

A Whole Life



A Integrated Approach to Sustainable Well-being

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Mindfulness

- Paying attention, on purpose, non-judgmentally
- Being aware of sensations, thoughts, emotions occurring right now without judgment



What are we integrating?

Mind, Body, Spirit
Self, Community, Planet
7 generations



To what end?
Resolving BIG problems through Sustainable Well-being (SWB)

How?
Lifestyle change
Decreased emotional reactivity
Mindfulness as one way

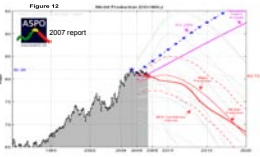




2007 Nobel Prize
IPCC & Al Gore

- Water scarcity
 - 75-250 million by 2020 in Africa
 - Up to 50% decline in agriculture
- Ecosystem: 20-30% extinctions
- Food shortages
- Coasts: .4 - 1.4 m rise in sea level is best case stabilization scenario
- Health: malnutrition, disease, heat/floods/droughts
 - WHO estimate: 150k annual deaths (McMichael, 2001; McMichael et al., 2004)

Peak oil & natural gas

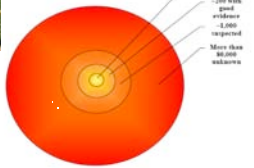


- Never run out
- Is cheap oil significant?
 - 400 g/yr to feed each American [1]
 - Work of 1 g of oil in agriculture = 120 hrs of human labor [2]
 - \$483,840/yr (\$10.08/hr, [3]) to maintain food production w/o oil

[1] Peak Oil, Population and the U.S. Economy Presented: David and Stephanie, Maine Coast Community College of Agriculture and the Sciences, Capacity Capacity Network, 11/21/1998
[2] Peak Oil, Population and the U.S. Economy Presented: David and Stephanie, Maine Coast Community College of Agriculture and the Sciences, Capacity Capacity Network, 11/21/1998
[3] Labor Health Dept of Labor Bureau of Labor Statistics, Mar 9, 2007



What we don't know about chemicals

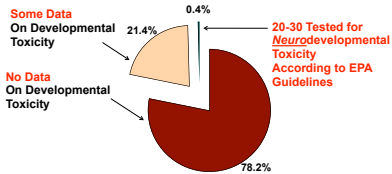


- Widespread use of human-made chemicals begins in 1950's (Wormsal, 1996)

Figure 2
The Collaborative on Health & the Environment (CHE)
Consensus Statement 2007

CHE info courtesy of Dr. Lucille Marchand, UW- Madison

Status of Developmental Toxicity Testing for the 2,863 Chemicals Produced Above 1 million pounds/year



In Harm's Way, www.preventingharm.org
slide courtesy of Dr. Martha Herbert, Harvard



Body Burden: The Pollution in Newborns

A benchmark investigation of industrial chemicals, pollutants and pesticides in umbilical cord blood
Environmental Working Group, July 14, 2005
10 newborns, \$10,000/baby for study

- 287 chemicals detected:
 - 180 cause cancer in humans or animals
 - 217 are toxic to the brain and nervous system
 - 208 cause birth defects or abnormal development in animal tests

<http://www.ewg.org/reports/bodyburden2>

See also: Centers for Disease Control and Prevention, (2005) Third National Report on Human Exposure to Environmental Chemicals. Atlanta (GA): CDC Available at: <http://www.cdc.gov/exposurereport/report.htm>

Slide courtesy of Dr. Martha Herbert, Harvard



Interactions & low doses

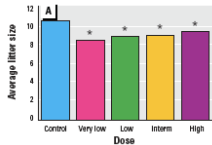
- aldicarb (insecticide), atrazine (herbicide), & nitrate (fertilizer)
 - Aggression
 - Thyroid
 - Immune

Porter, Jaeger, & Carlson (1999)



How many 2 & 3-way interactions from 80k chemicals?

