Sedentary behavior and Health

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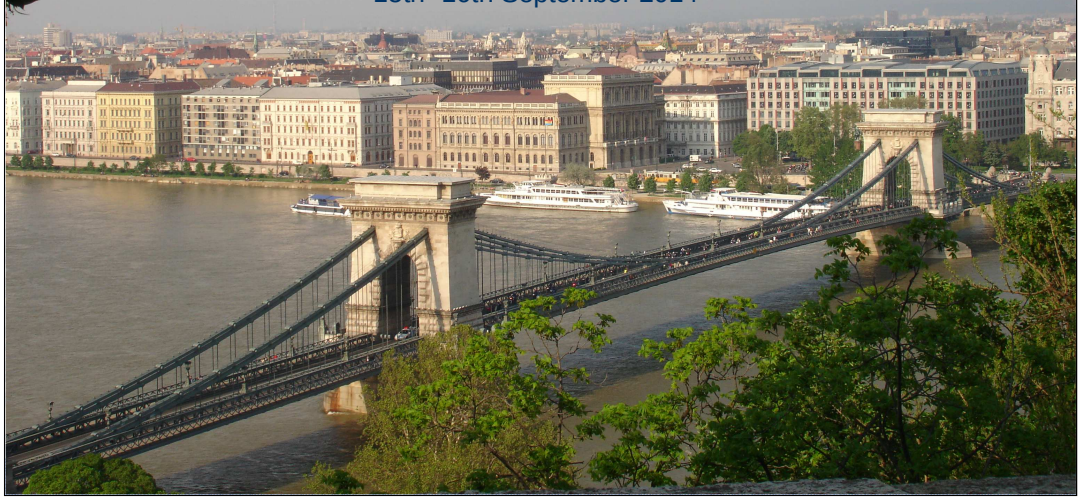
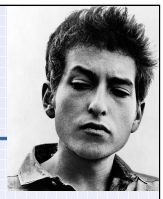


The Times They are a Changin' …



- Work, household, commuting, leisure time

- Physical activity engineered out of our lives, and replaced by sitting

Epidemiology

- Daily overall sitting time:
  - Germany: ca. 300 min. (Wallmann-Sperlich et al 2013)
  - USA: ca. 460 min. (55% of waking time) (Matthwes et al 2008)
  - Sweden: ca. 500 min. (Hagströmer et al 2010)
  - Canada: 570 min. (69% of waking time) (Colley et al 2011)

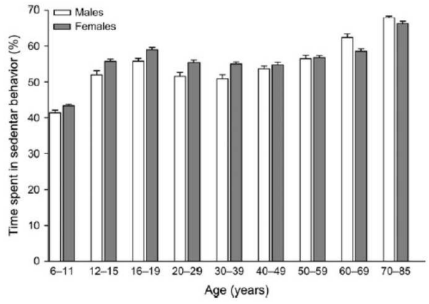


FIGURE 1. Percentage of time spent in sedentary behaviors, by age and gender, United States, 2003–2004. Bars, standard error.

What is sedentary behavior?

PERSPECTIVES FOR PROGRESS

The Evolving Definition of "Sedentary"

Russell R. Pate, Jennifer R. O'Neill, and Felipe Lobelo

Department of Exercise Science, Arnold School of Public Health, University of South Carolina, Columbia, SC, United States

PATE, R.R., J.R. O'NEILL, and F. LOBELO. The evolving definition of "sedentary." *Exerc. Sport Sci. Rev.*, Vol. 36, No. 4, pp. 173–178, 2008. *Studies that did not directly measure sedentary behavior often have been used to draw conclusions about the health effects of sedentariness. Future claims about the effects of sedentary, light, and moderate-to-vigorous activities on health outcomes should be supported by data from studies in which all levels of physical activity are differentiated clearly and measured independently.*

Key Words: physical activity, health, accelerometry, adult, child

Health effects

- „People spend too many hours in a waking day sitting for the scientific community to neglect the existing yet limited evidence that these behaviors may matter for metabolic diseases“
  (Hamilton et al 2007)

- Increasing body of literature
  - On specific outcomes
  - In specific contexts
- Need for “putting the pieces together”

Methods

- selective literature search in Pubmed and the Sedentary Research Database between September 2012 and September 2013
- 2 researchers independently
- articles published in English and German
- Keywords: combination “sedentary” / “sitting” with
  - mortality
  - cardio*
  - cancer
  - depression
  - diabetes
- Reference lists of retrieved articles manually checked for additional studies


Übersichtsarbeit

Sedentäres Verhalten und Gesundheit – Eine selektive Literaturübersicht

Sedentary Behaviour and Health

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Methods contd.

- Inclusion criteria:
  - health effects of sedentary behavior
  - reviews and systematic reviews of epidemiological or experimental studies
  - adult population
- Exclusion criteria
  - grey literature
  - protocols
  - inactivity (insufficient amount of MVPA)
- methodological quality of the reviews independently assessed based on AMSTAR (Shea et al 2009)

Results

- 826 reviews and systematic reviews → 13 reviews (9 narrative reviews)
- Assessment of SB
  - 5 reviews: self-report
  - 6 reviews: self-report and objectively measured
  - 2 reviews: no data on assessment
- Domain:
  - 9 reviews: various domains
  - 2 reviews: TV
  - 1 review: occupational SB
  - 1 review: no data
- Evidence synthesis:
  - 3 reviews: with reference to an established approach

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Is SB a risk factor? – Endpoints

Weak evidence

- Cardiometabolic biomarkers

Moderate evidence

- Cardiovascular diseases
- Diabetes
- Obesity / Weight gain
- Hypertension
- Mental health
- Metabolic syndrome
- Cancers

Strong evidence

- All-cause mortality
- Cardiovascular mortality

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Is SB a risk factor? – Domains of SB

- TV vs. overall sitting
  - Mortality
  - Diabetes
- TV vs. computer use
  - Cognition
  - Depression

→ Residual confounders?

