authors stated that existence of obesity is paralleled by an increase in inactivity and that overweight people are more likely to report being inactive. They conducted two field studies in which university students are paid to attend the gym. The students were split into a no-incentive group, a low-incentive group and a high incentive group and were required to attend the gym several times a week. In the second study, the biometric measurements of the participants were also taken. The gym attendance before, during and after the experiment were analysed. The results of the first study show that post-intervention attendance is more than twice as high for the high-incentive group compared to no-incentive group. Also, there is little difference between the behaviour of the no-incentive and low-incentive groups, while there is a significant difference between the behaviour of the low-incentive and high-incentive groups. The results of the second study are very similar. There is a significant increase in the attendance rate of people of the high-incentive group. Also, health

indicators such as weight, waist size and pulse rate were more improved in the high-incentive group. The authors concluded that it is possible to encourage good behaviour with the means of financial incentives. The participants did not go the gym before the experiment but did continue to go after the experiment was finished.

Abraham, Feldman, Nyman and Barleen (2011) examined which factors might influence the behaviour of participants in a wellness program regarding exercise. They conducted a survey to analyse why individuals decided to participate in a wellness program. The Uplan Fitness Rewards Program (FRP) was conducted among approximately 6,900 employees of the University of Minnesota. The participants were able to get up to \$20 per month if they visited a fitness centre at least eight times a month. Approximately half of all the participants of FRP have met the requirements each months and received the monetary award. The purpose of this research was to analyse whether the financial incentives could be associated with the desired changes in behaviour. The purpose of FRP is to attract non-exercisers and sporadic exercisers and encourage them to exercise frequently. However, the program will not create the desired behavioural change if it attracts regular exercisers. Firstly, the results of the survey indicated that the exercise behaviour prior the wellness program affects the probability of participating in the program. Regular fitness centre exercisers were more likely to sign up for FRP compared to non-exercisers. Sporadic fitness exercisers were more likely to sign up compared to non-exercisers. However, they were less likely to get the reward. Secondly, the time cost of exercise is considered an important factor for employees. Employees with a fitness facility close to their house were more likely to sign up. Thirdly, another important factor is the taste for fitness centre exercise of the employee. For example, younger employees were more likely to sign up, but less likely to become regular exercisers. Lastly, employees' attitudes about the benefits and barriers of exercise influences their decision to sign up. Individual who perceived higher benefits from exercise were more likely to sign up.

Dallat et al. (2013) conducted their research with the purpose to investigate how physical activity of employees could be increased with the means of financial incentives. They performed a cost-effectiveness analysis (CEA) of the Physical Activity Loyalty (PAL) study. The PAL study was a quasi-experimental trial that investigated the effects of financial incentives on the physical activity of employees working in two large buildings at Northern Ireland's main government offices from both a healthcare and employer's perspective. The incentive group consisted of the participants of building A (n=199) and the non-incentive group

consisted of the participants of building B (n=207). Participants would carry a loyalty card which monitored the physical activity during work over a 12-week period. Sensors were positioned on walking routes and at the entrance to a gym and exercise studio within the grounds of the workplace. The incentive group could earn points that could be exchanged for retail vouchers. Over the following 6 months, the quality of life (QOL), absenteeism, incremental cost-effectiveness ratio (ICER) and productivity were investigated. Over 12 weeks of the experiment, the incentive group had a higher performance of physical activity compared to the non-incentive group, however the difference was not significant. At 6 months, the results showed that the difference was high enough to compensate the additional costs of the incentive group and the intervention will likely be cost-effective. The authors concluded that the PAL scheme is cost-effective at increasing the physical activity of the employees and increasing the employee's productivity. They stated that the results show the economic value for both the health and employment sector.

Finkelstein et al. (2016) also conducted a research on the effects of financial incentive on physical activity. They tested the effectiveness of a wireless pedometer with and without financial incentives on achieving weekly physical activity goals. 800 employees from 13 companies from Singapore participated in the experiment. Most participants were office workers and they did not engage in a lot of physical activity due to their jobs. The participants were randomly assigned to the control group, the charity-incentive group or the cash-incentive group. During the experiment, participants were requested to use the Fitbit Zip wireless physical activity tracker. Also, they were provided access to the Fitbit website, which allowed them to track their progress over the 12 months of investigation. Incentives were based on weekly steps and Moderate to Vigorous Physical activity (MVPA). Participants could earn \$15 per week if they logged 50,000-69,999 steps in a week. For more than 70,000 steps, participants could earn \$30. The results indicated that the physical activity and health outcomes of participants from the charity incentives groups were not significantly different from the control group. The physical activity levels of participants in the cash-incentive group was positively affected. However, the additional physical activity was on average 4 minutes per day. Also, the additional activity was not noticeable in the health outcomes of the employees. Furthermore, physical activity decreased back to its initial level after cash incentives were discontinued.

