Sedentarism: a health hazard for Office Workers

Non-Exercise Activity Thermogenesis in the Workplace using a treadmill workstation: is it feasible?

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Current hypothesis

Bad diet  

Sedentarism  

Overweight; Obesity

Early disability and/or death due to metabolic and cardiovascular diseases
New (complementary) hypothesis

Overweight; Obese

Good diet

Decrease sedentarism

NO early disability and/or early death due to metabolic and cardiovascular diseases
Just for the records

- It is easier to be cured of cancer than to purposefully lose weight
- It is not well understood how weight is controlled
Context

PHYSICAL ACTIVITY AND HEALTH
Exercise and diet are the solution for our illnesses...
Physical Activity and Health

• Exercise $\rightarrow$ Good health

• Lack of Exercise $\rightarrow$ Poor health

• Extreme lack of exercise $\rightarrow$ Sedentaryism $\rightarrow$ Extreme poor health
List of sportspeople who died during their careers - Wikipedia, the ... en.wikipedia.org/.../List_of_sportspeople_who_died_during_their_ca...
This is a list of sports people who have died either during their respective careers or due to career-ending injury or disease at an age when they could still have ...

Shocking and tragic sports deaths
msn.foxsports.com/mlb/lists/Shocking_and_tragic_sports_deaths
Nov 14, 2011 – categoryName, categoryld, galleryId, galleryTitle, mediald, imageTitle, imageUrl, league, description, shortDescription, attribution, large ...

Face of Death - The Worst Sports Injuries - YouTube
www.youtube.com/watch?v=MRGjy6AX69c
Nov 8, 2010 - 5 min - Uploaded by SEROTONIN
The second best sports injury compilation on youtube. To see the best one click this link: http://www.youtube ...

Most Horrifying Death In Sports - YouTube
www.youtube.com/watch?v=Rffw3nX22WM
Nov 2, 2011 - 27 sec - Uploaded by rareuploads
Most Horrifying Death In Sports ... Deaths In Pro Wrestling - Real Sports Part 1 of 2 by MrAdrenaline198284946 ...
Sitting Too Much May Have Serious Consequences - MedPage Today
www.medpagetoday.com › Specialty › Cardiovascular
Jan 10, 2011 – Point out that in this study, [recreational sitting] as reflected in daily screen viewing time -- was associated with more than double the risk of ...

Sitting time and mortality from all causes, cardiovascular ... - NCBI
www.ncbi.nlm.nih.gov/pubmed/19346988
by PT Katzmarzyk - 2009 - Cited by 158 - Related articles
Sitting time and mortality from all causes, cardiovascular disease, and cancer. Katzmarzyk PT, Church TS, Craig CL, Bouchard C. Pennington Biomedical ...

[PDF] Sitting Time and Mortality from All Causes, Cardiovascular Disease
www.ergotron.com/portals/0/literature/.../ACSM_SittingTime.pdf
File Format: PDF/Adobe Acrobat - Quick View
and mortality rates from all causes, cardiovascular disease, and cancer. It is of particular importance to gain insight into the risk associated with excessive sitting ...

Gym benefits undone by too much sitting - Health - Fitness - msnbc ...
www.msnbc.msn.com/.../are-you-sitting-down-its-slowly-killing-you/
Jul 23, 2010 – While several studies support a link between sitting time and obesity, type 2 diabetes, risk factors for cardiovascular disease risk and unhealthy ...

Sitting for too long could lead to cardiovascular disease | The News ...
www.thenewstribe.com/.../sitting-for-too-long-could-lead-to-cardiov
Physical Activity and Health

• Populations that are physically more active (in average), have better health outcomes (in average)

• It is not the same than “if you do exercise you are going to have better health outcomes”
Physical Activity and Health

• Populations that are physically more active (in average), have better health outcomes (in average)  This is epidemiology

• It is not the same than “if you do exercise you are going to have better health outcomes”  This is clinical work
Some clarifications

• There is no evidence that purposefully losing weight increase health and delay disability and/or mortality

• Losing fat (no weight) has been associated with better health outcomes

• But it is difficult to measure fat; so, let’s measure weight

• It is also difficult to measure fitness; so, let’s measure weight
So, there is this excellent idea of decreasing work-related sedentarism...
Let’s falsify it...

Is it possible to reduce sedentarism in office workers?
Falsification: the tragedy of scientists

FALSIFICATION: to make every possible effort to demonstrate that our (loved) hypothesis is wrong.

Loved hypothesis
Well conducted research
If a hypothesis is not seriously injured by the knife of a well conducted research

maybe the hypothesis is true.

