

# A Review of the Importance of Physical Fitness to Company Performance and Productivity

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**Abstract:** The purpose of this study is to illustrate and investigate the importance of physical fitness to company performance and productivity, by comparing previous researches on this area. This study focuses on the importance of physical fitness and its effect on employee health, performance and productivity in organizations. The number of health promotion programs in workplace settings has continued to grow. Although employers' rationales vary, health promotion programs may yield economic benefits such as reduced absenteeism, presentism, employee health care costs and employee turnover. The data for the study is collected from various sources namely articles from 1969 to 1999 and 2000 to 2015. The methodology adopted is qualitative and the findings are based on reliable data with respect to the economic impact of worksite physical fitness activity programs. Most, if not all, researches in this field have been performed in developed and high-income countries. This research recommends improvements and further studies on physical fitness on company performance and offers some suggestions for further research.

**Keywords:** Physical Fitness, Company Performance, Productivity, Employee, Exercise

## Introduction

Physical fitness has been gaining considerable attention in industries from both, employers and employees over the last few years. People spend most of their time at the workplace, which is utilized by many to share as well as receive messages of health (Kelly, 2000). Poor employee health means reduced productivity and increased expenses for the employer. This is the main reason why many global organizations are giving serious attention to various health programs or fitness activities (Dursi, 2008). Many organizations have focused on addressing their employees' health aspects, even before anything happens since prevention is better than cure. Organizations usually get aware of the issues via increased large claims and immediately focus on lowering costs instead of enhancing health and promoting better physical and mental wellbeing for the workers. In addition, they have

to manage the costs related to productivity loss from the employees who are absent from work.

Employees who are lean as well as active are seen as more productive than the ones who are inactive and overweight. The scientific proof for the effectiveness of workplace physical fitness activities on productivity is irrefutable. The rationale behind the workplace physical programs implementation is transparent, given the job related gains of physical activity as well fitness and the costs of obesity (Selecky, 2007). The idea of the relationship between productivity and physical fitness of an employee needs no justification. It is evident from the thinking that only a physically fit individual can perform more physically demanding tasks at work and withstand workload pressures and over-time. As such, a person who is physically fit can serve better at work and be productive compared to an unfit person (Sharifzadeh, 2013). Employee health promotion programs have

resulted in reduced absenteeism and job related injuries. Both of these help employers reduce unwanted expenditures related to HRM. Employees who regularly take part in physical fitness programs at work tend to have less involuntary absenteeism. As such, in every possible way, employee physical fitness programs can physically enhance an individual as well as reduce the extra expenditures undertaken by the organization in managing ill health and lower productivity at work (Wattles and Harris, 1997). Employees who have three or more health related risks show a 30% higher rate of absenteeism and a 38% higher rate of health related expenditures at work. The World Health Organization (WHO) defines the condition of being healthy as a state of full mental and physical wellbeing. Considering these aspects, many modern day organizations that are termed as 'Health Conscious Enterprises' have started serious initiatives towards the wellbeing of their employees. They carry out physical fitness programs by being in partnership with their employees on health issues and in preventive care. Healthcare initiatives target to optimize the fitness aspects and not just simply to eliminate the risks. This paradigm shift is visible in the orientation of many enterprises as they strive to be a completely health focused enterprise (Gibbs and Cartwright, 2010). These days, lifestyle diseases are rather common. Unhealthy food habits or unhealthy living style makes many people diabetic, develop hypertension, etc. These disorders can at a later stage turn in to serious ailments related to the heart and so on. As a result, the employees will become unproductive. Such employees will incur more costs in terms of health related expenditure at work with increased absenteeism. Employers are considering to such indirect costs, which can be reduced with a proper fitness program at the workplace. This study is important for companies given the economic impact of workplace physical activity and for the promotion of health and wellness among employees. In doing so, this study describes the evidence for the importance of physical activity and its influence on health-related and work-related outcomes. This will be done through the analysis of published researches from which the evidences will be used by this study to review and investigate the relationship between physical activity and company performance and productivity.

### *Purpose of Study*

The aim of this study is to examine and review the importance of physical fitness for organizational performance as well as productivity. There are 3 objectives that must be achieved. These include, investigating the concept and criteria used to describe physical fitness and company performance and

productivity based on theory and previous research and to determine the factors that relate physical fitness to company performance and productivity based on previous research findings. Moreover, it will include investigating researches from 1969 to 2015, which have been conducted on organizational health performance and recommending policies to promote a healthy work-place.

### **Research Methodology**

The qualitative descriptive research approach is used to perform a review of sixty researches on the importance of physical fitness to company performance and productivity. Data for this study is gathered from journals, reports and articles from 1969 to 2015. Analysis is done on the reviews of sixty researches and their respective findings. The study uses descriptive research to ascertain the importance of physical fitness to company performance and productivity and to investigate the factors related to this area based on previous research findings. A qualitative descriptive design is the appropriate choice for a qualitative study because the participants could reveal a more detailed understanding of their perspectives on the phenomenon of the importance of physical fitness to company performance and productivity. The qualitative descriptive approach is ideal for this research as the identified important factors lay the foundation on the experiences of the participants (McGlone *et al.*, 2008). When conducting a qualitative descriptive study, researchers use descriptive validity that describes the phenomenon directly (Sandelowski, 2010). With reference to the case study, the descriptive design enables the researcher to describe the characteristics of workplace recreation and its impact on the wellbeing and performance of employees (Orodho and Kombo, 2002). The importance of physical fitness is evaluated and described by reviewing researches and the ways in which they affect the employees' wellbeing and performance. The use of the descriptive design also enables the researcher to give succinct recommendations to researchers and scholars interested in employee wellbeing at the workplace.

Qualitative data is being re-used in many modern day studies. Thus, data from qualitative studies are archived (Corti and Thompson, 1998; Hammersley and Gomm, 1997; Corti *et al.*, 1995). In addition, the collection of qualitative data is costly in many cases as well as time consuming. The opportunities to conduct a primary research are limited in many studies. In this modern era, software and computer programs make the collection, archiving and retrieval of data easy. Such secondary data can be easily accessed and utilized optimally for primary researches, which are the main reasons for using secondary data in qualitative studies (Procter, 1993). Secondary data analysis is a method

suggested mainly for student researchers due to the ease and cost effectiveness (Szabo and Strang, 1997). Moreover, the current research is not experienced in secondary research, mostly undertaken by experienced researchers due to the specific difficulties in conducting the secondary analysis (Thorne, 1994). It also has to be noted that the adaptation of the method does not necessarily preclude the chances of gathering primary data (Fig. 1). This may for instance, be needed for obtaining extra data or to pursue the findings arising from the primary analysis in a much controlled manner. There may also be a requirement for consulting the primary researcher or researchers for investigating the conditions of the original data collection and process. In this study, data is collected from secondary sources of information including human health and physical activity journals, conference papers and databases such as Emerald Insight, Science Direct and Sage Publications. Available secondary data may be entirely appropriate and adequate to draw conclusions, answer questions, or solve problems and it is cheaper to collect secondary data than it is to obtain primary data. With no bud-get and a lack of time, examination of secondary sources can yield a great deal more information than a primary data collection exercise. In other words, the time involved in searching secondary sources is much less than that needed to complete a primary data collection. Secondary sources of information can yield more accurate data than that obtained through primary research.

*Analysis and Findings*

In order to address the issues and to meet the aims of this study, below are the researches that were developed:

- What are the researches related to physical fitness and performance and productivity of the organization?
- These researches on physical fitness and performance and productivity have been carried out from 1969 to 2015. All the papers were retrieved from Google scholar and web of science. Table 1 demonstrates the authors, years and titles of these researches for further understanding
- What are the factors, which illustrate that physical fitness, promotes higher company performance and productivity?

As stated in the article “the impact of a health promotion program on employee health risks and work productivity”, productivity levels are increased by being part of a firm’s fitness program (Mills *et al.*, 2007). This survey comprised a variable group of 266 and a control group of 1242 respondents. The participants of the variable group were placed in a multi-part health promotion program that expresses a personalized health improvement plan, health risks, literature and lectures, which bring health improvement in- to focus. Based on the findings of the World Health Organization (WHO), the health risk of individuals who have been enrolled in a multi-component health promotion program decreased by 0.45, their work performance increased by 0.79 and their monthly absenteeism decreased by 0.36. These findings indicate that applying a multi-component health promotion for the purpose of increasing the fitness level of participants could make distinct differences in productivity and health risks. As such, a fitness program has a positive effect on work performance and productivity.