Patel et al. (2016) examined the difference between the effects of individual and team-based financial incentives on physical activity. This study focused on team-based physical activity

intervention using individual and team incentives. 304 employees of a firm in Philadelphia were invited to participate in the experiment. Participants were randomly assigned to a control group, individual incentive program, team incentive program or the combined individual and team incentive program. Participants had to achieve the goal of walking 7000 steps a day during the 13-week intervention period. 76 teams of four participants were formed. In the individual incentive program, participants of the winning team would receive \$50, if the individual achieved the goal of 7000 steps that day. In the team incentive program, participants could only receive the \$50 prize if all members of the team achieved the goal. In the combined incentive program, the participants of the winning team could earn 20\$ if the individual achieved the goal of 7000 steps and an addition \$10 for each other team member that also achieved the goal. The combined incentive group had a significantly greater number of participants achieving the goal compared to the control group. The individual incentive group had an insignificant larger number of participants that achieved the goal than the participants in the control group. Also, the team incentive group did not significantly perform better than the control group. Furthermore, the combined incentive group performed significantly better than the team incentive group. In this study it is concluded that the combined incentive program was most effective for increasing physical activity.

4.2 Financial Incentives and Tobacco Consumption

In 1993, Glasgow, Hollis, Ary and Boles published their research on the effects of incentives on the worksite smoking cessation program. They examined the impact of financial incentives on the tobacco consumption of 1100 employees of 19 worksites. Employees were randomly assigned to an incentive group and a control group. Participants of the incentive group were paid \$10 each time an abstinence of smoking was confirmed with a cotinine at the monthly meetings. Abstinent smokers could also win a lottery prize, which ranged from \$5 to 20 in the first half year and had a minimum of \$50 in the second half year. The results show that participants who received incentives did not perform better compared to those that did not receive incentives. The incentive program did not significantly increase smoking cessation among employees.

In 1993, Jeffrey et al. also published their research regarding smoking cessation. They conducted the Healthy Worker Project, which was a work-site intervention program for weight control and smoking cessation. The purpose of this research was to evaluate the effectiveness of the project in reducing obesity and smoking among employees. During the 2-year intervention period, 32 worksites were randomly assigned to a treatment or no-treatment group. Participants received classes on health education for smoking cessation and weight loss. Weight loss goals were set by the participants and had a minimum of 0 lb and a maximum of 1% of body weight loss each week. The monetary incentive system consisted of a pay check reduction of minimal \$5 biweekly. Participant could choose the amount to be deducted from each pay check. Employees received a refund if they made progress towards their weight goal and if the carbon monoxide values were less than 8 ppm (no-smoking level). Of 10,000 employees in the treatment work-sites, 2041 and 270 employees participated in the weight control and smoking cessation program, respectively. The weight loss was 4.8 lb on average and 43% of the smokers quit smoking. Smoking decreased significantly compared to the control group, however only 12% of the smokers participated in the experiment. It can be argued that the participants were already intrinsically motivated to quit smoking. However, the study did not find a significant effect for weight. The research does not provide supports for work-site weight control programs.

On the other hand, Graham et al. (2007) concluded in their research that financial incentives can be effective in promoting smoking cessation. They analysed the effectiveness of an Internet-based worksite smoking cessation program at 12 months. The study focused on 1776 active employees of International Business Machines (IBM) within the United States in 2003.

Employees were offered financial incentives for participation. Smokers could choose between a self-help print-based kit and an internet-based intervention for the smoking cessation treatment. Smokers that agreed to participate in the experiment received a premium discount of \$11 per month, with a total of \$132 for the year. The results indicated that with more than 16,000 potential smokers, a program with a 13% quit rate could yield more than 2000 quitters each year. The authors concluded that the internet cessation program along with financial incentives can be effective in promoting smoking cessation as many people decided to quit throughout the experiment.

This research was supported by the study of Volpp et al. (2009). They analysed how financial incentives can be used for increasing smoking cessation in the United States. From February 2005 through November 2006, 878 employees of a company were selected to participate in the experiment. They were randomly assigned to the control-group or the incentive-group. All participants received information and only the incentive-group received monetary rewards. The participants had interviews throughout the experiment. Participants received \$100 for completing the smoking-cessation program, \$250 for abstinence of smoking within 6 months and \$400 if they did not smoke in the 6 months afterwards. If participants stated that they quit smoking, they were requested to provide urine for a cotinine test for confirmation. The smoking cessation rate for the incentive-group (14,7%) was much higher than the rate of the control-group (5.0%). The study shows that employees are more likely to quit smoking with both information and financial incentives compared to the employees who only received program information. However, this research was limited generalizability as 90% of the participants was white and the participants had relatively high education and income levels.

However, the results of this study also suggest that 85.3% of the smokers in the incentive group did not quit in the long-run. Kim, Kamyab, Zhu and Volpp (2011) analysed why the incentives were not enough for these participants to quit. They conducted a survey to analyse why the participants did or did not quit smoking. 68.8% of the participants that quit smoking stated that they were already motivated to quit smoking and that they would have quit for less money. They indicated that incentives were “not at all” or only “somewhat” important. The non-quitters reported that even higher incentives would not be enough to motivate them to quit. The authors concluded that intrinsic motivation needs to be high enough for modest incentives to be effective.