- Over 85 trillion (85,303,200,000,000)
- 50,683 lifetimes just to count them (at 2 per sec)



- Low doses can matter more (Caverees, Jaeger, & Porter, 2002)

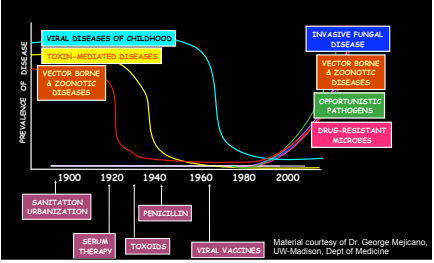
Last lifetime being infection free?

"One can think of the middle of the 20th century as the end of the most important social revolutions in history – the virtual elimination of infectious disease as a significant factor in social life."

Sir M. Burnet, 1962
Nobel Laureate

Material courtesy of Dr. George Mejicano, UW-Madison, Dept of Medicine

Emerging Infectious Diseases



Current antibiotic resistant bacteria

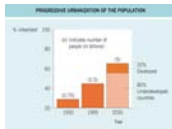
- Acinetobacter
- S. pneumoniae
- VRE
- MRSA, VISA, & VRSA
- MDR-TB, XDR-TB
 - Airborne
 - South Africa: 52 of 53 died (WHO, 2006)



CDC, WHO Photo courtesy of Dr. George Mejkano, UW-Madison, Dept of Medicine

Major Factors Contributing to the Emergence of Infectious Diseases

- Human demographics and behavior
 - urbanization
- Industry and commerce
 - Over use of antibiotics in animals creates drug-resistant bacteria
 - Huge farms: animals close proximity
 - Non-local food: cyclospora parasite



Material courtesy of Dr. George Mejkano, UW-Madison, Dept of Medicine

Swine Factory Creates Airborne MDR Bacteria



Courtesy Kellogg Schwab, Johns Hopkins

- Most antibiotics are not used to treat disease but to increase growth and feeding efficiency
- *Enterococcus* and other bacteria isolated from air sample at swine feeding facility
- 98% resistant to 2 or more antibiotics used in humans (and approved for use in swine feed)
- 0% resistant to vancomycin (not legal for swine feed)

Environ Health Perspect 113:137-142 (2005)



Major Factors Cont'd

- Economic development and land use
- International travel
- Microbial adaptation and change
- Breakdown of public health measures



Material courtesy of Dr. George Mejicano, UW-Madison, Dept of Medicine



Infectious Disease



- Ship ballast water contains cholera
- West Nile Virus
 - Mosquito arrives by plane on an abnormally hot July in 1999
 - By 2002, birds have spread it across U.S.
- Climate change story
 - e.g., Malaria & mosquito incubation time (Patz & Olson, PNAS, 2006)



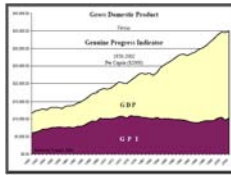
Some material courtesy of Dr. George Mejicano, UW-Madison, Dept of Medicine



“When the depression ended, we stopped dancing” (Joe Bonus)

GDP vs. other measures

- GDP
 - Muggings & divorce good for GDP
 - Services with no \$ exchange don't count
- GPI
 - Destructive \$ subtracted not added: CO2, commuting, loss of leisure time, unfair income distribution
 - Volunteer & house work, etc. included



Source: Postville, Inc., Genuine Progress, 1980 to 2000



"Salud, amor, y pesetas, y tiempo para gozarlos"

It goes 7.4 miles!



- Denominator
- per hour?
 - til it dies?
 - per gallon?

Sustainable Well-Being

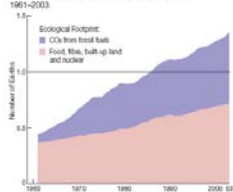
$$\frac{(\text{Mental \& Physical Health}) * \text{Longevity}}{\text{Ecological Footprint}}$$



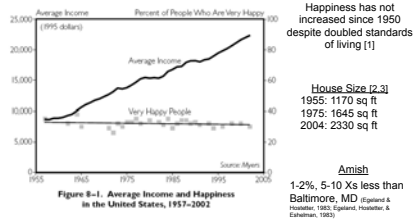


How much of the Earth's resources does your lifestyle require?

