

THE NON MEDICAL VIEW OF EXERCISE AS MEDICINE

Alan Salmoni
School of Kinesiology
Western University



Credentials: physically active since 1947, running since 1960, drinking beer since 1966

Take Home Messages

1. Words matter
2. I think people are very/most often hedonistic, not analytic decision makers (and in particular when it comes to health).
3. For "regular/habitual" exercise to be achieved FUN may trump all other "prescriptive" variables on your prescription pad.
4. A variety of "exercises" are good for the immune system.
5. "Exercise" to promote a healthier immune system (slow down immunosenescence) is a wonderful example of why we need to combine psycho, socio, and physiological "prescriptions" for participants.
6. We need medicine & fun in EQUAL doses.
7. Waterloo Dark is a good beer.



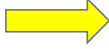
Goal for my talk

- "To get the right answers, you have to ask the right questions" (Pew, 1972).
- I hope I can leave you with a few of the right questions to ponder.



RULE during my talk

- As Clara said yesterday, because sedentary behavior has been shown to be a risk factor for poor health in its own right I do not want my talk to promote sedentary, SO..
- **WHEN YOU SEE A YOUTUBE VIDEO APPEAR YOU MUST STAND UP AND DANCE WITH THE MUSIC AND THE PARTICIPANT IN THE VIDEO**



Even though Melanie Stuckey said yesterday you need to be cognitively impaired for fun to be a goal of the exercise class – go for it!!!

I hope my presentation is entertaining

<http://www.youtube.com/watch?v=nDIHEWgIH2c>

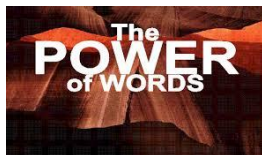
THIS IS A DANCE VIDEO!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Please listen carefully to what Grandma says at the very end when she is getting into the car



DO WORDS MATTER?

- 3 good, not so good, and “bad” words beginning with “F”
 - Fun
 - Falls (don’t use the “F” word)
 - F... (“I could do this all f...ing day”)



What were your thoughts from the video?

Lessons from Social Marketing

Like marketing, the goal of social marketing is to sell your product to as many “customers” as possible

- Stigma – falls prevention or exercise program?
- Marketing of falls prevention
 - Men: social and fun (“DO NOT mention falls prevention)
 - Women: ok to mention “falls prevention”
- “Framing” exercise (see next slide)



Werle et al. (2014).

Is it fun or exercise? The framing of physical activity biases subsequent snacking

- Three studies showed that framing physical activity as “fun” or “exercise” produced differences in food choices after the event
- In first two studies workers went for a “walk for exercise” or a “walk for fun” – after the walk participants in exercise condition (both conditions equal in PA) consumed more calories of hedonic food choices (chocolate pudding, regular coke, M&M s) than participants in fun condition
- In third study, participants in a race who perceived the race to have been fun (post race) chose a cereal bar rather than a chocolate bar as a payment for filling out a questionnaire after race

Are people logical decision makers when it comes to their health and safety?

And, how powerful is education in directing people’s health behavior?

When we attempt to educate the end point user, what is our assumption?

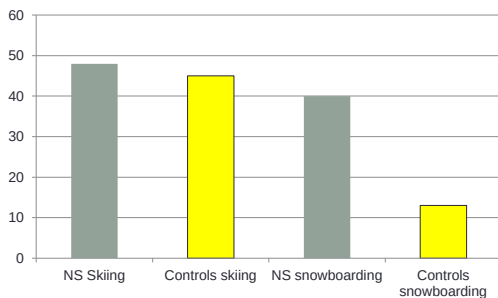
Helmet use in winter sport – attitude and opinion of neurosurgeons and non-traumatic-brain-injury educated persons

Jung et al. (2011), Acta Neurochir 153: 101-106

- Surveyed 465 NS (neurosurgeons) and 546 lay people controls with no specialized education about TBI
- **FACT** about ski helmets: wearing a helmet leads to a 60% decrease in risk of TBI in skiing and snowboarding
- **Question asked** of survey participants was whether they wore a ski helmet when skiing or snowboarding (next slide shows the people who reported “never” wearing a helmet)

What do you think the results should show?