Kouvonen et al. (2012) examined the implementation of a smoking cessation program in the Finnish public sector study. The study was conducted in 10 municipalities and 21 hospitals in

Finland among 6179 employees. Data was obtained from a survey which was conducted among the employees. In the survey, participants were requested to provide characteristic of their selves, such as age, gender and BMI. They were also requested to provide information on the smoking cessation program their employer offered and how this affected them. The participants had to report whether their employer provided one of the following: support groups, subsidized nicotine replacement therapy, other pharmacological treatments, financial incentives, campaigns, or other types of support. The results indicated that employees who received other pharmacological treatments were more likely to quit smoking than employees who did not receive any support from their employer. However, nicotine replacements therapy was not associated with smoking cessation. Also, the results show that there is a significant relationship between financial incentives and smoking cessation. However, the intrinsic motivation and readiness to quit have to be high enough for modest financial incentives to be effective. Other forms of support did not have a significant effect on smoking. Furthermore, the researchers stated that the associations were stronger among moderate and heavy smokers. They concluded that financial incentives and pharmacological treatments can be effective to encourage

Halpern et al. (2015) conducted a randomized trial of four financial-incentive program for smoking cessation in the United States. The authors stated that employing a smoker cost the employer \$5,816 more per year compared to a non-smoker. They evaluated different incentive programs for smoking cessation to analyse which program is most effective. The participants were CVS Caremark employees, their relatives and friends. They were randomly assigned to one of the five groups, which are the control group, individual-reward group, collaborative-reward group, individual-deposit group and the competitive-deposit group. The deposits were \$150, and the participants could earn monetary rewards up to \$800. The results show that all incentive programs were effective in promoting sustained abstinence from smoking. Group orientated reward programs were not significantly more effective than individual-orientated programs. Deposit reward-based programs were overall less effective compared to the reward-based programs mainly because the acceptance rate for deposit-based program was lower. However, the authors recommend the employers to use deposit-based programs as they are more cost-effective and to make the deposits smaller than \$150.

4.3 Financial Incentives and Obesity

Brownell et al. (1984) found positive results for weight loss with their experiment. They held three weight loss competitions among overweight employees in business and industrial settings. Each participant was required to pay \$5 and the winning team with the with the largest weight loss would receive the pool of money. The first competition was held among 570 employees of three banks, the second was held among 225 employees of a manufacturing firm in Litton industries and the third competition was held among 48 employees of the manufacturing firm “Koppers industries”. The mean weight loss was 5.5 kg for all the competitions and the mean change in percentage overweight was 9.1 per cent. The program was rated positively by the employees and management. Also, results show that the competitions were cost-effective. The cost-effectiveness Ratio is \$2.93 per 1 per cent reduction in percentage overweight. Overall, this research shows that overweight employees can be motivated to lose weight with the means of a monetary reward.

Another research was conducted by Finkelstein, Linnan, Tate and Birken (2007). They tested the effect of different levels of financial incentives to encourage weight loss among overweight employees. Overweight employees at one university and three colleges in North Carolina were requested to participate in the experiment. They performed a three-group experiment with measurements at baseline, 3 months and 6 months. Monetary rewards were given per 1% of baseline weight lost. Participants of group A (back loaded) received \$0 at 3 months and \$14 at 6 months per 1% baseline weight lost, participants of group B (front loaded) received \$14 at 3 months and \$0 at 6 months per 1% baseline weight lost, and participants of group C (steady payment) received \$7 at 3 months and \$7 at 6 months per 1% baseline weight lost. The result show that at 3 months, participants of group A lost 2 pounds, participants of group B lost 3 pounds and participants of group C lost 4,7 pounds. However, at the end of 6 months the weight losses were similar across groups. At 6 months, the financial gains were stabilized, and the weight losses were not significantly different across the treatment groups. The authors stated that further research should investigated this further as modest financial incentives might be effective in motivating overweight employees to lose weight. However, this study did not find significant weight loss at six months.

Volpp et al. (2008) also examined the effects of financial incentives on weight loss. 57 participants aged 30-70 years with a BMI of 30-40 were invited to participate in the experiment. They were randomly assigned to a control group, a deposit contract group or lottery incentive

group. All participants had the weight loss goal of 1 lb per week for 16 weeks. Participants in the deposit contract group had to contribute a payment between \$0.01 and \$3.00 per day. This payment was doubled by the researchers with an additional payment of \$3.00 per day if they were able to achieve the weight loss goal. The participants were weighted at the end of the month weight-in sessions and only received the accumulated award if they achieved the weight loss goal at the end of the month. They could receive up to \$252 per month. The daily lottery prize had an expected value of \$3.00 per day. Participants of the lottery incentive group could participate in the lottery if they achieved the weight loss goal. Participants chose a 2-digit number for the lottery. There was a 1 in 100 chance for the \$100 reward and a 1 in 5 chance for the \$10 reward. The lottery group (13.1 lb) and the deposit contract group (14.0 lb) lost on average significantly more weight than the control group (3.9 lb) in the 16-weeks of intervention. The weight loss of the incentive groups was also larger than the control group at the end of 7 months, however these differences were not significant. On the other hand, participants of the incentive groups did have a significant weight loss compared to the beginning of the experiment, whereas the participants in the control group did not.