Fig. 1: HUMAN DEMAND ON THE BIOSPHERE, 1967-2003



Happiness



Happiness has not increased since 1950 despite doubled standards of living [1]

House Size [2,3]
1955: 1170 sq ft
1975: 1645 sq ft
2004: 2330 sq ft

[1] "State of the World: 2004" Worldwatch Institute; [2] Center for Sustainable Systems Residential Building Fact Sheet; [3] Nat'l Assoc. of Home Builders

How are we doing?

Life Sat	Life Exp	EF	HPI	Rank
7.4	77.4	9.5	28.8	150

Country	Life Sat	Life Exp	EF	HPI	Rank
Vanuata	7.4	68.6	1.1	68.2	1
Costa Rica	7.5	78.2	2.1	66	3
Cuba	6.3	77.3	1.4	61.9	6
Switzerland	8.2	80.5	5.3	48.3	65
UK	7.1	78.4	5.4	40.3	108
Sweden	7.7	80.2	7	38.2	119
France	6.6	79.5	5.8	36.4	129
Lithuania	4.7	72.3	3.9	29.3	149
USA	7.4	77.4	9.5	28.8	150
UAE	7.4	78	9.9	28.2	154
Ukraine	3.6	66.1	3.3	22.2	174
Zimbabwe	3.3	36.9	1	16.6	178

nef "The UnHappy Planet Index"



Life Sat	Life Exp	EF	HPI	Rank
7.4	77.4	9.5	28.8	150

Well-being: Physical Health

24th in world for disability adjusted life expectancy
"Basically, you die earlier and spend more time disabled if you're an American rather than a member of most other advanced countries"

World Health Organization

Q: Why?

Life Sat	Life Exp	EF	HPI	Rank
7.4	77.4	9.5	28.8	150

- Some groups (e.g., Native Americans, inner city poor) have extremely poor health, more characteristic of a poor developing country rather than a rich industrialized one
- HIV kills or disables more in U.S. than in most other advanced countries
- U.S. a leader for cancers relating to tobacco
- A high coronary heart disease rate
- High levels of violence, especially of homicides, when compared to other industrial countries (Crime is up 300% from 1950-1980 & still above 1950 levels; Layard, 2005)

A: Social Justice & Lifestyle

World Health Organization

Well-being: Mental Health

Life Sat	Life Exp	EF	HPI	Rank
7.4	77.4	9.5	28.8	150

Table 3. Twelve-Month Prevalence of World Mental Health Composite International Diagnostic Interview (Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition)*

Country	% 12-Month Prevalence (95% Confidence Interval)			
	Anxiety	Mood	Impulse-Control	Substance
Australia	10.0 (9.4-10.7)	6.0 (5.6-6.7)	3.9 (3.2-4.7)	2.8 (2.0-3.7)
Canada	6.6 (6.1-7.0)	4.0 (3.6-4.4)	1.3 (1.0-1.6)	2.3 (1.6-3.0)
United States	10.7 (10.0-11.5)	6.6 (6.0-7.2)	4.0 (3.3-4.7)	3.3 (2.5-4.1)
Denmark	6.8 (6.3-7.3)	4.7 (4.2-5.1)	1.0 (0.7-1.3)	1.2 (0.8-1.6)
France	11.0 (10.4-11.7)	6.1 (5.6-6.6)	1.4 (1.1-1.7)	0.7 (0.5-1.0)
Germany	6.2 (5.7-6.7)	3.5 (3.1-3.9)	0.9 (0.7-1.1)	1.1 (0.8-1.4)
Italy	6.4 (5.9-7.0)	3.8 (3.3-4.3)	0.9 (0.7-1.1)	0.9 (0.7-1.1)
Netherlands	6.8 (6.3-7.3)	4.9 (4.4-5.4)	1.3 (1.0-1.6)	0.9 (0.7-1.1)
Spain	10.0 (9.5-10.5)	6.1 (5.6-6.6)	0.8 (0.6-1.0)	0.2 (0.1-0.3)
Sweden	7.1 (6.6-7.6)	4.1 (3.7-4.5)	1.2 (0.9-1.5)	0.4 (0.3-0.5)
United Kingdom	11.2 (10.6-11.8)	6.6 (6.1-7.1)	1.7 (1.4-2.0)	1.0 (0.7-1.3)
Japan	3.3 (2.9-3.7)	0.8 (0.7-0.9)	0.0 (0.0-0.0)	0.0 (0.0-0.0)
Mean	6.3 (5.7-7.0)	3.1 (2.7-3.6)	1.0 (0.8-1.2)	1.7 (1.3-2.0)
People's Republic of China	2.2 (1.8-2.6)			
India	2.4 (2.0-2.8)			
South Africa	2.4 (2.0-2.8)			