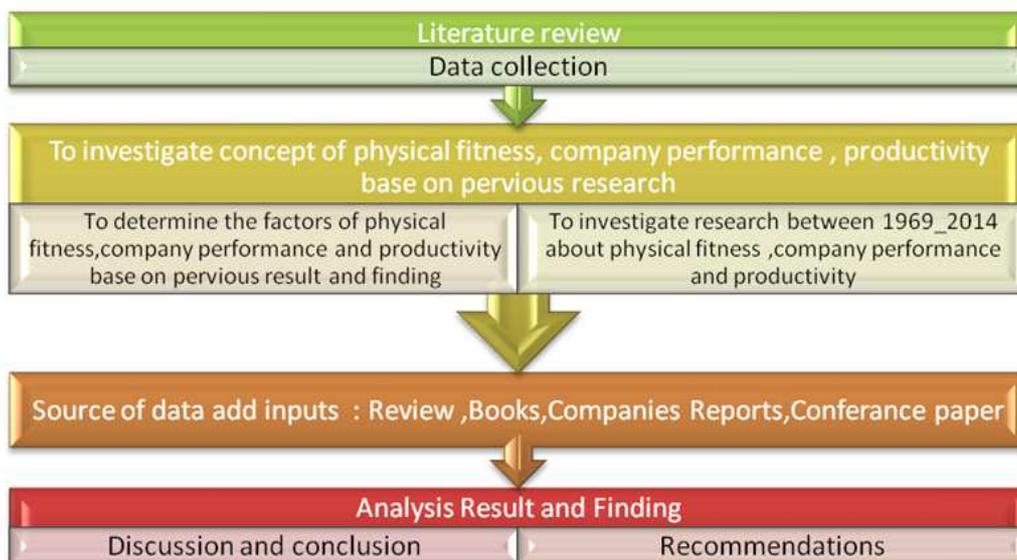


Fig. 1. Schematic illustration of secondary data

Table 1. Review of published papers since 1969 to 2015 base on authors, year and title of research

No	Authors	Years	Titles
1.	DeNelsky and McKee	1969	Perediction of job performance from assessment reports
2.	Der-Karabetian and Gebharbp	1986	Effect of Physical Fitness Program in the Workplace
3.	Frew and Brunning	1988	The effect of employees' participation in an exercise program on increasing job satisfaction and productivity
4.	Ganster and Schaubroek	1991	Work stress and employee health
5.	Shephard	1992	Benefits of worksite fitness programmes
6.	Lupinacci <i>et al.</i>	1993	Age and physical activity effects on reaction time and digit symbol substitution performance in cognitively active adults.
7.	Kerr and Vos	1993	Employee fitness programmes, absenteeism and general wellbeing. In Work and Stress
8.	Gomel <i>et al.</i>	1993	Worksite cardiovascular risk reduction: Randomised trial of health risk assessment, risk factor education, behavioral counselling and incentive strategies
9.	Biddle	1995	Exercise and psychosocial health
10.	Calfas <i>et al.</i>	1996	Promotion of physical activity and healthy diet through individual counselling at the workplace
11.	Falkenberg	1987	Employee fitness programs: Their impact on the employee and the organization
12.	Sallis <i>et al.</i>	1997	Assessment of Physical Activity
13.	Veitch <i>et al.</i>	1999	Physical activity promotion for male factory workers
14.	Shephard	1999	Do worksite exercise and health program
15.	Midha and Sullivan	1999	Conflicting rationales for promoting health in the workplace.
16.	Neck and Cooper	2000	The fit executive: Exercise and diet guidelines for enhancing performance.
17.	Jacobson and Aldana	2001	Relationship between frequency of aerobic activity and illness-related absenteeism in a large employee sample
18.	Trost <i>et al.</i>	2002	Correlates of adults' participation in physical activity
19.	Kahn <i>et al.</i>	2002	The effectiveness of interventions to increase physical activity
20.	Wattles and Harris	1997	The relationship between fitness levels and employee's perceived productivity job satisfaction and absenteeism.
21.	Pronk <i>et al.</i>	2004	The association between work performance and physical activity, cardiorespiratory fitness and obesity.
22.	Marshall	2004	The effectiveness of workplace physical activity interventions from 1997
23.	Katzmarzyk and Janssen	2004	Estimated the direct and the indirect economic costs of physical inactivity and obesity Canad
24.	Burton <i>et al.</i>	2005	The association of health status, worksite fitness center participation and two measures of productivity.
25.	Van den Heuvel <i>et al.</i>	2005	Effect of sporting activity on absenteeism in a working population.
26.	Ackland <i>et al.</i>	2005	Workplace Health and Physical Activity Program
27.	Bates	2006	Recreational Program and Its Association with Job Satisfaction
28.	Proper <i>et al.</i>	2003	Dose response relation between physical activity and sick leave
29.	Engbers <i>et al.</i>	2005	workplace environmental intervention to promote physical activity and a healthy diet
30.	Mills <i>et al.</i>	2007	The impact of a health promotion program on Employee Health Risks and Work Productivity
31.	Hlobil <i>et al.</i>	2007	Effectiveness and economic impact of worksite interventions to promote physical activity and healthy diet
32.	Grzywacz <i>et al.</i>	2007	The Effects of Workplace Flexibility on Health Behaviors: A Cross-Sectional and Longitudinal Analysis
33.	Lucove <i>et al.</i>	2007	Association between employee leisure-time physical activity and subsidized gym memberships
34.	Donaghy	2007	Exercise can seriously improve your mental health: Fact or Fiction?
35.	Beale <i>et al.</i>	2012	Workplace physical activity interventions
36.	Lovelace <i>et al.</i>	2007	Work stress and leadership development: The role of self-leadership, shared leadership, physical fitness and flow in managing demands and increasing job control
37.	Dugdill <i>et al.</i>	2008	Workplace physical activity interventions
38.	Parks and Steelman	2008	Organisational Wellness Programmes
39.	Cooper <i>et al.</i>	2008	Obesity reduction and its possible consequences
40.	Kumar <i>et al.</i>	2009	Operational impact of employee wellness programs a business case study
41.	Bingham	2009	Minding Our Bodies, Physical Activity for Mental Health
42.	Conn <i>et al.</i>	2009	Meta-Analysis of Workplace Physical Activity Interventions
43.	Burke <i>et al.</i>	2010	Group goal setting in a physical activity context
44.	Erickson <i>et al.</i>	2011	Exercise training increases size of hippocampus and improves memory
45.	Bennie <i>et al.</i>	2011	Associations between social ecological factors and self-reported short physical activity breaks during work hours among desk-based employees
46.	Greene	2011	Employee wellness proves its worth
47.	Tamers <i>et al.</i>	2011	The association between worksite social support, diet, physical activity and body mass index
48.	Crespo <i>et al.</i>	2011	Worksite Physical Activity Policies and Environments in Relation to Employee Physical activity
49.	Barr-Anderson <i>et al.</i>	2011	Integration of Short Bouts of Physical Activity into Organizational
50.	Mokaya andGitari	2012	Effects of Workplace Recreation on Employee Performance
51.	Bernaards <i>et al.</i>	2007	Occupational and Environmental Medicine
52.	Arvidson <i>et al.</i>	2013	The level of leisure time physical activity isassociated with work ability-a cross sectional andprospective study of health care workers
53.	Sliter and Yuan	2015	Workout at Work: Laboratory Test of Psychological andPerformance Outcomes of Active Workstations
54.	Pasricha <i>et al.</i>	2014	Iron Supplementation Benefits PhysicalPerformance in Women of Reproductive Age: A Systematic Review and Meta-Analysis
55.	Thompson	2015	Worldwide surveyof fitness trendsfor
56.	Lechner	2015	Sports, exercise and labor market outcomesIncreasing participation in sports and exercise can boost productivity and earnings
57.	Tomaskova <i>et al.</i>	2015	Health status and physical fitnessof mines rescue brigadesmen
58.	Rehman <i>et al.</i>	2015	Impact of km practices on firms'performance: A mediating roleof business process capability
59.	Pelletier <i>et al.</i>	2004	The relationship between health risks and work productivity
60.	Ayabar <i>et al.</i>	2015	Regression Model to Estimate Standard Time throughEnergy Consumption of Workers in Manual Assembly Linesunder Moderate Workload
61.	Buckley <i>et al.</i>	2015	The sedentary o-ce: Anexpert statement on thegrowing case for changetowards better health andproductivity