Positive results were found by Lahiri and Faghri (2012). They performed a study on the cost-effectiveness of a workplace-based incentivized weight loss program, the Behavioural Weight Management Program (BWMP). The study was conducted in four nursing home facilities and observed the progress of 72 overweight or obese healthcare workers. Participants were randomly assigned to a control and incentive group. For the first 16 weeks, the weekly weight loss goal was 1 lb if the BMI is between 25-30 and 1,5 lb if the BMI is larger than 30. For the next 12 weeks, the participants were encouraged to maintain the weight loss or lose more weight. The participants received \$10 per 1-1,5 pound of weight loss during the 16-week intervention. If the participants maintained or lost more weight per week at the 3-month follow-up, they could receive another \$100. Overall, participants could receive a reward up to \$260 for losing weight. The results show that there was a significant difference between the weight change of the incentive group (-7.4 lb) and the control group (-2.2 lb). Also, a critical factor of this research is that the results show that weight loss caused an enhancement of the productivity of the employees. Furthermore, the authors concluded that the incentive group performed better than the control group in terms of cost effectiveness. The results indicated that workplace-based incentivized BWMP was effective in achieving significant weight loss for overweight and obese employees and generating savings for employers.

On the other hand, Cawley and Price (2013) analysed the effects of three financial incentives on the weight loss of 2635 overweight employees with a BMI larger than 25 at 24 worksites. With the first incentive system, continuous pay, participants received quarterly payments which were determined by the percent of baseline weight lost. For the second incentive system, the deposit contract with lump sum payment, participants were required to pay \$9.95 per month and the fee of \$109.45 (11×9.95) was only refunded if at least 5% of baseline weight was lost. If more than 10% of the baseline weight was lost, participant would receive an additional \$100. The third schedule, deposit contract with continuous repayment, consisted of a monthly payment of \$9.95 and rewards increased up to 20% of baseline weight. Participants in the control group did not receive incentives for weight loss. 68% of the participants dropped out of the experiment before the end of the year. The researchers found that continuous payment sets do not create a greater weight loss compared to the control group. Also, the deposit contract with lump sum repayment resulted in a net revenue of \$19.42 as participants were unsuccessful at achieving the weight loss goals. Therefore, the program made a revenue as fees received were larger than the rewards given. Overall, evidence was not found to support the theory that managers can positively influence the health of their employees with financial incentives regarding obesity.

Kullgren et al. (2013) examined the effects of financial incentives on weight loss in an individual- and group-based setting. They concluded that the group-based incentive system was more effective than the individual incentive system. For this study, the authors conducted an experiment among 105 obese employees at a children's hospital of Philadelphia for 24 weeks. Employees with a BMI of 30 to 40 were invited to participate. Participants were randomly assigned to a control group, the individual-based incentive group or the group-based incentive group. The employees received \$100 per month if they met the weekly goal of 0.4 kg weight loss with the individual-based incentive system. With the group-based system, employees were assigned to groups of 5 and \$500 would be split among the participants that met the weekly weight loss goal. The results of this research indicated that the group-based incentive system was more effective compared to the control group and the individual-based incentive system. The group-incentive participants lost 4.4 kg more than the control group and 3.2 kg more than the individual incentive group. The group-incentive participants also maintained greater weight loss than the control group after the incentives ended.

However, Patel et al. (2016) found that there was not a statistically significant difference in the mean weight change between the control group and the incentive groups. They conducted a 12-

month experiment which analysed the effects of financial incentives in a workplace wellness program. The participants were 197 employees of University of Pennsylvania Health System with a BMI of at least 30. Participants were randomly assigned to the control group or one of the three incentive groups. The participant in the delayed premium adjustment group would receive \$550 in the form of twenty-six biweekly premium discounts beginning the following year if they achieved the 5 percent weight loss target. Participants in the immediate premium adjustment group would immediately receive \$550 in the form of twenty-six biweekly premium discounts if they met the target. The lottery incentive group participated in a daily lottery separate from premiums. There were no significant differences in weight change between the control group and the incentive groups. The weight of obese adults was not improved after participating in a workplace weight loss program in combination with financial incentives of \$550. The authors stated that employers who wish to encourage their employees to achieve a healthy weight should test alternative incentive designs.

