The Essence of Health

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Health Enhancement Program (HEP)

- HEP is mindfulness-based lifestyle program
- Objectives
  - underpins personal and professional development
  - improve attitudes and practices in self-care
  - preventive and holistic medical practice
  - build future clinical skills
    - Lifestyle management
    - Motivational interviewing
    - Stress management
  - foster experiential, self-directed and deep learning
  - integration learning across themes
HEP based on the ESSENCE model

The Essence of Health

- Education
- Stress management
- Spirituality
- Exercise
- Nutrition
- Connectedness
- Environment
Health Enhancement Program

- Deep learning model
- Students learn by applying the program to themselves
- Participation in practical activities encouraged but voluntary (i.e. mindfulness, lifestyle change)
  - More students put in the more they learn personally and professionally
- Weekly journal about experiences and questions
- Integration with other curriculum
- Content assessable
Health Enhancement Program

- Lectures
  - Evidence, Science, Clinical application

- Tutorials
  - Practical and personal application
  - First Semester
    - Mindfulness-based stress management program
    - ESSENCE lifestyle program

- Second semester 5 lectures
  - Positive psychology, improving performance, mental health enhancement
Burnout and psychiatric morbidity in new medical graduates.

- Mid-final year: 28% of medical students had burnout
- 8 months into internship: 75% interns had burnout
- 73% (of interns) met criteria for psychiatric morbidity on at least one occasion
Study of 2006 cohort of medical students found that 90.5% of students personally applied strategies.

Improved student wellbeing noted on all measures of wellbeing even in the pre-exam period:
- Reduced depression, hostility and anxiety subscale
- Improved psychological and physical quality of life

Mindfulness and student wellbeing

- Study investigated relationships among engagement in self-care behaviours, dispositional mindfulness, and psychological distress
  - 207 Australian medical students aged across the 5 years of the Monash University medical course
  - Online survey: demographics, the Five Facet Mindfulness Questionnaire, the Health-Promoting Lifestyle Profile II, and the DASS

- Significant correlations between distress and both mindfulness and self-care

- Dispositional mindfulness a significant moderator of the relationship between self-care and psychological distress

- “The present study points to the potential of self-care and mindfulness to decrease medical student distress and enhance well-being.”

Mindfulness and work engagement

- Study on 2013 cohort of year 1 Monash medical students
- Post mindfulness program:
  - Large increases in dispositional mindfulness
  - Increases in study engagement (UWES; medium effect size)
    - Increases in study dedication and vigour
  - No increase in depression, anxiety or stress in pre-exam period c/w early semester prior to mindfulness program
Healthy lifestyle & chronic illness

- Study on the reduction in relative risk of developing major chronic diseases (CVD, diabetes, and cancer) associated with 4 healthy lifestyle factors
  - Never smoking, BMI < 30, 3.5 h/wk or more of physical activity, Healthy dietary principles (high intake of fruits, vegetables, and whole-grain bread and low meat consumption)
  - People aged 35 to 65 years followed for 7.8 years
Healthy lifestyle & chronic illness

- During f/up 2006 participants developed diabetes (3.7%), MI (0.9%), stroke (0.8%), or cancer (3.8%)
  - < 4% of participants had zero healthy factors
  - Approximately 9% had 4 healthy factors
- Risk for developing a chronic disease decreased as the number of healthy factors increased
- All 4 factors at baseline had a 78% lower risk of illness
  - Diabetes, 93%; myocardial infarction, 81%; stroke, 50%; cancer, 36% than participants without a healthy factor.
Education

- Having an education is associated with:
  - Better physical and mental health
  - Lower rate of dementia
  - Healthier lifestyle
  - Greater autonomy
  - Decision-making ability
  - Confidence
  - Opportunities
  - Social and economic advantage

- Education is not just about going to school, or being health literate

- It is about knowing and enabling ourselves:
  - Understanding our own minds and motivation
  - Cultivating mindfulness
  - Stress management
  - Behaviour change strategies
  - Goal setting
Allostatic load

- Prolonged stress leads to wear-and-tear on the body (allostatic load)
  - Mediated through the Sympathetic Nervous System

- Allostatic load leads to:
  - Impaired immunity, atherosclerosis, metabolic syndrome, bone demineralization
  - Atrophy of nerve cells in the brain
    - Hippocampal formation: learning and memory
    - Prefrontal cortex: working memory, executive function
  - Growth of Amygdala mediates fear response

- Many of these processes are seen in chronic depression and anxiety
TELOMERES

Embryonic Stem Cell  
Telomere Long  
Telomerase Active  
Telomere is a Repeating DNA Sequence