Pronk *et al.* (2004) examined the relationship between performance at work and physical activity together with two other elements recognized being related to physical fitness activities including obesity and cardio respiratory. Four variables including absenteeism, quality and quantity of performance at work and final performance were used to define work performance. The result of the 683 data collected from workers showed that physical activity had a positive effect on the quality and the overall performance at work. Moreover, a higher level of cardio respiratory fitness had a positive effect on the quantity of work performance and reduced applied effort to perform the work. Obesity was also found to be related to higher absenteeism (Pronk *et al.*, 2004). As such, cardio respiratory fitness and physical activity are related to presentism while obesity has a relationship with absenteeism. The relation between fitness physical activity and absenteeism was confirmed by a study by Jacobson and Aldana (2001). The aim of their study was to compare the frequency of self-reported exercise with illness-related absenteeism. The results revealed a significant relation between weekly exercise days and annual absenteeism with lower exercise rates being associated with higher rates of annual absenteeism. The association was specifically significant between no exercise at all (0 days per week) and 1 day per week of exercise compared to a higher exercise frequency rate (Jacobson and Aldana, 2001). Moreover, it appeared that non-exercisers were more likely to be absent for more than 7 days when compared to those exercising at least once per week. In a research conducted in Netherlands, data regarding absenteeism due to sickness over four years was gathered from 1228 employees of 21 Dutch firms. They also utilized data from two large Dutch cross-sectional data bases. The study investigated the relationship between sick leave and physical activity (Proper *et al.*, 2003) find out whether physical activity affected sickness absenteeism. The results of their study showed that moderate intensity physical activities are neither related to duration of sick leave nor its frequency (Proper *et al.*, 2003).

According to Shephard (1999), fitness promotes job performance. Commercial real estate stock brokers who participated in an aerobics training program (walking and/or running three times a week,

for 12 weeks) earned greater sales commissions during and after the training program than brokers who did not participate. Workers from a hospital equipment firm who participated in a similar aerobics training program (walking, running, swimming and bicycling four times a week, for 24 weeks), enjoyed greater productivity and job satisfaction than workers who did not participate in the fitness program. The result showed that participating in fitness programs creates greater sales and productivity and it causes job satisfaction among the workers. Among the variety of studies conducted by Bennie *et al.* (2011), a large cross-sectional study (n = 801) identified work environment as a key setting to promote breaks in sitting and found that employees meeting the daily physical activity recommendations reported taking more short breaks than those who did not meet the recommendations. The finding showed that employees who have daily physical activity, take less short breaks in comparison with those who did not do any physical activity. As a result, physical activity promotes breaks in sitting. In another study conducted by Grzywacz *et al.* (2007), cross-sectional and longitudinal health risk appraisal data were obtained from employees of a multinational company (n = 3193) and it was found that physical activity frequency was positively related to perceived flexibility of work hours in the cross-sectional analysis. The result showed that physical activity and work flexibility may contribute to positive lifestyle behaviors and may play an important role in effective workplace health promotion initiatives.

What are the studies from 1969 to 2015 on physical activity and company performance and productivity?

Table 2 shows how many studies have been carried out on physical activity and company performance and productivity from 1969 to 2015 and denotes the purpose, findings and criteria for these studies for understanding and comparing the findings.

### Policy Recommendation

The policy recommendations that can be applied from this study are based on the analysis of Table 2. The policy recommendations for this research are shown in Table 3.

Table 2. The studies of purposes, findings and criteria for published papers since 1969 to 2015.

No.	Author	Year	Title	Purpose	Findings	Criteria
1.	Mills <i>et al.</i>	2007	The impact of a health promotion program on Employee Health Risks and Work Productivity	The significance of physical fitness towards productivity and performance of the firm	findings indicate that applying a multi-component health promotion for the purpose of increasing the fitness level of participators would make distinct differences in productivity and health risks. As such, fitness program has positive effect on work performance and productivity.	significance of physical fitness productivity performance

2.	Burton <i>et al.</i>	2005	The association of health status, worksite fitness center participation and two measures of productivity.	Comparing individuals who officially registered and who did not registered in a fitness center of the firm on the productivity in the workplace	Those employees who enrolled in the fitness center of the company had higher productivity compared to those who did not participate in the fitness program of the company	comparison between employees who registered/do not register in a fitness center of the firm productivity
3.	Frew and Brunnin	1988	The effect of employees' participation in an exercise program on increasing job satisfaction and productivity	The effect of aerobic program for the sales of brokers who took part in or throughout of this program	The research on study showed that aerobic program has positive effect and increase sales in between brokers who took part in this program.	Aerobic program performance (increase sales)
4.	DeNelsky and McKee	1969	Use of a modified Q-sort technique to expand predictor and criterion variance.	Attempted to predict individual's job performance on the basis of an evaluation which involved fitness	The Sample of 32 government employees showed that 71% of employees have had high level in their job performance and 60% were below standard level because of participate in fitness.	Participate in fitness performance (high level in job performance)
5.	Van den Heuvel <i>et al.</i>	2005	Effect of sporting activity on absenteeism in a working population.	The impact of physical activities on absenteeism for the period of four years on 1228 workers of 21 Dutch firms	Physical activities based on result have a positive influence on absenteeism as individuals who participated in sports had fewer sick leaves of the work.	Physical activity performance (absenteeism)
6.	Pronk <i>et al.</i>	2004	The association between work performance and physical activity, cardiorespiratory fitness and obesity.	The relationship among performance at work and physical activity and recognized to be related with physical fitness activities including obesity and cardio respiratory.	The result of 683 data collected from workers showed that physical activity had positive effect on the quality of performance at work and higher level of cardio respiratory fitness had positive effect on quantity of work performance.	physical activity performance (positive effect on quality and quantity of work)
7.	Jacobson and Aldana	2001	Relationship between frequency of aerobic activity and illness related absenteeism in a large employee sample	Compare the frequency of self-reported exercise with illness-related absenteeism	The results revealed a significant relation between weekly exercise days and annual absenteeism with lower exercise rates being associated with higher rates of annual absenteeism duration.	Significant relation between weekly exercise performance (absenteeism)
8.	Proper <i>et al.</i>	2003	Dose response relation between physical activity and sick leave	Investigated the relationship between sick leave and physical activity	The findings of their study showed that moderate intensity physical activities is neither related to duration of sick leave nor the frequency of it	Physical activity performance (sick leave)
9.	Hlobil <i>et al.</i>	2007	Effectiveness and economic impact of worksite interventions to promote physical activity and healthy diet	Physical exercises, used based on operant conditioning behavioral principles.	The most significant results of the cost effectiveness analysis were the health care uses' costs throughout the first follow-up year and the cost of productivity loss throughout the second together with the third follow-up year.	physical exercises productivity
10.	Neck and Cooper	2000	The fit executive: Exercise and diet guidelines for enhancing performance.	There is a relationship between work productivity and individual's fitness.	The result of this study was fitness has positive effect on higher productivity.	Fitness productivity
11.	Lupinacci <i>et al.</i>	1993	Age and physical activity effects on reaction time and digit symbol substitution performance in cognitively active adults.	The relationship between fitness and mental performance, especially for individuals within the age ranges of many executives.	The findings showed that physical activity has significant influence on mental performance. Information processing in active people is faster than inactive people.	Physical activity performance
12.	Shephard	1999	Do worksite exercise and health program?	Fitness promotes job performance.	The result showed that fitness program make greater sales and productivity and it makes job satisfaction in workers. <sup>^</sup>	Fitness program performance productivity
13.	Bennie <i>et al.</i>	2011	Associations between social ecological factors and short physical activity breaks during work hours among desk-based employees	Physical activity promote breaks sitting	The finding showed that employees who have daily physical activity, they take less short breaks in comparison with those who did not do.	Physical activity performance (promote breaks sitting)
14.	Grzywacz <i>et al.</i>	2007	The effects of workplace flexibility on health behaviors: A cross-Sectional and longitudinal analysis	Investigate physical activity frequency was positively related to perceived flexibility of work hours	The result showed that, physical activity andwork flexibility may play an important role in effective workplace health promotion initiatives.	physical activity performance
15.	Beale <i>et al.</i>	2012	Workplace physical activity interventions	The economic impact of workplace interventions which aim to increase employees' physical activity levels.	Research reporting the physical activity has economic benefit in workplace.	Physical activity productivity
16.	Shephard	1992	Benefits of worksite fitness programmes	Look critically at appropriate techniques for the economic analysis of worksite fitness and lifestyle programmes	programme afitness and lifestyle programme showed that an increase in productivity in the experimental company and reduce absenteeism.	Fitness programme productivity performance