Slide shows percentage (%) of people in the two groups reporting that they never wear a helmet!!!



People are hedonistic not analytic

← Hedonic Logical →

- My observations are (and marketing research supports) that many actions are taken because of a pleasure-seeking drive or motivation, not because of logically derived utility

• Or, “sex sells”

- This tendency by people is not bad in and of itself, except that it seems to me that the “health” system is determined to believe that people make logic-based decisions about their health (I accept that some do, but many do not as the previous slide shows)



Do/should we market and treat physical activity like beer or medicine?



Why do we refer to "it" as exercise prescription?

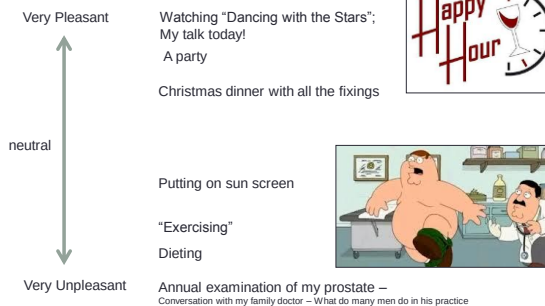
Why do we say it is a "workout"?

Amica Case Study: "Where's the Party?"



- Last spring we offered 1 hr workshops on brain health, falls prevention, and driving safety to residents at Amica
- Attendance for each session around 15 of 230 residents at Amica
- On falls prevention day there were only 8 attendees – workshop went from 1:30-2:30 pm
- At 3 pm there was a party/celebration in the lobby
- Leaving the residence we saw 80-100 seniors all dressed up at the party with a band, food, drinks.....!!!!
- Week before I saw a couple, the husband of whom had had a terrible fall in their apartment (smashed his face, went to hospital, etc.) – didn't come to workshop

What's wrong with "medicine"



Case study: Fabre et al. (2002)

- Four groups of older adults (60-76 yrs): exercise, mental training, both exercise and mental training, or control (just leisure time – no training)
- Older adults (60-76 yrs) exercised 2 times per week for 2 months
- **Exercise** = running/brisk walking intervals on a track (400s, 800s) at a target heart rate corresponding to their ventilatory threshold (threshold when breathing becomes laboured)
- **Results**: memory quotient improved 8.5, 7.4 and 9.2% in AT, MT, and AMT groups respectively (vs. control)

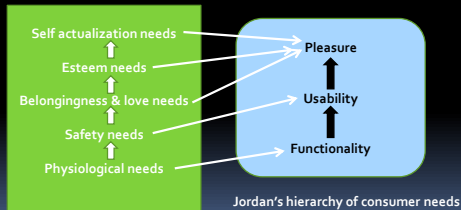


BUT – how many people could maintain this exercise for 30 years??!! (running intervals sounds more like a prostate exam)
My grandsons do intervals by playing tag.

Jordan's model of product design

Jordan (2000). *Designing Pleasurable Products: An Introduction to the New Human Factors*. London: Taylor & Francis.

- Model based on Maslow's hierarchy of needs (left)



Jordan's Four Pleasures

[when developing and marketing a product]

Physio-pleasure = pleasures derived from the senses (car mufflers are now designed to make a car sound a certain way)

Socio-pleasure = enjoyment derived from relationships with others (clothes give you a social identity) - "Penny loafers no socks"

Psycho-pleasure = pleasures derived from the cognitive and emotional reaction to products (the product makes you feel good – I enjoy looking at my grandfather clock and I enjoy hearing it chime)

Ideo-pleasure = pleasure related to people's values (environmentalists like "green" products)

Grandpa2 dancing

• http://www.youtube.com/watch?v=vR_VhfxAnXU

"Exercise as Medicine"



For us as practitioners and researchers the evidence is in – regular physical activity is a great lifestyle choice and a great medicine



Professor Kohman (2012): Immunologist

[article about the brain's aging immune system]

"The beneficial effects of engaging in aerobic exercise are vast, as exercise improves cognitive function, efficiency of the vascular system, measures of neural plasticity, and increases in production of growth factors that support brain health".