4.4 Summary of Literature

Table 1: *Financial incentives and physical activity*

Financial incentives and physical activity					
Article	Objective	Sample	Method	Reward	Results
Herman et al. (2006)	physical activity in fitness centre	Employees at IBM corporation	Case study	Cash rebate issued in the pay check	<ul style="list-style-type: none"> • Increased participation in program • Increase physical activity • Improved health status
Charness and Gneezy (2009)	Gym attendance	University students	(Field) case study	Monetary reward	<ul style="list-style-type: none"> • Increased gym attendance • Greater attendance in the high-incentive group • Health benefits
Abraham et al. (2011)	Reasoning behind participation in wellness program	Employees at university of Minnesota	survey	Monetary rewards	<p>The probability that an employee signs up for an incentivized wellness program depends on:</p> <ul style="list-style-type: none"> • Prior exercise behaviour • time cost of exercise • taste for fitness centre exercise • attitudes about the benefits and barriers of exercise
Dallat et al. (2013)	Physical activity at workplace	Employees at government offices	Case study	Retail voucher	<ul style="list-style-type: none"> • (insignificant) increase in physical activity • Cost-effective • Increase productivity of employee
Finkelstein et al. (2016)	Financial incentives and weekly steps	employees from 13 companies	Case study	Monetary reward	<ul style="list-style-type: none"> • No significant difference between charity-incentive and control group • Cash-incentives positively affect physical activity • Increase physical activity moderate • No improvements in health
Patel et al. (2016)	Individual and team-based incentives for physical activity	Employees in a company in Philadelphia	Case study	Monetary reward - competition	<ul style="list-style-type: none"> • Financial incentives have a positive effect on physical activity • Combination of team and individual incentives are most effective in increasing physical activity

Table 2: *Financial incentives and tobacco consumption*

Financial incentives and tobacco consumption					
Article	Objective	Sample	Method	Reward	Results
Glasgow et al. (1993)	Impact of incentives on smoking cessation	Employees at 19 worksites	Case study	Monetary reward and lottery	<ul style="list-style-type: none"> no significant difference between incentive group and control group incentives did not significantly increase smoking cessation
Jeffrey et al. (1993)	Obesity and smoking cessation	2041 + 270 employees at 32 work sites	Case study	Pay check deduction	<ul style="list-style-type: none"> Significant positive effect on smoking cessation No significant effect on weight control
Graham et al. (2007)	Financial incentives and smoking cessation	Employees at IBM	Case study	premium discount	<ul style="list-style-type: none"> Financial incentives are effective to promote smoking cessation
Volpp et al. (2009)	Financial incentives and smoking cessation	Employees of a multinational company	Case study	Monetary reward	<ul style="list-style-type: none"> Financial incentives have a significant positive effect on smoking cessation Financial incentives more effective than only providing information
Kouvonen et al. (2012)	Smoking cessation programs in finish public sector	Employees in finish public sector	survey	(various forms of) Financial incentives	<ul style="list-style-type: none"> pharmacological treatments and financial incentives have a positive effect on smoking cessation nicotine replacements therapy and campaigns did not have a significant effect on smoking cessation.
Halpern et al. (2015)	Incentive programs for smoking cessation	CVS Caremark employees and their relatives and friends	Case study	Monetary reward	<ul style="list-style-type: none"> Incentive programs are effective for smoking cessation No significant difference between individual and group-based program Acceptance rate for deposit-based programs lower

Table 3: *Financial incentives and obesity*

Financial incentives and obesity					
Article	Objective	Sample	Method	Reward	Results
Brownell et al. (1984)	Weight loss competition	Employees of banks and manufactory firms	Case study	Monetary reward	<ul style="list-style-type: none"> • cost-effective • positive effect on weight loss for overweight employees
Finkelstein et al. (2007)	Financial incentives for weight loss	Employees at higher educational institutions	Case study	Monetary rewards	<ul style="list-style-type: none"> • Financial incentives have a (insignificant) positive effect on weight loss • No significant difference between the different incentive systems
Volpp et al. (2008)	Financial incentives for weight loss	Individuals aged 30-70 years with a BMI of 30-40	Case study	Deposit with additional monetary reward or lottery reward	<ul style="list-style-type: none"> • incentive groups lost significant more weight than the control group at 16 weeks • incentive groups did not lose significant more weight than the control group at 7 months • incentive groups lost significant amount of weight compared to the beginning, control group did not
Lahiri & Faghri (2012)	Financial incentives for weight loss	Overweight or obese healthcare workers	Case study	Monetary reward	<ul style="list-style-type: none"> • Enhancement of productivity • Cost-effective • Significant positive effect on weight loss
Cawley and Price (2013)	Workplace wellness program	Employees at 24 worksites	Case study	Penalty and Monetary reward	<ul style="list-style-type: none"> • 68% dropped out of the program • No significant difference between incentive group and control group
Kullgren et al. (2013)	Group and individual based financial incentives	Employees at children hospital	Case study	Monetary reward	<ul style="list-style-type: none"> • Group-based incentive system more effective compared to individual-based incentive system • Group- incentive participant lost significantly more weight compared to participants of the control group
Patel et al. (2016)	Financial incentives for weight loss	Employees at University of Pennsylvania	Case study	Premium discount	<ul style="list-style-type: none"> • No significant difference between control group and incentive groups

Conclusion and Limitations

5.1 Conclusion

Improving the health of employees is beneficial for the employee, the firm and society at large. Research has shown that wellness-programs can reduce absenteeism, reduce healthcare cost and improve the health of the employees (Kaspin et al., 2013). Also, productivity is negatively affected by poor health conditions and lifestyle risk factors. An employer with 10.000 employees is estimated to have a productivity loss of 3.8 million dollar a year (Mitchell and Bates, 2011). Robroek et al. (2011) had found in their study that more than 10% of sick leave and productivity loss was caused by unhealthy lifestyle behaviour. Therefore, the research question is: *“How can managers use financial incentives to motivate employees to have a healthier lifestyle?”*.