Adult Stem Cell  
Telomere Short  
Telomerase Inactive or Absent
Stress and telomere shortening

- Study on healthy premenopausal women showed that psychological stress associated with:
  - higher oxidative stress
  - lower telomerase activity (telomerase repairs DNA telomeres) leading to shorter telomere length
- These are known determinants of cell death/longevity
- Women with highest levels of perceived stress c/w low stress women have shorter telomeres
  - Average equivalent at least 9-17 years of additional ageing
- Implications for how stress may promote earlier onset of age-related diseases
The greater the level of mind wandering, the greater the level of telomere shortening (a marker of biological age).

Fig. 1. Leukocyte telomere length by greater mind-wandering group.

The Default Brain

- **Active tasks**
  - Tasks associated with paying attention
  - Brain efficient and quiet

- **Default state (mode)**
  - Mind is inattentive, distracted, idle, recalling past, daydreaming
  - Areas active in default mode similar to areas affected by Alzheimer’s Disease
The Default Brain associated with:

- Stress (Brewer et al., 2011)
- Anxiety (Zhao et al., 2007)
- Depression (Greicius et al., 2007)
- ADHD (Uddin et al., 2008a)
- Schizophrenia (Pomarol-Clotet et al., 2008)
- Autism (Kennedy & Courchesne, 2008)
- Alzheimer’s disease (Firbank et al., 2007)
- Criminal recidivism (Aharoni et al., 2013)
- Reduced performance (Brewer et al., 2011)
“The faculty of voluntarily bringing back a wandering attention over and over again, is the very root of judgment, character, and will. No one is compos sui if he have it not. An education which should improve this faculty would be the education par excellence.”

- William James, Principles of Psychology, 1890
Applications of mindfulness

- **Mental health**: E.g. therapeutic application for depression, anxiety, panic disorder, stress, emotional regulation, addiction, sleep problems, eating disorders, psychosis, ADHD, autism, reduced burnout, greater resilience

- **Neuroscience**: E.g. structural and functional changes in the brain, stimulation of neurogenesis, possible prevention of dementia and cognitive decline, down-regulating the amygdala, improved executive functioning and working memory, reduced default mental activity, improved self-monitoring and cognitive control, improved perception of sensory input

- **Clinical**: E.g. therapeutic applications for pain management, symptom control, coping with chronic illness (e.g. cancer and MS), metabolic and hormonal benefits (e.g. reduced allostatic load, cortisol), facilitating lifestyle change (e.g. weight management, smoking cessation), improved immunity (e.g. improved resistance, reduced inflammation), improved genetic function and repair, slower ageing as measured by telomeres

- **Performance**: E.g. sport, academic, leadership qualities, mental flexibility and problem solving, decision-making, sunk-cost bias

- **Education**: E.g. improved problem-solving, executive functioning and working memory, better focus, less behavioural problems, fostering growth mindsets

- **Relationships**: E.g. greater emotional intelligence and empathy, improved communication, reduced vicarious stress and carer burnout

- **Spiritual**
MBCT and depression

- RCT investigated the effects of Mindfulness-based cognitive therapy (MBCT) on the relapse in depression, time to first relapse and the quality of life
  - 106 recovered depressed patients with a history of at least 3 depressive episodes
  - Treatment as usual (TAU) vs MBCT plus TAU 1 year f/up
- Relapse/recurrence significantly reduced and the time until first relapse increased in the MBCT plus TAU c/w TAU
- MBCT plus TAU group also showed a significant reduction in both short and longer-term depressive mood, better mood states and quality of the life
Mindfulness, adolescents and mental health

- “Mindfulness-based stress reduction (MBSR) program for adolescents age 14 to 18 years with heterogeneous diagnoses in an outpatient psychiatric facility.
- Relative to treatment-as-usual control participants, those receiving MBSR self-reported reduced symptoms of anxiety, depression, and somatic distress, and increased self-esteem and sleep quality.”
    [http://dx.doi.org/10.1037/a0016241](http://dx.doi.org/10.1037/a0016241)
Mindfulness in schools

- 522 young people aged 12–16 in 12 secondary schools either participated in Mindfulness in Schools Programme (intervention) or usual school curriculum (control)

- Rates of acceptability were high

- Children who participated in the intervention reported:
  - Fewer depressive symptoms post-treatment and at 3 month f-up
  - Lower stress and greater well-being at f-up

- The degree to which students practised the mindfulness skills was associated with better well-being and less stress at follow-up
Mindfulness and cellular ageing

- Meditation may slow genetic ageing and enhance genetic repair
  - “...we propose that some forms of meditation may have salutary effects on telomere length by reducing cognitive stress and stress arousal and increasing positive states of mind and hormonal factors that may promote telomere maintenance.”