We will keep trying to kill it to show how good the hypothesis is.
Office workers

WORK ORGANIZATION
Work organization

- Very difficult to estimate how many office workers are around
- 56% of the US working adult population now uses a computer at work
- Some, the less, typical office workers do not use a computer
- Most of them use a chair and a desk
- They (we) do sit most of the time
Sedentarism by Design

• Service economy
• Productivity
• 7.5 to 8.0 hours per day
• A chair
• A desk
• A phone
• A computer
• Paper
• Pen-pencil
• A defined place/location
Stressful job

Behaviors

- Too little social life
- Poor quality meals
- Smoking
- Too much coffee, alcohol, illegal drugs

No physical exercise

Physiological indicators

- Changes in appetite patterns
- Weak immune system
- High cholesterol
- High blood pressure
- High blood sugar
- High cortisol

Illnesses and Injuries

- Anxiety
- Depression
- Metabolic syndrome
- Arrhythmias
- Obese
- Atherosclerosis
- Stroke
- Myocardial infarction
- Diabetes

Everything will be solved by decreasing sedentarism.
What is N.E.A.T.?

• Non-Exercise Activity Thermogenesis
  – Over basal activity level (sitting)
  – Non-noticeable heart rate increase
  – No sweating
  – Slightly increased oxygen consumption
  – So, slightly increased caloric expenditure

• Exercise is faster, hotter, sweatier
N.E.A.T. is an appropriate level of activity for office workers

If you know what I mean

This is not about replicating the gym in the office space
Is N.E.A.T. a solution?

HOW TO INCREASE N.E.A.T. IN OFFICE WORKERS
So, first solution

- Do not sit
- Stand up and work
- Raised desk
standing tired legs

Legs - (tired, aching, heavy)
www.medicinechest.co.uk/index.php?option=com_content
Most people's legs will get tired and ache at some time in their lives, usually from standing or sitting for long periods, but the discomfort soon goes once the legs...

Legs Are Tired From Standing Up... Is It Time To Sit? « Ramblings of...
heatherrayne.wordpress.com/.../legs-are-tired-from-standing-up-is-it-...
Mar 1, 2011 – Legs Are Tired From Standing Up... Is It Time To Sit? Posted on March 1, 2011 by Heather Rayne. Legs Are Tired From Standing Up... Is It Time...

Mustela expert file - Aching or heavy legs
The "tired, aching or heavy" legs phenomenon is characterised by a feeling of .... It occurs more in the evening, at the end of the day, increased by standing for a...

How To Avoid Leg Fatigue From Standing
trainerconfidential.com/.../how-to-avoid-leg-fatigue-from-standing/
Aug 26, 2009 – Q: I have to stand all day at work for 13 hour shifts. Are there any simple exercises or stretches I can do just to keep myself in shape? I'm so tired ...

relief of aching legs using the World Run Recovery System
aching-legs.org/
When you sit down the legs throb. When you sit down too long and try to stand up your muscles are stiff? Are you Tired, Exhausted, Are your legs Aching, Tired.
Stand up, do not move, and work for 7.5 hours!
Is N.E.A.T. even feasible?

THE TREADMILL WORKSTATION IDEA
The face of a non-field-tested solution
After just four months of working/walking at my office Treadmill Desk, I lost 16 lbs!
Now I have the wonderful problem of trying to eat more every day. Details...

The $39 Treadmill Desk - Buying a Treadmill - Freestanding Desk Style - Jay
A treadmill workstation in action

Typical reaction: shut up and take my money!
Is N.E.A.T. feasible?

RESEARCH STEPS
Figure 3: Injuries among office and administrative staff from 2010 sorted by the reported causal event or exposure. (BLS Information, 2012)
Nicole Tardiff, MSc Ergo (WED) – Capstone report (draft)
Is there a problem?

Usability: Expensive dust collector?

**Rating Home Exercise Equipment**

After losing a home treadmill in a house flood 18 months ago, I’ve decided to venture back into the home exercise equipment market. My timing is good — Consumer Reports has just released its new ratings on home gym equipment, including those touted in infomercials.

Nearly 40 percent of those who buy home exercise machines say they use the equipment less than they expected, according to Consumer Reports. Given the chances that your home machine will gather dust, it’s worth doing a little extra homework to make sure the machine you buy meets all your needs. Choosing a reliable, easy-to-use machine with features you enjoy should increase the likelihood that you will use it more.
Is there a problem?

Comfort:
Quiet enough?

Are they well designed?

Shouldn’t we have a walking/sit flexible workstation?
Is there a problem?

Productivity

Although using a treadmill workstation may change the sedentary nature of desk jobs, it is unknown if walking while working affects performance on office-work related tasks. Purpose: To assess differences between seated and walking conditions on motor skills and cognitive function tests.