Individuals can be extrinsically motivated with financial incentives. Financial incentives can influence the behaviour of employees. This study observed whether it is possible to encourage employees to change their behaviour regarding their health by financially rewarding or punishing them. The health status of an individual is influenced by many factors such as genetics, social-economic environment and behavioural related risk factors. In this study, only behavioural related risk factors are observed as these might be influenced with incentives. According to the WHO (2018), the biggest risk factors of health are physical inactivity, tobacco consumption and obesity. This review analysed articles that observed the effects of financial incentives on these risk factors.

Financial incentives can be effective in improving the behaviour of employees regarding their health. The majority of the analysed articles found that monetary rewards can positively influence their behaviour which leads to an improvement of their health. However, the papers can also differentiate from each other as they found different results on the effects of financial incentives on the behaviour of employees. For example, the results presented in the papers regarding weight do not always seem to be in line with each other and they are not always significant. This makes it hard to draw a conclusion with the results of the analysed articles. The papers do show that there is a possibility that financial incentives can positively influence the behaviour of employees. An effective method of incentivising people should be developed to have a significant improvement in their behaviour. If behaviour related risk factors of health are reduced, this can improve the health of the employees.

Financial incentives might be able to increase physical activity if an efficient incentive system is used. Herman et al. (2006) concluded that financial incentives are effective in increasing physical activity. These results were supported by Charness and Gneezy (2009). They also found that health indicators significantly improved after the implementation of financial incentives. These papers show that financial incentive can be effective in increasing physical activity. However, Finkelstein et al. (2016) found that the increased physical activity was moderate and there were no noticeable improvements in health status. The effectiveness depends on multiple factors of the incentives, such as the amount and complexity of the incentives. For example, Patel et al. (2016) argued that a combined incentive system is more effective than individual or group incentives. Thus, the method of incentivizing people to increase their activity level can influence the effectiveness of the incentives.

Smoking is a major health issue and is estimated to be the cause of 300.000 premature deaths per year (OECD, 2018). Smoking cessation can positively influence the health status of employees and monetary rewards are shown to be effective in reducing tobacco consumption. The articles regarding tobacco consumption are very promising. The results show that financial incentives are effective in promoting smoking cessation among employees. In the papers of Jeffrey et al. (1993) and Graham et al. (2007) it was concluded that financial incentives have a significant positive affect on the smoking cessation rate of employees. Volpp et al. (2009) found that the cessation rate was three times as high with incentives (14,7%). On the other hand, these results showed that financial incentives were not effective to encourage 85,3% of the smokers to quit. Kouvonen et al. (2017) also concluded that financial incentives can motivate people to stop smoking, however their intrinsic motivation has to be high enough. Implementing financial incentives can therefore be effective to reduce tobacco consumption and improve the health of the employees.

The results of the articles regarding obesity are conflicting and not always significant. This makes it more difficult to draw a conclusion. More research is required to examine the effect of financial incentives on the weight of employees. For example, Cawley and price (2013) and Patel et al. (2016) concluded in their papers that financial incentives did not significantly improve the weight of employees. The incentives were not effective in encouraging obese employees to lose weight. In contrast, Lahiri and Faghri (2012) and Kullgren et al. (2013) found that the incentivized groups lost significantly more weight than the control groups. Kullgren et al. (2013) also stated that group-based incentives were more effective than individual-based incentives. Furthermore, Finkelstein et al. (2007) also stated that monetary rewards are effective

in encouraging overweight employees to lose weight, although their results were not significant. These articles show that financial incentives can influence the behaviour of employees, however more research is needed to examine the most effective way to motivate weight loss among employees.

In conclusion, financial incentives are shown to be effective in encouraging physical activity and smoking cessation. However, more research is needed to examine how financial incentives can improve the BMI of individuals. No definite conclusion can be drawn on the effect of financial incentives on weight. The analyses conducted in this research supports the conclusion that providing monetary rewards can be an effective method to promote physical activity and smoking cessation. This can help to improve the health status of employees. Financial incentives can influence behaviour of individuals. Employers can therefore use them to influence these behaviour related risk factors in order to improve their employees' health. Smoking and inactivity are among the major risk factors of health and reducing unhealthy behaviour can help to prevent from diseases and health risks. This study provides more insight in the beneficial consequences of encouraging healthy behaviour among employees in favour of the employee as well as the employer.

5.2 Limitations and Suggestions for Further Research

This literature review has several limitations. Firstly, the intrinsic motivation of employees to change their lifestyle is ignored. Intrinsic motivation is not included, because it can be difficult to observe which employees are intrinsically motivated. However, intrinsic motivation can influence the effectiveness of financial incentives as intrinsically motivated employees might act differently. Intrinsically motivated employees might also be more likely to participate in a health program.

