

# SLIDES FROM KILLING THEM SOFTLY PRESENTATION

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Note: The graphs cited in the original presentation are summarized in these slides. To view the actual graphs, please refer to the articles in which they appeared, as listed in the bibliography at the end of the slides.

# Adverse Childhood Experiences (ACE) Study

- ▣ V.J. Felitti, R.F. Anda et al, 1998.
- ▣ Ongoing study based on data from Kaiser Permanente Health Plan members conducted in conjunction with the U.S. Centers for Disease Control (CDC).
- ▣ Study cohort of >17,000, largely middle class.
  - 50/50 male/female.
  - 80% White (inc. Hispanic); 10% Black; 10% Asian.
  - Average age of 57.
  - All had good health insurance.
- ▣ Study originally dealt with obesity.
  - Why did most successful often drop out?

# Likelihood of dropping out related to number of *Adverse Childhood Experiences* – Effects Generalized to Other Health Problems.

- ▣ Originally identified eight categories (stressors) when reviewing first wave of data:
  - Abuse:
    - ▣ Emotional/recurrent threats/humiliation.
    - ▣ Physical (beating).
    - ▣ Sexual (with “contact”).
  - Dysfunctional home:
    - ▣ Mother treated violently.
    - ▣ Family member = alcoholic / drug user.
    - ▣ Imprisoned household member.
    - ▣ Chronically depressed/suicidal/mentally ill/psych. hospitalized.
- ▣ Added categories of neglect with second wave:
  - Neglect:
    - ▣ Physical neglect.
    - ▣ Emotional neglect.
- ▣ One of more instances of any one category counts as **one** ACE point.
  - ACE score range is zero to ten (0-10).

# Interesting Fact # 1.

Women are 50% more likely than men to have experienced five or more ACE categories.

Let's see what other statistically significant data was noted...

# Graph showing likelihood of depression at some time in life with increasing ACE score:

- ▣ Women:
  - <20% at ACE score of zero
  - Rises to nearly 60% at ACE score  $\geq 4$
  
- ▣ Men:
  - Approx. 20% with ACE score of zero
  - Rises to 30+ % with ACE score  $\geq 4$

# Graph showing likelihood of making a suicide attempt with increase in ACE score:

- ▣ Shows rise in likelihood from negligible at ACE score of zero to nearly 20% at ACE score of 4 or greater.



# Graph showing likelihood of certain health outcomes with increasing ACE score

- ▣ Likelihood of having had sexual intercourse by age 15 increases from about 7% with zero ACE score to >25% with ACE score  $\geq 4$ .
- ▣ Likelihood of teen pregnancy increases from about 20% with zero ACE score to >40% with ACE score  $\geq 4$ .
- ▣ Likelihood of teen paternity increases from about 15% with zero ACE score to approximately 35% with ACE score  $\geq 4$ .

# *WHAT ABOUT “PHYSICAL” ILLNESSES?*



# Graph showing the increase in likelihood of liver disease with increasing ACE score

- ▣ Likelihood of liver disease increases from below 6% at ACE score of zero to above 10% at ACE score  $\geq 4$ .

# Graph showing increase of likelihood of chronic obstructive pulmonary disease (COPD) with increase in ACE score.

- ▣ Likelihood of suffering from COPD rises from about 7% for an ACE score of zero to more than 17% for an ACE score of 4 or greater.

For those with up to a maximum of 4+ ACEs, the following risk factors and disease conditions were found to be substantially more common (compared to those persons with 0 ACEs):

<b>Cigarette Smokers to 2+ times (x)</b> those with no ACEs.	<b>IHD 2.2 x</b>
<b>Severe obesity 1.6 x</b>	<b>Cancer 1.9 x</b>
<b>No leisure time physical activity 1.3 x</b>	<b>Stroke 2.4 x</b>
<b>Depressed 2 weeks 4.6 x</b>	<b>COPD 3.9 x</b>
<b>Suicide attempt 12.2 x</b>	<b>Diabetes 1.6 x</b>
<b>Alcoholic 7.4 x</b>	<b>Broken bones 1.6 x</b>
<b>Illegal drug use 4.7 x</b>	<b>Hepatitis/jaundice 2.4 x</b>
<b>Injected drugs 10.3 x</b>	<b>Fair/poor health 2.2 x</b>
<b>Had an STD 2.5 x</b>	<b>50+ intercourse partners 3.2 x</b>

# Overall Mortality Graph

- ▣ Longevity decreases with each increase in ACE score.
- ▣ Individuals with an ACE score of 4 are significantly less likely to live past age 65.

# Proposed Mechanisms:

- ▣ **Homeostasis:** The process by which living physiological systems regulate their levels of activity around fixed optimal set points. (W.B. Cannon, 1929)
- ▣ **Allostasis:** the process of achieving stability, or homeostasis, through physiological or behavioral **change in response to environmental factors**. This can be carried out by means of alteration in the autonomic nervous system, the hypothalamic/adrenal/pituitary axis, hormones, cytokines (cell-signaling protein molecules), or a number of other systems, which is **generally adaptive in the short term**. Allostasis is essential in order to maintain internal viability amid changing conditions. (Sterling and Eyer, 1988; McEwen, 1998; Schulkin, 2003)
- ▣ **Patterns of neuronal firing in brain:** neuronal/chemical activity are two sides of the same coin – e.g. arousal, amygdala activity, PTSD/DTD.
- ▣ What's adaptive in the short term is, however, **not necessarily adaptive in the long term**.