The role of meaning

- The lack of meaning in life is a soul sickness whose full extent and full import our age has not yet begun to comprehend.
  - Carl Jung

- Many different ways of exploring and expressing meaning
  - Religion, philosophy, science, altruism, environmentalism, art …
Spirituality, meaning and health

- Religious commitment is widely used in the medical and psychological studies
  - Most common interpretation of spirituality / easy to measure

- Protective for:
  - Depression and suicide
  - Substance abuse
  - Physical illness
  - Longer life expectancy

- Links hold even when controlled for other risk factors
Spirituality, meaning and longevity

- 22,000 people - 9 y f/up
- All-cause mortality reduced for those with active religious dimension to life
- Life expectancy
  - 75 y - non-attenders
  - 79 y - < once per week
  - 82 y - once per week
- Controlled for other variables
  - Demography 1999;36:273-85
- Significantly protective against all-cause mortality
  - relative hazard 0.64 and when controlled for social and physical variables still 0.76
  - Am J Public Health 1998;88:1469-75
Purpose, happiness, self-gratification, genetics and immunity

- Immunity in individuals with high levels of hedonic wellbeing (pleasure seeking / gratification) characterized by:
  - an increased expression of genes involved in inflammation (implicated in diseases such as arthritis and heart disease), and
  - decreased expression of genes involved in antiviral responses

- This immune response (known as CTRA) is also associated with chronic stress and uncertainty

- The opposite effect was found for eudaimonic wellbeing (meaning / engagement)

- Both forms of wellbeing associated with similar self-reported affect

Compassion, stress & inflammation

- Study of healthy adults randomized to 6 weeks of training in compassion meditation or participation in a health discussion control group
- Followed by exposure to a standardized laboratory stressor (TSST)
- Meditation practice correlated with decreased TSST-induced IL-6 and POMS distress scores
- Individuals with meditation practice times above the median exhibited lower TSST-induced IL-6 and POMS distress scores compared to individuals below the median, who did not differ from controls
Exercise levels in Australia

“In 2004-05, 70% of Australians aged 15 years and over were classified as sedentary or having low exercise levels. Of these, just under half (48%) recorded no or very little exercise in the previous two weeks (sedentary exercise level) and 52% recorded a low level of exercise.”

- ABS – Australian snapshots
## Disease prevention recommendations

<table>
<thead>
<tr>
<th>Illness</th>
<th>Recommended exercise modality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>Aerobic / Resistance</td>
</tr>
<tr>
<td>Cancer</td>
<td>Aerobic</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>Aerobic / Resistance</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Aerobic / Resistance / Balance</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>Aerobic / Resistance / Balance</td>
</tr>
<tr>
<td>Dementia</td>
<td>Aerobic</td>
</tr>
<tr>
<td>Depression</td>
<td>Aerobic / Resistance / Balance</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>Aerobic / Resistance / Balance (falls prevention)</td>
</tr>
<tr>
<td>Stroke</td>
<td>Aerobic / Resistance / Balance for rehab.</td>
</tr>
<tr>
<td>Type-2 diabetes</td>
<td>Aerobic / Resistance</td>
</tr>
</tbody>
</table>

Adapted from Fiatarone-Singh M. (2007) Physical fitness and exercise.
Exercise and children’s weight

- Study of 734 boys and girls measured at age 8, 10 and 12 years for % body fat, physical activity and dietary intake
- Children with higher % body fat were less physically active, both in terms of amount and intensity of physical activity
- Fatter children did not consume more energy, fat, carbohydrate or sugar
- “physical activity is the main source of variation in the percent body fat... strategies involving dietary intake and physical activity to combat childhood obesity may benefit by making physical activity the foremost focus of attention.”

