Sedentary Behaviours & Learning

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Session Outcomes

• To define sedentary behaviours
• To explore sedentary behaviour recommendations for children, young people & adults
• To examine the research into sedentary behaviours
• To provide practical activities for teachers to interrupt sedentary behaviour in the classroom
• To explore how human movement improves learning
Students learn best:

• through a multi-sensory approach (hear, see, say and do);
• when the material is authentic and meaningful
• when they are emotionally engaged and given opportunities for reflection
• through social interaction and collaboration
• when the material is challenging but achievable
• when the feedback is positive, specific, timely, and learner-controlled
• through novelty and repetition
• when the material is developmentally appropriate and student-centered
• when the material is presented sequentially and holistically, rather than randomly and in sub-parts
• through a variety of teaching strategies.

Jensen’s Seven Golden Maximizers for Learning

1. Physical activity (voluntary, gross motor)
2. Novel, challenging, and meaningful learning (that includes contrast to the everyday)
3. Coherent complexity (not chaotic)
4. Managed stress levels (not boring or distressful)
5. Social support (at home, school and community)
6. Good nutrition (balanced and healthy)
7. Sufficient time (not rushed, plenty of sleep)
Brain Energiser – My Bonnie

My Bonnie lies over the ocean My Bonnie lies over the sea My Bonnie lies over the ocean Oh bring back my Bonnie to me Bring back, bring back Bring back my Bonnie to me, to me Bring back, bring back Bring back my Bonnie to me
Sit less, move more

Is Sitting a Lethal Activity?

By JAMES VLAHO
Published: April 14, 2011

DR. LEVINE'S MAGIC UNDERWEAR resembled bicycle shorts, black and skintight, but with sensors mounted on the thighs and wires running to a fanny pack. The look was part Euro tourist, part cyborg. Twice a second, 24 hours a day, the magic underwear's accelerometers and inclinometers would assess every movement I made, however small, and whether I was lying, walking, standing or sitting.

James Levine, a researcher at the Mayo Clinic in Rochester, Minn., has an intense interest in how much people move — and how much they don't. He is a leader of an emerging field that some call inactivity studies, which has challenged traditional thinking about exercise and health.
What are *sedentary* behaviours?

Mostly SITTING activities (but also include some activities performed lying down – e.g. reading lying down)

<table>
<thead>
<tr>
<th>Screen based</th>
<th>Non-Screen based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watching television</td>
<td>Sitting and talking</td>
</tr>
<tr>
<td>Playing video games</td>
<td>Reading</td>
</tr>
<tr>
<td>Using the computer</td>
<td>Writing</td>
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<tr>
<td>Sending text msgs (seated)</td>
<td>Listening to presentations!</td>
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</table>
Move and Play Every Day

Children need to be active every day – it is important for healthy growth and development among infants, toddlers and pre-schoolers.

National Physical Activity Recommendations for children 0-5 years

DID YOU KNOW...

- Children between 1 and 5 years need to be active every day for at least 3 hours, spread throughout the day.
- Infants (birth to 1 year) need physical activity too – particularly floor-based play in a safe environment.

AND...

- TV viewing needs to be limited to less than 1 hour per day for children 2 to 5 years, and is not recommended at all for under 2’s.
- It is not good for children to be kept inactive (e.g. sitting in strollers, high chairs or car seats) for more than 1 hour at a time.

For more information on the National Physical Activity Recommendations and tips to get your kids active pick up a brochure or go to www.healthyactive.gov.au
Sedentary Behaviour Recommendations

Children aged <2 years:
• Watching television or using other electronic media (DVDs, computer & other electronic games) is not recommended at all for children under 2 years

Children aged 2-5 yrs:
• Sitting & watching television & the use of other electronic media (DVDs, computer and other electronic games) should be limited to less than one hour per day
Sedentary Behaviour Recommendations:

All children (Birth to 5 years):

- Infants, toddlers and pre-schoolers should not be sedentary, restrained, or kept inactive, for more than one hour at a time, with the exception of sleeping
Interpreting the Recommendations

• There is no evidence that educational TV programs beneficial for children’s learning/cognitive outcomes

• Restricting movement includes sitting in strollers, highchairs & car seats for long periods; use of baby jumpers & baby walkers also discouraged
National Physical Activity recommendations for 5-18 year olds & adults

Get out, get active, and surf more than the net!

AUSTRAILIA'S PHYSICAL ACTIVITY RECOMMENDATIONS FOR CHILDREN AND YOUNG PEOPLE.