All of us here are convinced, behind a mountain of evidence, that physical activity is good medicine!

The GRADE system for conducting systematic reviews

- In the GRADE system reviewers are asked to evaluate the quality of the research as well as the strength of the recommendation (confidence in treatment suggested)
- One dimension of the strength of recommendation is whether the "treatment" may produce any adverse events
- In most clinical trials exercise has had few to no adverse events compared to pharmaceutical trials where adverse events are relatively more common
- If exercise was used to treat depression there are not only likely no adverse effects, but a huge number of additional benefits like reduced risk of injuries from falls, cardiovascular disease, dementia, Alzheimer's, type II diabetes, hypertension, infectious illnesses, metabolic syndrome, improved response to vaccinations like the flu shot, etc.!!!!!!!!!!!!!!!!!!!!!!!!!!!!
- On "strength of recommendation", exercise has no rivals

The Aging Immune System (Immunosenescence)

- The point of my title for the talk was not to diminish the value of the vast amount of research that has shown the health value of physical activity/exercise as medicine, but to ponder the advantages and disadvantages of doing so (particularly for the endpoint user)
- Since you were expecting someone to talk about exercise and chronic conditions, and because I find the research on the immune system to be so conceptually rich, I have decided to talk about physical activity and the strengthening of the immune system
- Indeed, there is a research area called "Exercise Immunology"
- I like this area because of the importance of the immune system as a corner stone to health and because it seems to speak to the value of various forms of physical activity and the necessity of treating the whole person (physical, social, psychological, emotional)

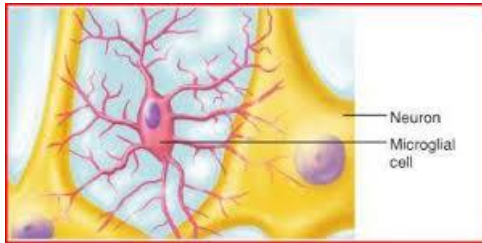
Immunosenescence

- Many changes occur during aging which make the immune system less capable of dealing with viruses, bacteria, infections, wound repair, etc.
- Features of an aging immune system include (I know almost nothing about the physiology of the immune system!!):
 - Reduced thymic output
 - Lowering numbers of circulating naïve T-cells
 - Increased proportions of differentiated T-cells
 - Impaired responses to novel antigens
 - Lower functioning N-K killer cells
 - etc.
- In short, there are many aspects of the immune system that change with age (the list is gigantic and complex, thus my profound ignorance of most of it)

Inflammaging – a marker of aging

- Many older adults present with a chronic low grade inflammation, as though their body is constantly fighting off an antigen (and thus the pro inflammatory response)
- This inflammaging is thought to play a role (negative) in many chronic diseases like cardiovascular disease, type 2 diabetes, Alzheimer's disease, osteoporosis, some cancers, etc.
- Therefore reducing "inflammaging" via physical activity could be an effective and efficient therapeutic approach to either prevent or delay the onset of these chronic conditions
- To the degree this is successful it could reduce frailty and mortality
- The most common PA mentioned/suggested in the research is moderate intensity aerobic exercise
- Two caveats from my reading of the "evidence":
 - Not much research on alternate forms of PA and immunosenescence
 - Many of the positive findings come from cross sectional studies (results from prospective longitudinal studies are far less impressive)

Aging Microglia (a major part of the brain's immune system)



The story for the brain's immune system and therefore brain health is very compelling

Different types and states of microglia

- 2 categories of activated microglia (there are >2):
- Classically activated microglia mediate the inflammatory response in the brain (antigens detected and "fought")
 - Alternatively activated microglia participate in wound healing, regenerative processes, and can actively suppress the inflammatory process (i.e., inflammatory process good in the short, but not long-term)
 - e.g., insulin-like growth factor (IGF), nerve growth factor (NGF), and brain-derived neural growth factor (BDNF) can be produced to aid in the regenerative process
 - Classically activated microglia are part of chronic low grade inflammation seen with the aging brain and thought to be linked to neurodegenerative diseases like MS and Parkinson's