Exercise and academic performance

- High overall sports participation meant children were less likely to participate in a range of risky behaviors
  - Adolescent risk behaviors (e.g. truancy, cigarette smoking, sexual intercourse, delinquency)
- Active teens less likely to have low self-esteem and more likely to have higher grades
Exercise and ageing

- Study on the effects of taking up activity later in life
- 3454 initially disease-free UK men and women (av. age 64 years at baseline) followed for 8 years from 2002/3
- Healthy ageing, assessed at 8 years of follow-up defined as those who survived without developing major chronic disease, depressive symptoms, physical or cognitive impairment
- At follow-up, 19.3% of the sample defined as having healthy ageing
Physical activity and ageing

- OR (95% CI) for the association of physical activity change over wave 1–3 and healthy ageing at follow-up (N=3051)

<table>
<thead>
<tr>
<th>Healthy ageing cases</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total N</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Remained inactive</td>
<td>12/273</td>
<td>1.00 (ref)</td>
</tr>
<tr>
<td>Became inactive</td>
<td>37/363</td>
<td>2.50 (1.27 to 4.94)</td>
</tr>
<tr>
<td>Became active</td>
<td>34/275</td>
<td>3.57 (1.79 to 7.14)</td>
</tr>
<tr>
<td>Remained active</td>
<td>521/2140</td>
<td>9.51 (5.22 to 17.33)</td>
</tr>
<tr>
<td>p-trend</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Perceived stress, telomere length and exercise

- Physical activity categories are based on whether the participant met CDC recommended levels of exercise per week. Perceived stress ratings are based on the Perceived Stress Scale. The relationship between perceived stress and telomere length was significant in sedentary participants only.
Exercise and mental health

- Evidence supports inclusion of Physical Activity programs as an adjunct to treatment for conditions including:
  - Depression
  - Schizophrenia
  - Anxiety disorders
  - Post-traumatic stress disorder
  - Substance abuse

- “PA is a feasible, effective and acceptable adjunct to usual care for a variety of mental disorders. There is a clear need for greater investment in initiatives aiming to increase PA among people experiencing mental illness, given the benefits to both mental and physical health outcomes.”

Nutrition and mental health

Healthy and unhealthy diet quality scores correlated with incidence of depression

- Adjusted for age, gender, socioeconomic status, parental education, parental work status, family conflict, poor family management, dieting behaviours, body mass index, physical activity, and smoking

Compared to the lowest quintile, the adjusted odds ratios for symptomatic depression across increasing quintiles of the unhealthy diet score were:

- Q1 = 1.00 (healthy whole-food diet)
- Q2 = 1.03
- Q3 = 1.22
- Q4 = 1.29
- Q5 = 1.79 (poor diet – fast and processed foods, empty calories)

Dietary patterns

- **Mediterranean Diet**: includes nine components: vegetables (excluding potatoes), fruits, nuts, whole grains, legumes, fish, monounsaturated:saturated fatty acid ratio, red and processed meats, and moderate alcohol intake.

- **Prudent dietary pattern**: characterized by high intakes of fruits, vegetables, legumes, fish and other seafood, poultry, and whole grains.

- **Western dietary pattern**: high intakes of red and processed meats, butter, high fat dairy products, eggs, sweets and desserts, French fries, and refined grains.

- **The Alternative Healthy Eating Index**: adherence to a dietary pattern based on foods and nutrients most predictive of risk for chronic disease. Each of the 11 components of the score (vegetables, fruits, whole grains, sugar sweetened drinks, nuts and legumes, red and processed meat, trans fat, long chain (n-3) fats, polyunsaturated fatty acids, sodium, and alcohol) has a minimum score of 0 (worst) and a maximum score of 10 (best), according to component specific criteria.
Mediterranean diet and telomeres

BMJ. 2014; 349: g6674. Published online Dec 2, 2014. doi: 10.1136/bmj.g6674

All dietary patterns are represented: prudent pattern, Western pattern, Alternative Healthy Eating Index (AHEI) score, and Alternate Mediterranean Diet (AMED) score.
Social isolation and health

- Social isolation associated with double death rates independent of other lifestyle variables
- Social interactions important for both quantity and quality
- Protective are:
  - Marriage
  - Contact with family and friends
  - Religious dimension
  - Group affiliation

Social support

- High social support associated with:
  - Better mental health
  - Less heart disease
  - Greater longevity
  - Less substance abuse
  - Better immunity
  - Less dementia

- Quantity and quality both important

- Social isolation associated with poorer health
Connectedness and adolescent health

- Parent-family connectedness and perceived school connectedness protective against health risk behaviors
- “Family and school contexts as well as individual characteristics are associated with health and risky behaviors in adolescents … diminish risk factors and enhance protective factors for our young people.”
Environment

- Environment impacts upon every aspect of mental and physical health
- ‘Environment’ can mean different things
- Ecology: climate, air, water, soil, radiation
  - E.g. living near high voltage power lines or a freeway entrance associated with illness
- Social: home, friends
- Educational: school
- Urban: home, architecture, town planning, safety