Secondly, no distinguish between long and short term is made in this review. Financial incentives might influence behaviour of employees different in the short run compared to the long run. Future research should examine whether differences exist in the effects of financial incentives in the long and short term.

Thirdly, this review did not analyse the different characteristic of participants. This paper did not make a distinguish between the gender, age, income and ethnicity of the employees which may influence the effectiveness of financial incentives. Also, the differences between industries is not analysed.

Fourthly, health is a very broad term and it is very difficult to estimate someone health status. It is very difficult to measure the health of individuals. Also, health can be influenced by many external factors which are not incorporated in this review.

Finally, this literature review did not analyse the differences between different incentives systems. The differences between incentives system are ignored. Further research should examine how the influence of financial incentives changes for different methods of providing incentives. Financial incentives can be provided in different amounts, in different shapes and at different periods. Further research should examine how the influence of financial incentives differs for different methods.

Future research should also examine if healthier employees are indeed more productive. It should also examine if smoking cessation, an increase in physical activity and an improvement of weight significantly improves an individual's health as the improvement of health status should be significant. Furthermore, it is important that a good method of incentivizing employees will be developed. Further research should examine the most efficient and effective way of providing financial incentives in order to improve the health of the employees.

Bibliography

A.

Abraham, J. M., Feldman, R., Nyman, J. A., & Barleen, N. (2011). What factors influence participation in an exercise-focused, employer-based wellness program?. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, 48(3), 221-241.

B.

Barkin, S. L., Heerman, W. J., Warren, M. D., & Rennhoff, C. (2010). Millennials and the world of work: the impact of obesity on health and productivity. *Journal of business and psychology*, 25(2), 239-245.

Bergner, M., & Rothman, M. L. (1987). Health status measures: an overview and guide for selection. *Annual review of public health*, 8(1), 191-210.

Brownell, K. D., Cohen, R. Y., Stunkard, A. J., Felix, M. R., & Cooley, N. B. (1984). Weight loss competitions at the work site: impact on weight, morale and cost-effectiveness. *American Journal of Public Health*, 74(11), 1283-1285.

C.

Cawley, J., & Price, J. A. (2013). A case study of a workplace wellness program that offers financial incentives for weight loss. *Journal of health economics*, 32(5), 794-803.

Charness, G., & Gneezy, U. (2009). Incentives to exercise. *Econometrica*, 77(3), 909-931.

Collier, J., & Esteban, R. (2007). Corporate social responsibility and employee commitment. *Business ethics: A European review*, 16(1), 19-33.

D.

Dallat, M. A. T., Hunter, R. F., Tully, M. A., Cairns, K. J., & Kee, F. (2013). A lesson in business: cost-effectiveness analysis of a novel financial incentive intervention for increasing physical activity in the workplace. *BMC Public Health*, 13(1), 953.

E.

F.

Finkelstein, E. A., Haaland, B. A., Bilger, M., Sahasranaman, A., Sloan, R. A., Nang, E. E. K., & Evenson, K. R. (2016). Effectiveness of activity trackers with and without incentives to increase physical activity (TRIPPA): a randomised controlled trial. *The lancet Diabetes & endocrinology*, 4(12), 983-995.

Finkelstein, E. A., Linnan, L. A., Tate, D. F., & Birken, B. E. (2007). A pilot study testing the effect of different levels of financial incentives on weight loss among overweight employees. *Journal of Occupational and Environmental Medicine*, 49(9), 981-989.

Finkelstein, E. A., Sahasranaman, A., John, G., Haaland, B. A., Bilger, M., Sloan, R. A., ... & Evenson, K. R. (2015). Design and baseline characteristics of participants in the TRIal of Economic Incentives to Promote Physical Activity (TRIPPA): a randomized controlled trial of a six month pedometer program with financial incentives. *Contemporary clinical trials*, 41, 238-247.

G.

Graham, A. L., Cobb, N. K., Raymond, L., Sill, S., & Young, J. (2007). Effectiveness of an internet-based worksite smoking cessation intervention at 12 months. *Journal of Occupational and Environmental Medicine*, 49(8), 821-828.

Glasgow, R. E., Hollis, J. F., Ary, D. V., & Boles, S. M. (1993). Results of a year-long incentives-based worksite smoking-cessation program. *Addictive behaviors*, 18(4), 455-464.

H.

Halpern, S. D., French, B., Small, D. S., Saulsgiver, K., Harhay, M. O., Audrain-McGovern, J., ... & Volpp, K. G. (2015). Randomized trial of four financial-incentive programs for smoking cessation. *New England Journal of Medicine*, 372(22), 2108-2117.

Halpern, M. T., & Taylor, H. (2010). Employee and employer support for workplace-based smoking cessation: results from an international survey. *Journal of occupational health*, 1009070142-1009070142.

Herman, C. W., Musich, S., Lu, C., Sill, S., Young, J. M., & Edington, D. W. (2006). Effectiveness of an incentive-based online physical activity intervention on employee health status. *Journal of Occupational and Environmental Medicine*, 48(9), 889-895.