17.	Wattles and Harris	1997	The relationship between fitness levels and employee's perceived productivity job satisfaction and absenteeism.	The purpose of this study was to examine the relationship between various components of health-related fitness and employees perceived productivity, job satisfaction and absenteeism.	Studies showed that fitness has a direct effect on the work performance.	Fitness performance productivity
18.	Pelletier <i>et al.</i>	2004	The relationship between health risk and work productivity	Examined the relationship between changes in various health risks and changes in work productivity	calculated that health program reduce absenteeism, improve presenteeism and increase productivity.	Performance productivity
19.	Katzmarzyk and Janssen	2004	Estimated the direct and the indirect economic costs of physical inactivity and obesity in Canada	Investigate indirect costs included the value of economic output lost because of illness, injury-related work disability, or premature death	The result showed that the physical inactivity has negative effect on economic (spend money for obesity)	Performance productivity
20.	Dugdill <i>et al.</i>	2008	Workplace physical activity interventions	The effectiveness of workplace physical activity interventions	Positive effect of physical activity on workplace	Physical activity company
21.	Calfas <i>et al.</i>	1996	Promotion of physical activity and healthy diet through individual counselling at the workplace	Intensity physical activity through advice from primary care physicians.	The result showed that physical activity has positive effect on Employee performance	Physical activity performance
22.	Engbers <i>et al.</i>	2005	workplace environmental intervention to promote physical activity and a healthy diet	Evaluate the effect of such an intervention, physical activity and health diet in workplace	Studies showed that changing environment at short time and more physical activity has positive effect on work place and employee	Physical activity
23.	Der-Karabetian <i>et al.</i>	1986	Effect of Physical Fitness Program in the Workplace	Investigate job satisfaction, body image and sick days for those who exercised and those who did not.	Suggested that every company should focus on employee fitness since it reduces absenteeism and increase the employees productivity.	Physical fitness performance
24.	Barr-Anderson <i>et al.</i>	2011	Integration of Short bouts of physical activity	Evaluate work performance related to physical activity	Increase in work performance after increased physical activity	Physical activity performance
25.	Crespo <i>et al.</i>	2011	Worksite physical activity policies and environments in relation to employee physical activity	An association between being physically active and improvements in psychological/cognitive factors	Suggested that, in general, higher levels of physical fitness can reduce the likelihood	Physical fitness
26.	Trost <i>et al.</i>	2002	Correlates of adults' participation in physical activity	Investigate Perceived self-efficacy (one's belief in their ability to succeed) and consistent associations with physical activity behavior	Studies show that physical activity in the workplace increased employee self-esteem, goal setting and self-efficacy	Physical activity performance
27.	Conn <i>et al.</i>	2009	Meta-analysis of workplace physical activity interventions	Evaluate workplace physical activity opportunities and job satisfaction	The result showed that stress was significantly lower and and job satisfaction increase after physical activity	Physical activity performance
28.	Ackland <i>et al.</i>	2005	Workplace health and physical activity program	Investigate workplace health and physical activity programs improved the work environment	The study showed that physical activity increased job satisfaction, greater commitment of employees and reduced job stress	Physical activity performance
29.	Donaghy	2007	Exercise can seriously improve your mental health: Fact or Fiction?	Evaluate the effect of exercise to protects against depression	Concluded that exercise not only protects against depression	Physical activity performance
30.	Searle <i>et al.</i>	2011	Patients' views of physical activity as treatment for depression	Investigate physical activity for treatment depression	The result showed that physical activity to be an acceptable treatment for depression	Physical activity
31.	Bingham	2009	Minding Our Bodies, Physical Activity for Mental Health	A direct relation between physical activity and psychological well-being	Aerobic exercise leads to a small to moderate decrease in tension, depression, fatigue and confusion	Physical activity
32.	Tamers <i>et al.</i>	2011	The association between worksite social support, diet, physical activity and body mass index	Evaluate association between physical activity and employee psychosocial health	The studies showed that physical activity has positive effect on employee health	Physical activity performance
33.	Kahn <i>et al.</i>	2002	The effectiveness of interventions to increase physical activity	Investigate staff participation in workplace health (physical activity)	Increased physical activity levels can increase individual employee self-confidence	Physical activity performance (higher self confidence)
34.	Lucove <i>et al.</i>	2007	association between employee leisure-time physical activity and subsidized gym memberships	Association between employee leisure-time physical activity and subsidized gym memberships	Positive effect on employee physical activity and reduce barriers to physical activity such as cost.	Physical activity

35.	Bernaards <i>et al.</i>	2007	Occupational and Environmental Medicine	Evaluate physical activity, fitness and affect work productivity and absence	The study showed that the amount of physical activity and fitness did not have an effect on work performance	Physical activity (negative) performance
36.	Erickson <i>et al.</i>	2011	Exercise training increases size of hippocampus and improves memory	Physical fitness and can reduce the likelihood of developing cognitive impairments in employee	The study showed that physical fitness has positive effect on employee	Physical fitness performance
37.	Conn <i>et al.</i>	2009	Meta-analysis of workplace physical activity Interventions.	Investigate workplace health promotion programs with health and physical activity	The study showed that Significant positive effects for physical activity behaviour, fitness, work attendance and job stress.	physical activity and fitness performance
38.	Falkenberg	1987	Employee fitness programs	Evaluate the premise that employee fitness programmes were attractive to employees	Study showed that physical fitness programmes had a significant positive impact on employee productivity and performance.	Physical fitness productivity
39.	Kerr and Vos	1993	Employee fitness programmes, absenteeism and general wellbeing. In work and stress	Investigate the implementation of fitness programmes to improve employee well-being and reduce absenteeism.	The results of their study showed that physical fitness reduced absenteeism rates and improved the general well-being of employees	Physical fitness performance
40.	Bates	2006	Companies make great gains with employee wellness programme	Evaluate the positive effect of social and physical recreation programmes on employee health	The study showed that physical programmes reduced health care costs for employers by reducing sick leave, health costs	Physical program performance
41.	Mokaya and Gitari	2012	Effects of workplace recreation on employee performance	Investigate physical fitness programs had an effect on the performance and health of employee	The result showed that the positive effect of physical fitness programmes on the performance, work quality, morale and efficiency of employees in the workplace.	Physical fitness performance
42.	Parks and Steelman	2008	Organisational Wellness Programmes	Evaluate participation in employee fitness programs in job satisfaction	The result showed that participation in employee fitness programs Increased job satisfaction.	Fitness program performance
43.	Midha and Sullivan	1999	Conflicting rationales for promoting health in the workplace.	Investigate Physical Activity in the Workplace	The study showed that physical activity on workplace has positive effect	Physical activity
44.	Gomel <i>et al.</i>	1993	Randomised trial of health risk assessment, risk factor education, behavioral counselling and incentive strategies.	Workplace physical activity promotion	Physical activity in workplace can increase participation	Physical activity performance
45.	Veitch <i>et al.</i>	1999	Physical activity promotion for male factory workers	Investigations possibility of increasing physical activity opportunities for less-skilled working male	The result showed that Physical activity increase opportunities for less-skilled working	Physical activity performance
46.	Sallis <i>et al.</i>	1997	Assessment of Physical Activity	Evaluate policy and environmental interventions show for increasing physical activity levels have an impact on all employees	The study showed that increasing physical activity has positive impact on employee	Physical activity
47.	Janet <i>et al.</i>	2002	The state of evidence for measures for increasing the employees physical activity	Investigate measures for increasing the employees 'physical activity	The result showed that increasing physical activity has effectiveness outcomes such as muscle flexibility, body weight as well as general health on employees	Physical activity
48.	Marshall	2004	The effectiveness of workplace physical activity interventions from 1997	Investigate the effectiveness of workplace physical activity interventions	The result showed that physical activity has positive effect on outcomes.	Physical activity productivity
49.	Ganster and Schaubroek	1991	Work stress and employee health	Evaluate reduced employee stress and less absenteeism by those who participate frequently in a corporate fitness program	The study showed that participate in fitness program can reduce stress and absenteeism	Fitness program performance
50.	Burke <i>et al.</i>	2010	Group goal setting in a physical activity context	Evaluate relationship between physical activity and outcomes	The positive relationship between physical activity and outcomes	Physical activity productivity
51.	Biddle	1995	Exercise and psychosocial health	Evaluate exercise effects on s measures of anxiety, depression, mood and self-esteem.	The result showed that exercise has positive effect on functioning and "prosocial" behaviours, such as networking.	Physical exercise performance
52.	Greene	2011	Employee wellness proves its worth	Investigate relationship between organization and employee health	The result showed that physical activity prevent of absenteeism and increase turnover	Physical activity performance
53.	Kumar <i>et al.</i>	2009	Operational impact of employee wellness programs a business case study	Evaluate organizational wellness programs	Physical activity and wellness program increase productivity	Physical activity productivity