National Physical Activity Guidelines for Australians

The guidelines refer to the minimum levels of physical activity required for good health. They are not intended for high level fitness or sports training.

Try to carry out all guidelines and for best results combine an active lifestyle with healthy eating.

ACTIVITY: Australia

Think of movement as an opportunity, not an inconvenience.

Be active every day in as many ways as you can.

Put together at least 30 minutes of moderate-intensity physical activity on most, preferably all, days.

If you can, also enjoy some regular, vigorous exercise for extra health and fitness.
Australia’s Physical Activity Recommendations for 5-12 & 12-18 year olds – Sedentary Behaviours

**5-12 year olds**
- Children should not spend more than two hours a day using electronic media for entertainment (e.g. computer games, TV, Internet), particularly during daylight hours.

**12-18 year olds**
- Adolescents should not spend more than two hours a day surfing the net, watching TV or playing video games? (Unless of course it’s educational!)
Sedentary Time  
(self report from ANCNPA survey)


Minutes per day

TST = total screen time; ST = Screen Time; NSST = Non-Screen sedentary time
Research Studies – Physical activity and sedentary behaviour

Non-Screen based sedentary time

Data from the 2007 Australian National Physical Activity and Nutrition Survey

How does time spent in sedentary behaviour lead to negative health?

1. Displacement of Physical Activity
   • Evidence that some children with high sedentary activity, have corresponding low PA.
   • Negative health outcomes may be a consequence of low PA (do not receive protective health effects of PA, eg healthy weight, protective cardiovascular effects).
Main effect for Sex ($\eta^2 = 0.12$); MVPA ($\eta^2 = 0.05$) sig interaction effect ($\eta^2 = 0.04$), $p<0.01$.
How does time spent in sedentary behaviour lead to negative health?

2. Diet

• Link between high sedentary behaviour and poor diet, and negative health is a consequence of poor diet.
• The link may be a result of: TV food advertising, poor health behaviour habits or sedentary behaviour effecting normal hunger cues.
3. Inactive Physiology

- Poor health which occurs as a result of sedentary behaviour is different to that which results from low PA.
- The lack of/limited contraction of muscles during sedentary behaviour, compared to that occurring during PA, has been linked to complex physiological processes which could lead to diabetes, cardiovascular disease.

4. Other health behaviours (clustering)

- There may be other health behaviours/environmental factors that accompany high sedentary behaviour habits, and these may explain the negative health outcomes. Eg low SES.
Sitting induces muscular inactivity

4 STEPS

GETTING OUT OF A CHAIR

SITTING  STANDING

High Television Viewing (2-4+ hrs/d)

- Overweight/ Obesity\(^1,2,3\)
- Abnormal glucose\(^4\)
- Dyslipidemia\(^5\)
- Metabolic syndrome\(^5,6\)

\(^1\) Cameron et al. 2003; \(^2\) Salmon et al. 2000, \(^3\) Foster et al. 2006, \(^4\) Dunstan et al. 2004, \(^5\) Dunstan et al. 2005, \(^6\) Bertrais et al., 2005
Watching TV linked to higher death risk

By RON WINSLOW

If you're reading this sitting down, you might consider standing up.

In a provocative look at the impact of sedentary behavior on health, a new study links time watching television to an increased risk of death. One of the most surprising findings is that it isn't just couch potatoes who were affected—even for people who exercised regularly, the risk of death went up the longer they were in front of the TV. The problem was the prolonged periods of time spent sitting still.
Watching TV – linked to higher death risk

- Compared to those watching < 2hrs/d, those who watch ≥ 4hrs/d:
  - 46% increased risk of death from all causes
  - 80% increased risk of death from CVD

- Associations remain even in people who exercise and in people with healthy weight!

Objectively-assessed sedentary time & obesity
Steele et al Am J Clin Nutr 2009

- SPEEDY study 9-10 year-old children in UK

- Accelerometer measured Sedentary Behaviour (<100cpm) was positively associated with fat mass index

- Association attenuated after adjusting for MVPA
Strategies to reduce sitting time in school
Activating a Champion Learner

Movement and Learning
Why do we move?

- To do work
- To feel better (Improve mood)
- To calm you from stress
- To lose weight
- For better health (prevention of chronic diseases)
- To improve our fitness & skills
- Because we’ve been sitting for too long
- For your brain. Exercise benefits the Brain first.
Key messages about Movement & Learning

• Movement facilitates cognition because the cognitive and the physical are integrated
• Movement improves brain function.
• Movement changes the brain at the molecular level
• Movement grows brain cells (Neurogenesis)
• Movement improves memory retrieval due to increased blood flow
• The chair is the least effective environment for learning!