Aerobic exercise “good medicine” for aging microglia

- Mostly from animal studies it is known that inflammation in the brain can impair learning and memory (hippocampus in particular) – as noted yesterday by Dr. Gill there is lots of interest in the hippocampus
- The ideal treatment for the age related inflammation is something that improves both sides of this process (improve both the pro inflammatory and anti inflammatory processes)
- Aerobic exercise has been shown to improve both processes in the brain (and to aid learning and memory)
- Not only will help with brain health, but has been shown to slow down the cognitive decline in Alzheimer's and improve movement initiation in Parkinson's patients

Review by Eyre et al. (2013) on “physical activity subtypes”

- Eyre et al. (2013) attempt to do a comparative review of different types of PA to see how they impact the immune system (differently)
- The subtypes were roughly (hard to do since research very irregular) grouped into aerobic, resistance training, neuromotor (balance), and mind-body (Yoga)
- Two important findings:
 1. Different types of PA had different types of beneficial effects on the immune system
 2. Different people with different biological profiles (including levels of immune markers) react differently to any/all these types
- My conclusion: All types of PA are good, maybe essential (this coincides with Dr. Gill's comment yesterday that it may be the amount and not the type of PA that matters)

Review by Muller & Pawelec (2013) on behavioral interventions and the aging immune system

- Many factors affect the health of the immune system including: inactivity, obesity, diet, chronic stress, mental well-being, infectious diseases
- Therefore a more holistic lifestyle intervention is optimal (e.g., moderate activity, plant-based diet, stress management, and improved social support)
- These factors are additive and interactive in their effect (e.g., lots known about chronic stress and the immune system)

Muller cont'd

- Treatments (including PA) that influence positive affect (mood, happiness) and negative affect (depression) can be very powerful for immune system health
 - e.g., stress-reducing interventions very valuable (including psychosocial interventions or activities like Yoga)

My conclusions:

1. Promotion of positive mood states and stress management (including through PA) maybe just as powerful as aerobic conditioning
2. This brings me full circle back to FUN and PLEASURE

Question: When you think about evaluation of a person's "fitness" program do you think about evaluating fun, pleasure, and mood on a regular basis (what would you do if a person was not having fun)????

Could/should fun "trump" other aspects of a PA program?



Habitual/regular physical activity as a permanent lifestyle change

- Here is the kicker – all the immune system reviews suggested that regular/habitual exercise is necessary to promote the health of the immune system
- Obviously if we are going to sell a lifestyle which promotes a healthy brain, we need to "convince" people that (lots of) physical activity must be a permanent fixture in their lives
- The research literature I found concludes that we know a fair bit about how to get people to initiate health behavior changes (dieting, exercising, stop smoking) but very little about how to maintain that behavior once initiated – don't even have effective theories to conceptualize the problem according to the research I read
- One researcher suggested that maintenance (of a health program) is a journey not a destination

My version of the “journey”

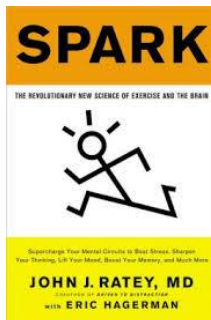
- <http://www.youtube.com/watch?v=MJusMpZu-eM>



Questions/Comments



Recommended Reading/Watching

[illegible]

Grandpa1 dancing

• <http://www.youtube.com/watch?v=ZPbeTvWiA8g>

Grandma2 dancing

• <http://www.youtube.com/watch?v=31XMbQAoRNo>

References of Interest

1. Eyre & Baune (2013). Assessing for unique immunomodulatory and neuroplastic profiles of physical activity subtypes: A focus on psychiatric disorders. Brain, Behavior and Immunity. dx.doi.org/10.1016/j.bbi.2013.10.026
2. Muller & Pawelec (2013). Aging and immunity – impact of behavioral interventions. Brain, Behavior, and Immunity. dx.doi.org/10.1016/j.bbi.2013.11.015
3. Simpson et al. (2012). Exercise and the aging immune system. Ageing Research Reviews, 11, 404-420.