54. Lovelace <i>et al.</i>	2007	Work stress and leadership development	Investigate physical fitness in job	Fitness supports healthful regeneration and increased engagement and is vital to a leader's ability to manage work stress	Fitness performance
55. Arvidson <i>et al.</i>	2013	The level of leisure time physical activity is associated with work ability-a cross sectional and prospective study of health care workers	Peruse physical activity, work ability and health care workers	Physical activity increases work ability and health between employee	Physical activity performance
56. Sliter and Yuan	2015	Workout at Work: Laboratory Test of Psychological and Performance Outcomes of Active Workstations	Study physical activity and psychologic and performance outcomes	The result showed that activity in workplace has positive effect on functioning and behaviours.	Physical activity performance
57. Avner <i>et al.</i>	2014	Treadmill Workstations: The Effects of Walking while Working on Physical Activity and Work Performance	Inspect physical activity and work performance	The positive relationship between physical activity and work performance	Physical activity Work performance
58. Thompson	2015	Worldwide survey of fitness trends for 2015	Study fitness	The result showed that fitness has positive effect on functioning	Fitness
59. Lechner	2015	Sports, exercise, labor market, Outcomes Increasing participation in sports and exercise can boost productivity and earnings	Peruse exercise and effects on outcomes and productivity	The study showed that increasing physical activity has positive impact on outcomes and productivity	Physical activity Outcomes productivity
60. Ayabar <i>et al.</i>	2015	Regression Model to Estimate Standard Time through Energy Consumption of Workers in Manual Assembly Lines under Moderate Workload	Evaluate model to estimate energy of workers	The result showed that physical activity has positive effect in worker	Physical activity work performance
61. Buckley <i>et al.</i>	2015	The sedentary office: An expert statement on the growing case for change towards better health and productivity	Investigate fitness activity to improving health and productivity	The result showed that fitness has positive effect on health	Fitness and productivity

Table 3. The policy recommendations from researchers and authors study

Author/researcher	Years	Recommendation for the importance of physical fitness to company performance and productivity
Ackland <i>et al.</i>	2005	Organizations should document a corporate policy that relates specifically to employee health and physical activity and that the support of management will be essential to the success of such a policy.
Pronk and Kottke	2009	policies that encourage or reward active commuting to work or the introduction of complete streets policies that ensure streets are designed and operated to enable safe access for all pedestrians, bicyclists, motorists and transit riders.
Phipps <i>et al.</i>	2010	Organizations interested in implementing workplace policies to increase opportunities for physical activity can benefit from understanding what personal, environmental and organizational factors may impact employee interest and willingness to participate in physical activity
Lucove <i>et al.</i>	2007	Introducing a workplace policy to provide employees with subsidized fitness counseling or gym/recreation memberships may be an effective way to increase and support employee physical activity and reduce barriers to physical activity such as cost.
Crespo <i>et al.</i>	2011	The more environmental and policy factors present in a workplace, the more total and recreational physical activity was reported by employees both at work and outside of work.

## Results and Discussion

As mentioned above, this study focused on three objectives. Two objectives are discussed and concluded as follows:

To illustrate the effects of physical fitness on company performance and productivity. The importance of physical fitness, physical fitness at work, company's performance and productivity was discussed in the literature review. According to the findings, five factors demonstrate the effect of physical fitness on company performance and productivity. The factors include job satisfaction and commitment; cognition and memory; self-confidence/self-efficacy; decreased weight/increased physical activity level; and psychosocial well-being and stress. Table 4 shows the results of the findings from the literature review.

There are five factors show the effect of physical fitness on company performance and productivity as discussed in objective one.

### *Job Satisfaction/Commitment*

All of the reviews which have been done systematically demonstrate that the initiatives of health promotion in the workplace attempt to improve fitness and physical activity which might result in more employee commitment and finally improve job satisfaction (Barr-Anderson *et al.*, 2011). Based on the achieved outcomes, implementing both activities of physical fitness and health programs will improve work context in many different ways such as increasing job satisfaction, more employee commitment and less job stress of employees (Ackland *et al.*, 2005).

Table 4. Results of physical activity for performance and productivity that find from literature review

Physical activity	Performance	Productivity		
	Positive	Negative	Higher	Lower
Yes	57	35	13	
No	3		2	1

### Cognition and Memory

One of the current cross-sectional researches demonstrates that there is a relationship between being active physically and improvement in both cognitive and psychological factors. Literature review revealed that generally, more physical activity and physical fitness will decrease the chances of cognitive impairments from occurring (Erickson and Kramer, 2009). In addition, short bouts of physical activity practices during work increased accuracy and the speed of data entry (Barr-Anderson *et al.* 2011). Some studies revealed that even physical activities in moderate levels can minimize cognitive declines and could be used as a method of treatment for reversing the already existing cognitive deficits in older adults as well (Hertzog *et al.*, 2009).

### Self-Confidence/Self-Efficacy

The systematic literature review demonstrated that initiatives of physical activities at the workplace might increase self-confidence among employees (Anderson *et al.*, 2009). Besides, other systematic studies showed that participation of employees in health initiatives at the workplace could establish social capital by developing a higher cohesion sense as well as a collective self-efficacy of staffs (Kahn *et al.*, 2002). The concept of social capital includes the processes among people that build norms, networks and trust and facilitates cooperation with mutual benefits (WHO, 1998). Therefore, more physical activity and higher fitness levels can enhance the self-confidence of employees that can finally result in a unified work culture.

### Decreased Weight/Increased Physical Activity Level

Based on previously conducted studies, initiatives of health promotion at the workplace attempt to increase nutrition and physical activity, also, it was revealed that fitness could decrease body weight and body fat of employees effectively (van Dongen *et al.*, 2011). In addition, Anderson *et al.* (2009) showed that because of health promotion programs at the workplace, some modest weight loss has been reported as well with the objective of improving physical activity and nutrition. The other review identified that overall, physical activity could be increased by workplace

intervention among all the participants in all the relevant investigations. In such studies, physical activity was evaluated and it was found that there are modest improvements in the level of physical fitness activity (Barr-Anderson *et al.*, 2011).

### Psychosocial Well-Being and Stress

Literature review demonstrated that 27% of individuals who have depression have serious issues in both the home and work life and within 3 months, they will lose an average of 4.8 working days and suffer 11.5 reduced productivity days (CDC, 2011). Some studies revealed that physical activity is related to a minimized risk of developing clinical depression (Bingham, 2009). Such conclusions are supported by a review in 2007, which revealed that exercise protects people against depression and it is an adjunctive and effective intervention to treat depression from mild to moderate levels (Donaghy, 2007).

To investigate the importance of physical fitness to company performance and productivity Based on previous studies, the necessity of physical fitness to productivity and company performance can be investigated based on increased job performance and productivity, return on investment/cost effectiveness, decrease in presentism/absenteeism, sick leave, turnover, compensation of workers and disability.