**Conclusion:** Compared with the seated condition, treadmill walking caused a 6% to 11% decrease in measures of fine motor skills and math problem solving, but did not affect selective attention and processing speed or reading comprehension.
Research project

• Barriers and Facilitators of Supplying a Treadmill Workstation to Office Workers: **Usability, Safety, Comfort, Productivity**
  – Funded by CPH-NEW; Difficult IRB approval
  – Five treadmill workstations (at UML)
  – Six months of use, at will
  – Monthly individual and group interview
  – Report and discussion of every incident: safety or productivity related
If successfully performed

• Evaluate whether a larger investment (~100 treadmills) is worthy to pursue.
  – Evaluate (Dr. Garelnabi) physiological changes associated with use/non-use of the workstation
  – Evaluate interaction with other risk factors for office workers

• In the future, population and person-level health effects of treadmill use in real work environments.
I decided to be proactive and tell the IRB about some safety issues...
Full review process required for their approval
Our design

• Adjustable electric desk
  – 240 pounds
  – 72 inches wide work surface

• Electric walking treadmill (4 mph maximum)
  – We cut the arms off and rewired the connection to the control console
Our instructions

• You wanted a treadmill workstation...

• Here it is

• See you twice a month (at least)
  – Group interview
  – Individual interview

• Ask us any question you want (24/7)
Is N.E.A.T. feasible?

WHAT WE HAVE LEARNED
Usability

• Expectations
  – I will do exercise at work
  – I will be able to sit and stand/walk; thanks for the desk

• Reality
  – It is hard to shift between the seat and the treadmill; **difficult set up (creative arrangements)**
  – Unanimous deep love for the “up and down desk.”
Usability

• Difficult to talk to people while walking
  – Disrespectful
  – On the treadmill we are taller (affect hierarchies)

• Humming
  – Maybe annoying for some people
  – Have to put phone on mute during conference calls
Usability

• **Office particularities**
  – Floor is uneven
  – Office is small

• **Directions needed**
  – It is assumed that the workstation has a correct way to be used
    • Speed? For how long?
  – Treadmill will be used more if there were external motivation!!!
Usability

• **Administration of physical resources**
  – Ergonomic evaluation ➔ proper adjustment
  – Problem solving: wires, wireless, monitor(s)

• **Better design needed**
  – Nobody was fully satisfied after 6 months of having the treadmill workstation to their full availability
  – Shorten the treadmill; facilitate setup; decrease noise
Safety

• **Main concern: trips and falls**
  – There was no event of trip. None.
  – There were no falls
  – There was no loss of balance
  – There were kicks on the side of the treadmill
Safety

• Foot pain and knee pain
  – While standing in the treadmill
  – Solved with anti-fatigue mat
Comfort

• Social pressure
  – Why you are not using your treadmill?

• Time to get used to standing on the floor
  – Two weeks.
  – Before, pain in feet and knees
Comfort

• Great contribution of ergonomist

  – Changing shoes implies changing height adjustment

  – Height of the monitor(s) is key

  – Angle of keyboard became very important
Productivity

• **Speed**
  – Faster → higher impact on productivity
  – .7 to .8 mph was the most used speed

• **Treadmill cannot be used when high concentration task is needed**
  – Spreadsheets
  – Drawing
Productivity

• Standing position does not decrease productivity

• Importance of job control
  – Control over own job decrease the impact on productivity
  – As soon as productivity was affected, shift from walking to standing position
Productivity

• Walking email station?

• Walking webinar station?

• Walking meeting room?

• In fact, there is a treadmill downstairs and nobody use it
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Not yet
Summarizing with scores

- Usability: 5/10
- Safety: 7/10
- Comfort: 6/10
- Productivity: 4/10
Conclusion

- Treadmill workstation did not meet expectations
  - Adjustable desk did
  - Treadmill did not
  - Setup was unsatisfactory
- Communication and productivity are affected
- Minor adaptation issues
- No safety issues???
Conclusion

• There are jobs for treadmills
• There are jobs that unlikely will allow using a treadmill

• Shared treadmill workstations are seen as a possibility..., and nobody will use them after having an individual workstation
Conclusion

• **Design needs to be improved**
  – 2 mph is still too much
  – Quieter is better
  – Shorter is better
  – Workstation setup needs to be improved

• **Guidance is required**

• **External motivation seems important**
  complement
Thanks so much for your attention

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Context

CLINIC AND EPIDEMIOLOGIC APPROACH
Clinic and Epidemiologic Approach

• 10 mmHg increase in blood pressure
  – Double the risk of premature death

• Allison had a systolic blood pressure of 110 mmHg; now it is 120. Does her risk double?

• What happens in a population, stays in the population. An individual is not a sample of a population.
Clinic and Epidemiologic Approach

• How to know whether one specific individual is going to die prematurely due to increased blood pressure?
  – Clinical sciences
  – Study ONE individual given his/her context and history

• Epidemiology refers to populations

• Too much is still unknown

• We, epidemiologists, encourage you to gamble to benefit the population, maybe at your own cost.
Clinic and Epidemiologic Approach

- We can compute the risk for
  - a country
  - A thousand people
  - A hundred people...
  - One person

- But because something can be computed does not mean that something is meaningful

- One person probabilities (based on epidemiological information) are meaningless

- For one person: use clinical sciences and perform within-person comparisons