Source: WHO World Mental Health Survey Consortium (2004), JAMA

Resources Used

Life Sat	Life Exp	EF	HPI	Rank
7.4	77.4	9.5	28.8	150

- U.S. uses 6.8 planets worth of resources
- We use more energy/person than any other country (except UAE)
- U.S. & allies outspend all non-allies militarily
- "Providing adequate food, clean water, and basic education for the world's poorest could all be achieved for less than people spend annually on...
makeup, ice cream, and pet food" (p.10, State of the World, 2004)


Mindfulness effective for...

- Anxiety, depression, stress, burnout (e.g., Cohen-Katz, Wiley, et al., 2005; Ma & Teasdale, 2004; Teasdale, Segal, Williams, et al., 2000)
- Chronic pain (Kabat-Zinn, 1982; Kabat-Zinn, Lipworth, & Burney, 1985)
- Substance abuse (Bowen, Witkiewitz, Dillworth, et al., 2006)
- Arthritis (Pradhan et al., 2007)
- Diabetes (Gregg, Callaghan, et al., 2007)
- Fibromyalgia (Sephton et al., 2007; Grossman, et al., 2007)
- Psoriasis (Kabat-Zinn et al., 1998)



Mindfulness effective for...

- Positive resting frontal alpha-asymmetry (Davidson, et al., 2003; Bamhofer et al., 2007)
- Immune Function (Davidson, Kabat-Zinn et al., 2003)





...and different types of people

- **Cancer patients** (Specia, Carlson, et al., 2000; Monti, Peterson, et al., 2005; Carlson, Specia, et al., 2007)
- **Health care professionals** (Shapiro, et al., 2005)
 - Medical Students (Shapiro, et al., 1998)
 - Nurses (Cohen-Katz, Wiley, et al., 2005)
- **Women with heart disease** (Tacon, McComb, Caldera, Randolph, 2003)
- **Prisoners** (Bowen, Witkiewitz, Dillworth, et al., 2006)
- **Borderline Personality Disorder** (DBT, Linehan, 1993)

Depression: Preventing Relapse

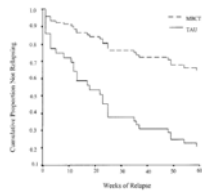


- In remission MDD (n=75)
- Randomly assigned MBCT+TAU vs. TAU
- Measures
 - Measures for treatment inclusion (baseline only)
 - HAM-D (severity of depression)
 - BDI (severity of symptoms of depression)
 - Measures of parenting style (MOPS)
 - Relapse/Recurrence
 - Life events: circumstances provoking relapse if it occurred

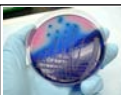
Ma, S. H., Teasdale, J. (2004); see also, Teasdale, Segal, Williams, et al. (2000)



Group	n	2 episodes		3 episodes		≥ 4 episodes	
		Rel/Rec	%	Rel/Rec	%	Rel/Rec	%
MBCT	36	4/8	50	4/12	33	6/16	38
TAU	37	2/10	20	9/15	60	12/12	100



- no difference in relapse rate for participants who suffered 2 episodes previously
- results for those who suffered 3 or more



Brain & Immune Function



- Biotech employees randomly assigned to 8-week MBSR or WL
- Results
 - Decreased anxiety (STAI-T & S) & negative affect (PANAS-trait)
 - Increased baseline left-sided anterior brain activation (EEG)
 - Increased antibody titers to influenza vaccine