Dodd, G. 2011
Enhanced Academic Performance

“Consistent exercise, and certain types of specific exercises, can both temporarily and permanently affect the way your brain is able to focus, its ability to deal with stress and anxiety, and its ability to learn ...”

“Exercise is like fertilizer for the brain ... it’s so good, it’s like Miracle Gro”.

- Dr. John Ratey, Harvard Brain Researcher
Movement improves Learning

On 3 levels

1. It optimises your mind set to improve alertness, attention, and motivation
2. It prepares and encourages nerve cells to bind to one another, which is the cellular basis for logging in new information and
3. It spurs the development of new nerve cells from stem cells in the hippocampus

SPARK! How exercise will improve the performance of your brain: Dr John Ratey & Eric Hagerman
brains taking the same test

Brains after sitting quietly  Brains after 20 minute walk

Blaydes, J. 2011
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Blaydes, J. 2011
How Movement Changes the Brain

• Oxygen and glucose fuel the brain
• Neurogenesis - Embodied cognition (Neurogenesis) – using gestures, actions and motions helps anchor the learning.
• Secondary dendritic branching – exercise improves your memory
• Brain Derived Neurotrophic Factor (BDNF) – A protein – the fertilizer for your brain
• Neurotransmitters – 56 brain chemicals identified

Blaydes, J. 2011
**Brain Derived Neurotrophic Factor**

- **BDNF** is a neurotrophin whose status as a regulator of the survival, growth & differentiation of neurons during development has matured to include the adult nervous system.

- **BDNF** functions to translate activity into synaptic & cognitive plasticity in the adult animal.
Spark! John Ratey says:

• Exercise is the brains natural Ritalin and Zoloft
• Exercise is encoded in our genes
• Play is automatic in every species and helps develop the brain
• What makes us move is also what makes us think
• After 17 minutes of sitting you have to move

Blaydes, J. 2011
What we know about Movement

• Benefits derive after 30-40 mins per day except for little kids who exercise through play.
• Can accumulate movement grows brain cells in the classroom and in Physical education.
• The positive benefits of Movement will last for 15-20 minutes.
• You learn 10% better when standing – better blood flow and attention is better.

Dodd, G. 2011
Ineffective Learning Environments

• The chair is the least effective environment for learning! After 17 minutes of sitting you have to move
• Long periods of time spent being sedentary and on one task
• Where learning is preceded by inactivity
• You can’t learn difficult material while moving at high intensity (70-80% max HR) because blood is shunted away from the prefrontal cortex which hampers executive function.

Blaydes, J. & Dodd G. 2011
What environment is best for learning?

- Learning improves after 30-40 mins of movement per day
- Can accumulate movement needs to be developmentally appropriate for:
  - Early childhood who move through play & FMS
  - Middle childhood through games, gymnastics & dance
  - Adolescents through fitness, games & dance
- Movement grows brain cells in classroom lessons as well as in Physical Education
- Processing information (Cognitive Flexibility) is better directly after movement for 35 minutes at 60-70% of max HR

Dodd, G. 2011
What movement is best?

Ratey suggests:

• Selecting activities that simultaneously tax the cardiovascular system as well as the brain.

• That while aerobic exercise elevates new blood vessels that pipe in growth factors, and spawns new cells, complex activities put all that material to use by strengthening & expanding networks. The more complex the movements, the more complex the synaptic connections.

Blaydes, J. & Dodd, G. 2011
What Movement is best?

Activities could include:

• Tennis & other complex games & sports
• Dance
• Gymnastics
• Pilates
• Karate
• Yoga Assanas
• Circus activities e.g. juggling

All activities that promote movement and decision making engage nerve cells throughout the brain.
Literacy/Reading Data

[Bar chart showing data for Non-LRPE, LRPE, and LRPE2]
What are the implications for you?

- Form a small group of 3-5 people and discuss the implications for you & your school
- Highlight changes for your classroom & the school regarding:
  - Healthy Eating and
  - Physical Activity

Be prepared to share your groups initial thoughts in 5 minutes
Conclusions

Promising strategies in schools include:

- An integrated curriculum where lessons are more physically active
- Brain energisers improve learning through activity and
- Quality daily physical education sessions that are developmentally appropriate appear to provide the best way forward
Conclusions

ACHPER (SA) can offer this session to your School/Site. Contact ACHPER (SA) for more information info@achpersa.com.au or visit our website www.achper.sa.com.au
Or telephone 08 8363 5700