### Productivity and Job Performance

It was concluded that work performance could increase as a result of increased fitness and physical activity after short bouts of physical activity were introduced within the work context. In addition it was revealed that work ability could be improved if we consider some exercise breaks and as a result significant improvements could be observed in both work productivity and cognitive performance. It can be achieved if we introduce physical activity as a daily routine at the workplace (Barr-Anderson *et al.*, 2011). Hutchinson and Wilson (2011) conducted a meta-analysis and they concluded that the workplace could be a suitable setting to initiate modest modifications in fitness and physical activity of employees. Thus, improved health conditions and successful interventions of physical activity might result in improved productivity.

### *Turnover, Disability, Worker's Compensation and Sick Leave*

Other advantages of improved physical fitness activities of employees are decreased obesity, less compensation cost of workers, sick leave, associated costs and short run disability rates (Ackland *et al.*, 2005). One of the recent studies revealed that initiatives of health promotion at the workplace to improve physical activity might result in more financial advantages for organizations by means of turnover reduction (van Dongen *et al.*, 2011). Moreover, Christie *et al.* (2010) explained that obesity could predict sick leave in the long term so less obesity by means of more physical activity can minimize sick leave. Pronk and Kottke (2009) stated that vigorous physical activity positively impacts sick leave. Besides Hutchinson and Wilson (2011) mentioned that improved health of employees leads to successful interventions of physical activity and it can finally results in decreased sick leave rates.

### *Cost Effectiveness/Return on Investment*

When we consider costs of sick leave, absenteeism, injuries, disability and health care, it is obvious that physical inactivity as well as its influence on obesity of employees can be a critical driver of costs in the work context (Anderson *et al.*, 2009). One of the mixed-method researches demonstrated that implementing physical activity, workplace health and fitness initiatives has many economic benefits for the organization such as cost improvements to benefit ratio (Ackland *et al.*, 2005). Another research demonstrated that there is \$1.59 USD for each single invested dollar in physical activity programs in workplace and cost effectiveness in three separate studies varied from \$1.44 to \$4.16 USD, for each pound of body weight loss (Anderson *et al.*, 2009).

### *Absenteeism and Presentism*

Presentism concept refers to being present at work regardless of weak health level and thus performing below par (Brown *et al.*, 2011). It is considered a new concept, which tries to quantify how current health conditions of employees can limit their work performance and it has a negative impact on organizational productivity as well (Ackland *et al.*, 2005). One of the current investigations demonstrated that losses for presentism in workplace were from 1.9 to 5.1 times higher than the incurred costs from absenteeism and the fact that related costs to presentism were more than those direct costs of health in many cases because of the decline in productivity (Brown *et al.*, 2011). In addition, positive associations in literature revealed that initiatives of physical activity in workplace could be a valid tool to help minimize both presentism and absenteeism.

### *Some Intangible Advantages*

Comprehensive study of previous investigations demonstrated that implementing physical activity initiatives and workplace health programs could lead to improved outcomes of human resource and in developing a positive corporate image. Such results can empower total performance in the workplace such as improved motivation, more loyalty and enhanced employee morale, better recruitment, good working atmosphere, improved teamwork and communication and finally retention of qualified employees. In general, relevant studies explain that staffs can benefit in different ways by creating opportunities for activities of physical fitness at the workplace (Ackland *et al.*, 2005).

### **Conclusion**

Achieved outcomes from the reviews revealed that physical activity levels could be positively impacted by fitness and productivity programs at the workplace. Moreover, this research review showed that, there is a direct relationship between work productivity and fitness. Some researchers measured improved job satisfaction and productivity through enrollment in exercise program by employees. Brokers of commercial real estate stock who participated in an aerobics program for a total of 12 weeks achieved higher sales levels compared to the non-participating brokers after or during the 12 weeks of aerobic programs. Moreover, Research showed that, employees who participated in physical activity programs have more self-confidence and concentration in their job in comparison to other employees. Workers are under pressure in the workplace and physical activity can reduce stress and depression among them. According to researches, physical activity in the workplace increases employees' health and efficiency and reduces the cost of treating employees. Introducing a workplace policy to provide employees with subsidized fitness counseling or gym/recreation memberships may be an effective way to increase and support employee physical activity and to reduce barriers to physical activity such as cost.

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## Author's Contributions

**Maryam Etemadi:** Led the study, collected the data and did all the analysis. He also produced the manuscript in its original form and revised it into its final form.

**Kamyar Shameli and Norihan Abu Hassan:** Participated in research design.

**Nurul Bahiyah Binti Ahmad Khairudin and Hirofumi Hara:** Reviewed the draft manuscript and provided suggestions to improve it.

**Kamyar Shameli and Zuriati Zakaria:** Reviewed the draft manuscript. In charge of publication correspondence.

## Ethics

This article is original and contains unpublished materials. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues involved.

## References

- Ackland, T., R. Braham, V. Bussau, K. Smith and J.R. Grove *et al.*, 2005. Workplace health and physical activity program review. Department of Sport and Recreation, Western Australian Government, Western Australia.
- Arvidson, E., M. Börjesson, G. Ahlborg, A. Lindegård and I.H. Jonsdottir, 2013. The level of leisure time physical activity is associated with work ability—a cross sectional and prospective study of health care workers. *BMC Public Health*, 13: 855-855. DOI: 10.1186/1471-2458-13-855
- Avner, B.N., D.J. Hamann, G. Koepf and C.U. Manohar *et al.*, 2014. Treadmill workstations: the effects of walking while working on physical activity and work performance. *PLoS One*, 9: e88620-e88620. DOI: 10.1371/journal.pone.0088620
- Ayabar, A., J. De la Riva, J. Sanchez and C. Balderrama, 2015. Regression model to estimate standard time through energy consumption of workers in manual assembly lines under moderate workload. *J. Ind. Eng.* DOI: 10.1155/2015/382673.
- Anderson, L.M., T.A. Quinn, K. Glanz and G. Ramirez *et al.*, 2009. The effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity: A systematic review. *Am. J. Prev. Med.* 37: 340-357. DOI: 10.1016/j.amepre.2009.07.003
- Barr-Anderson, D.J., M. AuYoung, M.C. Whitt-Glover, B.A. Glenn and A.K. Yancey, 2011. Integration of short bouts of physical activity into organizational routine: A systematic review of the literature. *Am. J. Preventive Med.*, 40: 76-93. DOI: 10.1016/j.amepre.2010.09.033
- Beale, S.J., M.W. Bending, P. Trueman and B. Naidoo, 2012. Should we invest in environmental interventions to encourage physical activity in England? An economic appraisal. *Eur. J. Public Health*, 151: 869-873. DOI: 10.1093/eurpub/ckr151
- Bennie, J.A., A.F. Timperio, D.A. Crawford, D.W. Dunstan and J.L. Salmon, 2011. Associations between social ecological factors and self-reported short physical activity breaks during work hours among desk-based employees. *Preventive Med.*, 53: 44-47. DOI: 10.1016/j.ypmed.2011.05.015
- Bingham, P., 2009. Minding our bodies-physical activity for mental health. *Literature Rev.* DOI: 10.1002/14651858.
- Buckley, J.P., A. Hedge, T. Yates, R.J. Copeland and M. Loosemore *et al.*, 2015. The sedentary office: a growing case for change towards better health and productivity. Expert statement commissioned by Public Health England and the Active Working Community Interest Company. *B. J. Sports. Med.* DOI: 10.1136/bjsports-2015-094618
- Bernaards, C.M, K.I. Proper and V.H. Hildebrandt, 2007. Physical activity, cardiorespiratory fitness and body mass index in relationship to work productivity and sickness absence in computer workers with preexisting neck and upper limb symptoms. *J. Occupat. Environ. Med.*, 49: 633-640. DOI: 10.1097/JOM.0b013e318058202c
- Biddle, S., 1995. Exercise and psychosocial health. *Res. Q. Exercise Sport*, 66: 292-297. DOI: 10.1080/02701367.1995.10607914
- Bates, J., 2006. Companies make great gains with employee wellness programs. *Wellness Program.* DOI: 10.5539/ass.v8n13p172
- Burke, S.M., K.M. Shapcott, A.V. Carron, M.H. Bradshaw and P.A. Estabrooks, 2010. Group goal setting and group performance in a physical activity context. *Int. J. Sport Exercise Psychol.*, 8: 245-261. DOI: 10.1080/1612197X.2010.9671952
- Burton, W.N., K.T. McCalister, C.Y. Chen and D.W. Edington, 2005. The association of health status, worksite fitness center participation and two measures of productivity. *J. Occupat. Environ. Med.*, 47: 343-351. DOI: 10.1097/01.jom.0000158719.57957.c6
- Brown, H.E., N.D Gilson, N.W Burton and W.J. Brown, 2011. Does physical activity impact on presenteeism and other indicators of workplace well-being? *Sports Med.* 41: 249-262. DOI: 10.2165/11539180-000000000-00000
- Calfas, K.J., B.J. Long, J.F. Sallis, W.J. Wooten and M. Pratt *et al.*, 1996. A controlled trial of physician counseling to promote the adoption of physical activity. *Preventive Med.*, 25: 225-233. DOI: 10.1006/pmed.1996.0050