Davidson, Kabat-Zinn, Schumacher, et al. *Psychosomatic Medicine* (2003)



Fibromyalgia & Active Control

- Quasi-random to MBSR or Active control
- MBSR more improvement on...
 - Anxiety
 - Depression
 - Pain regulation
 - Quality of life
- Many results held at 3-year follow-up

Grossman, et al. (2007)

Only 2 other studies with active control

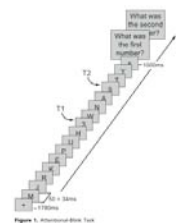
- Attention Control Training vs. physical exercise vs. wait-list control (McMillan, Robertson, et al., 2002)
 - n=145 with TBI
 - Self report reductions in cognitive failures for 2 active controls (=) vs WL
 - No group differences on other tests of cog function & self-report Sxs
- HEP vs. MBSR (N=63; MacCoon et al, submitted)
 - Pre, post, 4-month follow-up
 - No differences on self-report
 - Some indications of improved immune measures (Rosenkranz et al., in prep)



Mechanisms of Change?

- Attention is needed even for awareness of amygdala-mediated stimuli (Pessoa, Padmala, & Morland, 2005, NeuroImage)
- Increased control of habitual responding (Wenk-Sormaz, 2005)
- Better reality sampling (Slagter, Lutz, Greischar, et al. (2007; PLOS Biology)
- Meta-cognitive awareness (Teasdale, et al. 2002)
 - CT & MBST --> increased meta-cog awareness --> decreased depression
 - MBCT reduces overgeneral memory bias (Williams, Teasdale, Segal, & Soulsby, 2000)

Cluttered Room: Attentional Blink



- Attention capacity is limited
- Evidenced when 2nd of 2 close targets not seen (close means < 500 ms)

Slagter, Lutz, Greischar, et al. (2007; PLOS Biology)

- 17 experienced practitioners (Ps) vs. 23 novices (Ns)
- Pre-post 3 months (retreat for Ps)
- No diffs at time 1
- Training changes distribution of limited capacity attention
 - reduced blink (increased T2 accuracy)
 - reduced P3b amplitude at 400 ms
 - Greater reductions in P3b associated with better accuracy

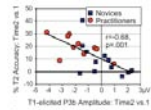
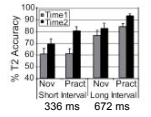


Figure 4. The Ability to Accurately Identify T2 Depends upon the Amount Processing at T1

Slagter, Lutz, Greischar, et al. (2007; PLOS Biology)



Mindfulness

- Being aware is the act of integrating, remembering all parts of ourselves
- welcoming them into awareness without judgment



Integrating parts of ourselves

- Authenticity associated with less depression & anxiety, lower stress, greater subjective vitality, & lower physical Sxs (Ryan, LaGuardia, & Rawsthorne, 2005)
- More distinct one is across different roles, less well-being (Sheldon, Ryan, et al. JPSP, 1997)

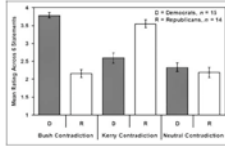


Reactivity as Barrier

- Repression
 - Report low anxiety but exhibit anxious physiology (Weinberger, et al., 1973, JAP)
- Defensive Deniers
 - higher (and medically significant) cardiovascular reactivity associated with higher distress relative to genuinely healthy individuals (Shedler, Mayman, et al., 1993)

Bounded rationality vs. Motivated reasoning

- All decisions are emotional
- Democrats & Republicans read statements about Bush, Kerry, or Tom Hanks (for ex)
- Consistently identified contradictions in "other" candidate but not own



- Negative emotion registered when contradiction was introduced
- With time to reach biased conclusion, negative affect gone
- "brain converges on solutions that minimize negative and maximize positive affect states" (Westin, et al., 2006, Jo of Cog Neuro, p. 1947)

Beyond Self



The Big Us

We are not separate from our context

- Depleting fishery (resource dilemma task)
- 10/30 words on sentence completion task either cooperation or neutral words
- Those primed subliminally for cooperation = those with conscious cooperation goal > neutral words for fish returned to common resource