"[s]edentary individuals and those who are not considered sedentary are likely to differ in a myriad of measurable and immeasurable ways" (Ford & Caspersen 2012)

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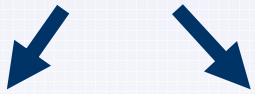
Interaction PA & SB

- Can high amount of PA protect from the detrimental effects of SB?
- Adjustment, operationalisation of moderate-vigorous physical activity (MVPA)

Adjustment



for MVPA

SB is a risk factor independent of MVPA (Wilmot et al 2010, Dunstan et al 2010, Koster et al 2012)

PA is protective, especially in case of high levels of SB (Chau et al 2013)

For overall PA

Associations b. SB and cardiometabolic biomarkers disappear after adjustment (Mahor et al 2014)


SITTING IS THE NEW ENEMY
SITTING IS THE NEW MARRYING HENRY VIII.
?
MOVE 1
MOVE 1
MOVE 1

Resümée

- Relationship between SB and health rather complex: nuanced view necessary
  - Strength of evidence varies depending on outcomes
    - Discrepancy between strong evidence for all-cause and cardiovascular mortality and (very) low evidence for cardio-metabolic risk factors
    - Reliance on observational and cross-sectional data
  - SB in different contexts might evoke different health effects
    - e.g. occupational, all-time vs. screen based
  - sitting *per se* or energy surplus? (Stephens et al 2011)
  - Residual confounders?
  - Role of cardiorespiratory and muscle fitness

Give me a break!

- Observational studies:
  - Breaks in SB beneficially associated with cardiometabolic markers (Healy et al 2008)
  - Other studies: corroborate some, but not all of the beneficial associations between breaks in SB (Healy et al 2011, Scheers et al 2012, Henson et al 2013, Henson et al 2013, Cooper et al 2012)
- Experimental studies:
  - Activity breaks in SB might be beneficial: evidence is not unequivocal
  - Optimal and minimal frequency and length of breaks, intensity of activity yet to be determined
    (Miyashita et al 2008, Dunstan et al 2012, Peddie et al 2013, Altenburg et al 2013, Bailey & Locke 2014)

Nothing new under the sun?

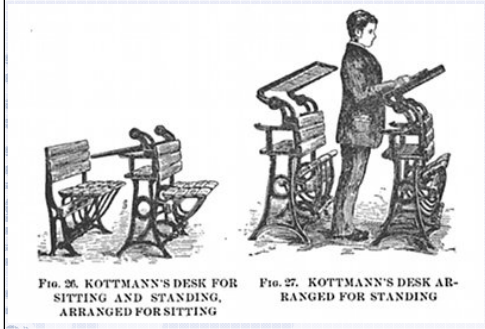
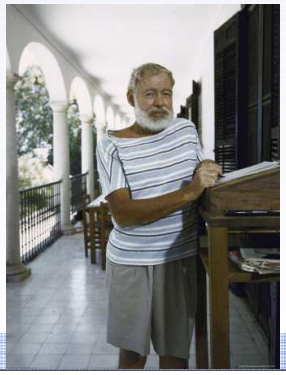


FIG. 26. KOTTMANN'S DESK FOR SITTING AND STANDING, ARRANGED FOR SITTING

FIG. 27. KOTTMANN'S DESK ARRANGED FOR STANDING



Public Health Recommendations

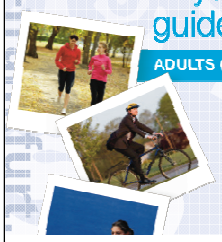
- Health potentials of PA of every day life (Banzer & Füzéki 2012)
- Limiting and breaking up sitting (ACSM 2011, UK 2011, NZ 2010, Australien 2014)

Canadian Physical Activity Guidelines
Canadian Sedentary Behaviour Guidelines
Your Plan to Get Active Every Day

FACTSHEET 4

Physical activity guidelines for

ADULTS (19–64 YEARS)



4. All adults should minimise the amount of time spent being sedentary (sitting) for extended periods.

Australian Government
Department of Health

AUSTRALIA'S PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOUR GUIDELINES

Physical Activity and Sedentary Behaviour Guidelines

PHYSICAL ACTIVITY

- Doing any physical activity is better than doing none. If you currently do no physical activity, start by doing some, and gradually build up to the recommended amount.
- Be active on most, preferably all, days every week.
- Accumulate 150 to 300 minutes (2 ½ to 5 hours) of moderate intensity physical activity or 75 to 150 minutes (1 ¼ to 2 ½ hours) of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week.
- Do muscle strengthening activities on at least 2 days each week.

SEDENTARY BEHAVIOUR

- Minimise the amount of time spent in prolonged sitting.
- Break up long periods of sitting as often as possible.

Thank you for your attention!