- Cooper, R.S., M. Franco and P. Orduñez, 2008. Obesity reduction and its possible consequences: What can we learn from Cuba's Special Period? *Can. Med. Assoc. J.*, 178: 1032-1034. DOI: 10.1503/cmaj.071677
- Conn, V.S., A.R. Hafdahl, P.S. Cooper, L.M. Brown and S.L. Lusk, 2009. Meta-analysis of workplace physical activity interventions. *Am. J. Preventive Med.*, 37: 330-339. DOI: 10.1016/j.amepre.2009.06.008
- Corti, L. and P. Thompson, 1998. Are you sitting on your qualitative data? Qualidata's mission. *Int. J. Soc. Res. Methodol.*, 1: 85-89. DOI: 10.1080/13645579.1998.10846865
- Corti, L., J. Foster and P. Thompson, 1995. Archiving qualitative research data. *Soc. Res. Update*, 10: 1-6.
- Crespo, N.C., J.F. Sallis, T.L. Conway, B.E. Saelens and L.D. Frank, 2011. Worksite physical activity policies and environments in relation to employee physical activity. *Am. J. Health Promot.*, 25: 264-271. DOI: 10.4278/ajhp.081112-QUAN-280
- CDC, 2011. Workplace health promotion: Physical activity. Centers for Disease Control and Prevention.
- Christie, J., P. O'Halloran, W. Caan, C.R. Cardwell and T. Young *et al.*, 2010. Workplacebased organisational interventions to prevent and control obesity by improving dietary intake and/or increasing physical activity. *Cochrane Database Syst. Rev.* DOI: 10.1002/14651858.CD008546.
- DeNelsky, G.Y. and M.G. McKee, 1969. Prediction of job performance from assessment reports: Use of a modified Q-sort technique to expand predictor and criterion variance. *J. Applied Psychol.*, 53: 439-445. DOI: 10.1037/h0028654
- Der-Karabetian, A. and N. Gebharbp, 1986. Effect of physical fitness program in the workplace. *J. Bus. Psychol.*, 1: 51-58. DOI: 10.1007/BF01014166
- Donaghy, M.E., 2007. Exercise can seriously improve your mental health: Fact or fiction? *Adv. Physiotherapy*, 9: 76-88. DOI: 10.1080/14038190701395838
- Dugdill, L., A. Brettle, C. Hulme, S. McCluskey and A.F. Long, 2008. Workplace physical activity interventions: A systematic review. *Int. J. Workplace Health Manage.*, 1: 20-40. DOI: 10.1108/17538350810865578
- Dursi, M., 2008. Can health promotion programs effectively reduce health care costs, increase productivity and retain qualified employees? University of Rhode Island.
- Erickson, K.I. and A. F. Kramer, 2009. Aerobic exercises effects on cognitive and neural plasticity in older adults. *B. J. Sports Med.* 43: 22-24. DOI: 10.1136/bjism.2008.052498
- Engbers, L.H., M.N. van Poppel, A. Chin, M.J. Paw and W. van Mechelen, 2005. Worksite health promotion programs with environmental changes: A systematic review. *Am. J. Prev. Med.*, 29: 61-70. DOI: 10.1016/j.amepre.2005.03.001
- Erickson, K.I., M.W. Voss, R.S. Prakash, C. Basak and A. Szabo *et al.*, 2011. Exercise training increases size of hippocampus and improves memory. *Proc. Nat. Acad. Sci.*, 108: 3017-3022. DOI: 10.1073/pnas.1015950108
- Falkenberg, L.E., 1987. Employee fitness programs: Their impact on the employee and the organization. *Acad. Manage. Rev.*, 12: 511-522. DOI: 10.5465/AMR.1987.4306566
- Frew, D.R. and N.S. Bruning, 1988. *Phys. Sports Med.*, 27: 48-72.
- Ganster, D.C. and J. Schaubroeck, 1991. Work stress and employee health. *J. Manage.*, 17: 235-271. DOI: 10.1177/014920639101700202
- Gibbs, P. and S. Cartwright, 2010. Steps to health: An evaluation of the impact of participating in the global corporate challenge: A report prepared for Global Corporate Challenge. Centre for Organisational Health and Well-Being.
- Gomel, M., B. Oldenburg, J.M. Simpson and N. Owen, 1993. Work-site cardiovascular risk reduction: A randomized trial of health risk assessment, education, counseling and incentives. *Am. J. Public Health*, 83: 1231-1238. DOI: 10.2105/AJPH.83.9.1231
- Greene, J., 2011. Employee wellness proves its worth. *Hospitals Health Netw.*, 85: 41-44. PMID: 21488554
- Grzywacz, J.G., P.R. Casey and F.A. Jones, 2007. The effects of workplace flexibility on health behaviors: A cross-sectional and longitudinal analysis. *J. Occupat. Environ. Med.*, 49: 1302-1309. DOI: 10.1097/JOM.0b013e31815ae9bc
- Hammersley, M. and R. Gomm, 1997. A response to Romm. *Sociological Research Online* 2:
- Hlobil, H., K. Uegaki, B.J. Staal, M.C. de Bruyne and T. Smid *et al.*, 2006. Substantial sick-leave costs savings due to a graded activity intervention for workers with non-specific sub-acute low back pain. *Eur. Spine J.*, 16: 919-24. DOI: 10.1007/s00586-006-0283-9
- Hertzog, C., A.F. Kramer, R.S. Wilson and U. Lindenberger, 2009. Fit body, fit mind? *Sci. Am. Mind.*, 20: 32-39. DOI: 10.1038/scientificamericansecrets0315-40
- Hutchinson, A.D. and C. Wilson, 2011. Improving nutrition and physical activity in the workplace: A meta-analysis of intervention studies. *Health Promot Int.* DOI: 10.1093/heapro/dar035
- Jacobson, B.H. and S.G. Aldana, 2001. Relationship between frequency of aerobic activity and illness-related absenteeism in a large employee sample. *J. Occupat. Environ. Med.*, 43: 1019-1025. DOI: 10.1097/00043764-200112000-00004