Bargh, Gollwitzer et al. (2001, Expt 2)



Stanford Prison Experiment

- Participants randomly assigned to "prisoner" or "guard" roles in mock prison setting
- Study prematurely terminated "when it became apparent that many of the 'prisoners' were in serious distress and many of the 'guards' were behaving in ways which brutalized and degraded their fellow subjects"
- "Volunteer prisoners suffered physical and psychological abuse...while volunteer guards were exposed to the new self-knowledge that they enjoyed being powerful and had abused this power to make human beings suffer."

Zimbardo (1973); Expt: Haney, Banks, & Zimbardo (1973)

- 600 MBSR participants -- 7% of effect on mental health Sxs due to group (Imel, Baldwin, Bonus, & MacCoon, 2008)
 - Ecologically responsible behaviors (ERBs)
 - Subjective well-being positively associated with ERBs
 - ...because they have intrinsic values
 - ...and are mindful of their inner experience & behavior
- Brown & Kasser (2005)



True neurally. Mirror Neuron System

- Observing an action = Doing that action
- Experiencing disgust & observing someone's disgust both activate anterior insula (Wicker, Keysers, et al., 2003, Neuron)
- Empathy: to put oneself in the place of others

Buccino & Amore (2008, Neuropsychiatry)

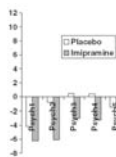


Empathy, Compassion, & Fairness

- Empathy: High functioning autistic individuals have less activation in MNS areas than controls when imitating emotional facial expressions (Depretto, et al, 2006, Nat Neurosci)
- Compassion: AC & Anterior insula activate when partner feeling pain (Singer, et al., 2004, Science)
- Fairness: AC & Anterior insula activated when neuroeconomic games are played fairly or not (Singer, et al., 2006, Nature)



Your Choice: Pills or Person



- Variance in BDI due to medication = 3.4% vs. 9.1% d/t psychiatrist
- HAM-D=5.9% & 6.7%

McKay, Imel, & Wampold (2006), J. of Affective Disorders



"WE must be the change WE wish to see in the world."

Permaculture

- "a set of techniques and principles for designing sustainable human settlements"
 - Permanent culture + permanent agriculture
 - Bill Mollison & David Holmgren (1970's)
- "...vision is of people participating in and benefiting from an abundant, nurturing natural world"
- Focus on relationships -- interconnections
 - among plants, animals, & buildings

Hemenway, Toby (2001). Gaia's Garden: A Guide to Home-Scale Permaculture. Vermont: Chelsea Green Publishing Company, p. 4.

Troy Co-housing

- Lifespan design
- Universal design
- Green space
- Promote community
- Green built & energy star
- Low operating costs
- Affordable: 20 (of 30) units permanently at affordable housing rates
- 2007 Livable Community Award from AARP & NAHB



Ecovillage at Ithaca, NY

Song (30 houses)

Frog Common House

Frog (30 houses)



- 800, 1000, 1200, 1500 sq ft
- Resources = ~14 acres/person (EF 1.0)
- 25 acres = avg (EF 1.0, 56% of avg American)

Sharing...

- Meals
- Childcare
- Cars?
- Financing to increase renewables?
- Homes to increase density?
- Largest obstacles?
 - Intending to change
 - Emotional reactivity prevents getting along

Getting along requires that...

- (A) Everyone do it our way
- (B) We learn to be non-reactive so we can...
- Pay attention to others by paying attention to ourselves
 - Communicate well with people who annoy us, drive us crazy, etc.



Maximize sustainable well-being

- Be fully human right here, right now
- Lean in to a more sustainable lifestyle
- Health care
 - Suicidal clients with abusive spouse out of inpatient benefits
 - Drug addict can't afford treatment so goes to prison
 - Being paid so little that work loads increase & care decreases
- Work with others for lifestyle change
- Living a lifestyle that allows us to charge reasonable fees



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Thank you

- Greg Reeb
- Rizwan Ahmad