Huber, M., Knottnerus, J. A., Green, L., van der Horst, H., Jadad, A. R., Kromhout, D., ... & Schnabel, P. (2011). How should we define health?. *Bmj*, 343, d4163.

I.

J.

Jeffery, R. W., Forster, J. L., French, S. A., Kelder, S. H., Lando, H. A., McGovern, P. G., ...

& Baxter, J. E. (1993). The Healthy Worker Project: a work-site intervention for weight control and smoking cessation. *American journal of public health*, 83(3), 395-401.

K.

Kaspian, L. C., Gorman, K. M., & Miller, R. M. (2013). Systematic review of employer-sponsored wellness strategies and their economic and health-related outcomes. *Population health management*, 16(1), 14-21.

Kim, A., Kamyab, K., Zhu, J., & Volpp, K. (2011). Why are financial incentives not effective at influencing some smokers to quit? Results of a process evaluation of a worksite trial assessing the efficacy of financial incentives for smoking cessation. *Journal of occupational and environmental medicine*, 53(1), 62-67.

Kouvonen, A., Kivimäki, M., Oksanen, T., Pentti, J., Heponiemi, T., Väänänen, A., ... & Vahtera, J. (2012). Implementation of workplace-based smoking cessation support activities and smoking cessation among employees: the Finnish public sector study. *American journal of public health*, 102(7), e56-e62.

Kullgren, J. T., Troxel, A. B., Loewenstein, G., Asch, D. A., Norton, L. A., Wesby, L., ... & Volpp, K. G. (2013). Individual-versus group-based financial incentives for weight loss: a randomized, controlled trial. *Annals of internal medicine*, 158(7), 505-514.

L.

Lahiri, S., & Faghri, P. D. (2012). Cost-effectiveness of a workplace-based incentivized weight loss program. *Journal of occupational and environmental medicine*, 54(3), 371-377.

M.

Macera, C. A., Hootman, J. M., & Sniezek, J. E. (2003). Major public health benefits of physical activity. *Arthritis Care & Research*, 49(1), 122-128.

Maes, S., Verhoeven, C., Kittel, F., & Scholten, H. (1998). Effects of a Dutch work-site wellness-health program: the Brabantia Project. *American journal of public health*, 88(7), 1037-1041.

Mitchell, R. J., & Bates, P. (2011). Measuring health-related productivity loss. *Population health management*, 14(2), 93-98.

N.

O.

OECD/EU (2018), *Health at a Glance: Europe 2018: State of Health in the EU Cycle*, OECD Publishing, Paris.

P.

Patel, M. S., Asch, D. A., Rosin, R., Small, D. S., Bellamy, S. L., Eberbach, K., ... & Hoffer, K. (2016). Individual versus team-based financial incentives to increase physical activity: a randomized, controlled trial. *Journal of general internal medicine*, 31(7), 746-754.

Patel, M. S., Asch, D. A., Rosin, R., Small, D. S., Bellamy, S. L., Heuer, J., ... & Wesby, L. (2016). Framing financial incentives to increase physical activity among overweight and obese adults: a randomized, controlled trial. *Annals of internal medicine*, 164(6), 385-394.

Patel, M. S., Asch, D. A., Troxel, A. B., Fletcher, M., Osman-Koss, R., Brady, J., ... & Volpp, K. G. (2016). Premium-based financial incentives did not promote workplace weight loss in a 2013–15 study. *Health Affairs*, 35(1), 71-79

Pronk, N. P., & Kottke, T. E. (2009). Physical activity promotion as a strategic corporate priority to improve worker health and business performance. *Preventive medicine*, 49(4), 316-321.

Q.

R.

Ries, N. M. (2012). Financial incentives for weight loss and healthy behaviours. *Healthcare Policy*, 7(3), 23.

Robroek, S. J., van den Berg, T. I., Plat, J. F., & Burdorf, A. (2011). The role of obesity and lifestyle behaviours in a productive workforce. *Occupational and environmental medicine*, 68(2), 134-139.

S.

T.

U.

V.

Volpp, K. G., John, L. K., Troxel, A. B., Norton, L., Fassbender, J., & Loewenstein, G. (2008). Financial incentive–based approaches for weight loss: a randomized trial. *Jama*, *300*(22), 2631-2637.

Volpp, K. G., Levy, A. G., Asch, D. A., Berlin, J. A., Murphy, J. J., Gomez, A., ... & Lerman, C. (2006). A randomized controlled trial of financial incentives for smoking cessation. *Cancer Epidemiology and Prevention Biomarkers*, *15*(1), 12-18.

Volpp, K. G., Troxel, A. B., Pauly, M. V., Glick, H. A., Puig, A., Asch, D. A., ... & Corbett, E. (2009). A randomized, controlled trial of financial incentives for smoking cessation. *New England Journal of Medicine*, *360*(7), 699-709.

W.

Ware Jr, J. E. (1987). Standards for validating health measures: definition and content. *Journal of chronic diseases*, *40*(6), 473-480.

WHO. (2010, December 01). The determinants of health. Retrieved from:

<https://www.who.int/hia/evidence/doh/en/>

X.

Y.

Z.