- Kahn, E.B., L.T. Ramsey, R.C. Brownson, G.W. Heath and E.H. Howze *et al.*, 2002. The effectiveness of interventions to increase physical activity: A systematic review. *Am. J. Preventive Med.*, 22: 73-107. PMID: 11985936
- Katzmarzyk, P.T. and I. Janssen, 2004. The economic costs associated with physical inactivity and obesity in Canada: An update. *Canad. J. Applied Physiol.*, 29: 90-115. DOI: 10.1139/h04-008
- Kelly, F., 2000. Guidelines on improving the physical fitness of employees. WHO Regional Office for Europe.
- Kerr, J.H. and M.C. Vos, 1993. Employee fitness programmes, absenteeism and general well-being. *Work Stress*, 7: 179-190. DOI: 10.1080/02678379308257059
- Kumar, S., M. McCalla and E. Lybeck, 2009. Operational impact of employee wellness programs: A business case study. *Int. J. Product. Performance Manage.*, 58: 581-597. DOI: 10.1108/17410400910977109
- Lechner, M., 2015. Sports, exercise and labor market outcomes increasing participation in sports and exercise can boost productivity and earnings.
- Lovelace, K.J., C.C. Manz and J.C. Alves, 2007. Work stress and leadership development: The role of self-leadership, Shared leadership, physical fitness and flow in managing demands and increasing job control. *Human Resource Manage. Rev.*, 17: 374-387. DOI: 10.1016/j.hrmr.2007.08.001
- Lucove, J.C., S.L. Huston and K.R. Evenson, 2007. Workers' perceptions about worksite policies and environments and their association with leisure-time physical activity. *Am. J. Health Promot.*, 23: 196-200. DOI: 10.4278/0890-1171-21.3.196
- Lupinacci, N.S., R.E. Rikli, C.J. Jones and D. Ross, 1993. Age and physical activity effects on reaction time and digit symbol substitution performance in cognitively active adults. *Res. Q. Exercise Sport*, 64: 144-150. DOI: 10.1080/02701367.1993.10608791
- Marshall, A.L., 2004. Challenges and opportunities for promoting physical activity in the workplace. *J. Sci. Med. Sport*, 7: 60-66. DOI: 10.1016/S1440-2440(04)80279-2
- McGlone, J., I. Valdivia, M. Penner, J. Williams and R.M. Sadler *et al.*, 2008. Quality of life and memory after vagus nerve stimulator implantation for epilepsy. *Canad. J. Neurol. Sci.*, 35: 287-296. DOI: 10.1017/S0317167100008854
- Midha, A. and M. Sullivan, 1999. Conflicting rationales for promoting health in the workplace. *Critical Public Health*, 9: 223-232. DOI: 10.1080/09581599908402934
- Mills, P.R., R.C. Kessler, J. Cooper and S. Sullivan, 2007. Impact of a health promotion program on employee health risks and work productivity. *Am. J. Health Promot.*, 22: 45-53. DOI: 10.4278/0890-1171-22.1.45
- Mokaya, S.O. and J.W. Gitari, 2012. Effects of workplace recreation on employee performance the case of Kenya Utalii College. *Int. J. Humanities Soc. Sci.*, 2: 176-183.
- Neck, C.P. and K.H. Cooper, 2000. The fit executive: Exercise and diet guidelines for enhancing performance. *Acad. Manage. Executive*, 14: 72-83. DOI: 10.5465/AME.2000.3819307
- Orodho, A.J. and D.K. Kombo, 2002. Research methods. Kenyatta University, Institute of Open Learning, Nairobi.
- Procter, M., 1993. Analysing other researchers' data. *Research. Soc. Life*.
- Pronk, N.P., B. Martinson, R.C. Kessler, A.L. Beck and G.E. Simon *et al.*, 2004. The association between work performance and physical activity, cardiorespiratory fitness and obesity. *JOEM*, 46: 19-25. PMID: 14724474
- Pasricha, S.R., M. Low, J. Thompson, A. Farrell and L.M. De-Regil, 2014. Iron supplementation benefits physical performance in women of reproductive age: A systematic review and meta-analysis. *J. Nutr.*, 144: 906-914. DOI: 10.3945/jn.113.189589
- Parks, K.M. and L.A. Steelman, 2008. Organizational wellness programs: A meta-analysis. *J. Occup. Health Psychol.*, 13: 58-58. DOI: 10.1037/1076-8998.13.1.58
- Pelletier, B., M. Boles and W. Lynch, 2004. The relationship between health risks and work productivity. *J. Occup. Env. Med.*, 46: 737-745. DOI: 10.1097/JOM.0b013e3181dce655
- Pronk, N.P. and T.E. Kottke, 2009. Physical activity promotion as a strategic corporate priority to improve worker health and business performance. *Prev. Med.*, 49: 316-321. DOI: 10.1016/j.ypmed.2009.06.025
- Proper, K.I., M. Koning, A.J. Van der Beek, V.H. Hildebrandt and R. Bosscher *et al.*, 2003. The effectiveness of worksite physical activity programs on physical activity, physical fitness and health. *Clin. J. Sport Med.*, 13: 106-117. DOI: 10.1097/00042752-200303000-00008
- Phipps, E., N. Madison, S.C. Pomerantz and M.G. Klein, 2010. Identifying and Assessing Interests and Concerns of Priority Populations for Work-Site Programs to Promote Physical Activity. *Health Promot Pract.* 11: 71-78. DOI: 10.1177/1524839908318165

- Rehman, W.U., N. Asghar and K. Ahmad, 2015. Impact of km practices on firms' performance: A mediating role of business process capability and organizational learning. *Pak. Econ. Soc. Rev.*, 53: 47. DOI: 0.1016/S0378-7206(02)00060-5.
- Sallis, J.F., M.F. Johnson, K.J. Calfas, S. Caparosa and J.F. Nichols, 1997. Assessing perceived physical environmental variables that may influence physical activity. *Res. Q. Exercise Sport*, 68: 345-351. DOI: 10.1080/02701367.1997.10608015
- Sandelowski, M., 2010. What's in a name? Qualitative description revisited. *Res. Nurs. Health*, 33: 77-84. PMID: 20014004
- Searle, A., M. Calnan, G. Lewis, J. Campbell and A. Taylor *et al.*, 2011. Patients' views of physical activity as treatment for depression: A qualitative study. *British J. General Pract.*, 61: e149-e156. DOI: 10.3399/bjgp11X567054
- Selecky, C.E., 2007. The rise of health improvement programs-giving something back to employees. *Bus. Compensat. Digest*, 44: 32-36.
- Sharifzadeh, M., 2013. Does fitness and exercises increase productivity? Assessing health, fitness and productivity relationship. *Am. J. Manage.*, 13: 32-52.
- Shephard, R.J., 1992. A critical analysis of work-site fitness programs and their postulated economic benefits. *Med. Sci. Sports Exercise*, 24: 354-70. PMID: 1549031
- Shephard, R.J., 1999. Do work-site exercise and health programs work? *Phys. Sportsmed.*, 27: 48-72. DOI: 10.3810/psm.1999.02.667
- Sliter, M. and Z. Yuan, 2015. Workout at work: Laboratory test of psychological and performance outcomes of active workstations. *J. Occupat. Health Psychol.*, 20: 259-271. DOI: 10.1037/a0038175
- Szabo, V. and V.R. Strang, 1997. Secondary analysis of qualitative data. *Adv. Nurs. Sci.*, 20: 66-74. DOI: 10.1097/00012272-199712000-00008
- Tamers, S.L., S.A. Beresford, A.D. Cheadle, Y. Zheng and S.K. Bishop *et al.*, 2011. The association between worksite social support, diet, physical activity and body mass index. *Preventive Med.*, 53: 53-56. DOI: 10.1016/j.ypmed.2011.04.012
- Thompson, W.R., 2015. Worldwide survey of fitness trends for 2016. *ACSM's Health Fitness J.*, 19: 9-18. DOI: 10.1249/FIT.0000000000000164
- Thorne, S., 1994. Secondary analysis in qualitative research: Issues and implications. *Critical Issues Qualitative Res. Meth.*
- Trost, S.G., N. Owen, A.E. Bauman, J.F. Sallis and W. Brown, 2002. Correlates of adults' participation in physical activity: review and update. *Med. Sci. Sports Exercise*, 34: 1996-2001. DOI: 10.1097/00005768-200212000-00020
- Tomaskova, H., Z. Jirak, S. Lvoncik, M. Buzga and V. Zavadilova *et al.*, 2015. Health status and physical fitness of mines rescue brigadesmen. *Int. J. Occup. Med. Environ. Health*, 28: 613-623. DOI: 10.13075/ijomeh.1896.00476
- Van den Heuvel, S.G., H.C. Boshuizen, V.H. Hildebrandt, B.M. Blatter and G.A. Ariëns *et al.*, 2005. Effect of sporting activity on absenteeism in a working population. *British J. Sports Med.*, 39: e15-e15. DOI: 10.1136/bjsem.2004.013052
- Veitch, J., O. Clavisi and N. Owen, 1999. Physical activity initiatives for male factory workers: Gatekeepers' perceptions of potential motivators and barriers. *Australian New Zealand J. Public Health*, 23: 505-510. DOI: 10.1111/j.1467-842X.1999.tb01307.x
- Van Dongen, J.M., K.I. Proper, M.F. Van Wier and A.J. van der Beek *et al.*, 2011. Systematic review on the financial return of worksite health promotion programmes aimed at improving nutrition and/or increasing physical activity. *Obes. Rev.* DOI: 10.1111/j.1467-789X.2011.00925
- Wattles, M.G. and C. Harris, 1997. The relationship between fitness levels and employee's perceived productivity, job satisfaction and absenteeism. MSc Thesis, Boise State University.
- WHO, 1998. Health promotion glossary. World Health Organization, Geneva.