# Concept of *Allostatic Load*:

- ▣ T.E. Seeman et al., 2001.
- ▣ *Allostatic Load* (AL) is proposed term for the cumulative biological burden exacted on the body through attempts to adapt to life's demands.
- ▣ In a baseline study of 1,189 men and women ages 70-79, higher AL scores were associated with:
  - Significantly increased risk for mortality, as well as declines in cognitive and physical functioning, during study.
  - Also marginally associated with increased incidence of cardiovascular disease.
  - Effects independent of “standard socio-demographic characteristics and baseline health status.”

# “Epigenetics”

- ▣ Literally, above or beyond genetics.
- ▣ Recent concept, not yet fully understood (Skinner, etc. 2005).
- ▣ Changes in gene expression or cellular phenotype caused by mechanisms other than changes in the underlying DNA sequence.
- ▣ Primary mechanisms appear to be induced changes in methylation process or piRNAs attaching proteins to specific genes.
- ▣ Can carry forward for two generations; possibly more.



# Stress Counts - Very Early Stress Counts a Lot.

- ▣ Telomere: a repetitive nucleotide in sequence at each end of a chromosome, which protects the end of the chromosome from deterioration or from fusion with neighboring chromosomes. Over time, the telomere ends become shorter with cell division as part of the aging process.
- ▣ In Nurses' Health Study, women with higher phobic anxiety were found to have a relative telomere length equivalent to women 6 years older (O.I. Okereke et al, 2012).
- ▣ Exposure to violence (domestic violence, bullying, victimization, physical abuse) during childhood is associated with telomere erosion between 5 and 10 years (I. Shalev et al., 2012).
- ▣ Whitehall study.
- ▣ IT'S GOOD TO BE KING!

# SHOULD DISCRIMINATION BE CONSIDERED AN ACE “CATEGORY”?

I would suggest that it should...

# Racism

- ▣ Most data in reference to African-Americans.
- ▣ Brown v. Board of Education (Topeka) (1954).
  - Cited impact of segregation on children's mental status ("doll test"). (K.B. Clark & M.P. Clark).
- ▣ Of 25 studies having to do with psychological distress, 20 reported a positive association between discrimination and stress; 3 reported a conditional association.
- ▣ Some numbers from the Healthy People Initiative study (1979-1998) (cited by R.S. Levine et al., 2001):
  - **Black Americans experienced 4.3 to 4.5 million premature deaths** relative to white Americans **between 1940 and 1999**.
  - Average numbers of excess deaths per day (relative to white Americans) among black Americans increased by 20% from 1980 to 1998.

# Racism II

- ▣ Response to experience perceived as racist leads to activation of the hypothalamic pituitary adrenal cortical system, cortisol release, cardiovascular and respiratory changes (Clark et al., 1999).
- ▣ NIH Healthy Aging in Neighborhoods of Diversity Across the Life Span (HANDLS) study (629 participants) (S.L. Szanton et al., 2011):
  - Measured oxidative stress by determining the level of degradation products in red blood cells.
  - Found individuals who reported suffering from racial discrimination (self report) had higher levels of oxidative stress than those who had not reported experiencing prejudice.

# Racism III:

## Implications from Birth

- ▣ Maternal stress compromises immune, endocrine, and vascular functioning during pregnancy, hyper-activates placental-fetal system, increases susceptibility to intrauterine & fetal infection, and leads to preterm delivery (Wadhwa et al., 2001).
- ▣ African-American women with lifetime exposure to three or more domains of interpersonal racism were 3.2 times more likely to deliver a very low birthweight infant (J.W. Collins et al., 2004).
- ▣ A interesting related statistic from the British “Whitehall Study:”
  - Hospitalization during childhood and lower birthweight are associated with a lower occupational position and a greater risk of heart disease later in life (M. Elovainio et al., 2010).

# Racism IV:

## Blood Pressure, Cardio and Belief in Yourself.

- ❑ In a sample of 4,694 African-American men and women, perceived discrimination was associated with higher levels of diastolic blood pressure (smaller number), but not with higher systolic BP (larger number) (T.T. Lewis et al., 2009).
- ❑ In a sample of 90 AA men and women, a “tendency to embrace mainstream American culture was associated with higher DBP and heart rate, as well as higher SBP in men.” (I.N. Daniels et al., 2001).
- ❑ In a sample of 1,216 AA men, cardiovascular risk was higher among those who endorsed negative beliefs about Blacks (particularly those reporting no discrimination) (Chae et al., 2010).
- ❑ African Americans with a “system-blaming” orientation who reported experiencing racism in 1979 were more likely to be alive in 1992 than “self-blamers” (T.A. LaVeist et al., 2001).



# Racism V: A Pain in the...

- ▣ Functional Magnetic Resonance Imaging (fMRI) shows that social exclusion activates areas of the brain similar to those associated with physical pain (anterior cingulate cortex mediated by right ventral prefrontal cortex) (Eisenberger et al., 2003).
- ▣ Episodes of major lifetime discriminatory events were the strongest predictors of back pain reports in African Americans – particularly women – in the National Survey of Midlife Development in the United States (MIDUS) (R.R. Edwards, 2008).



# IMPORTANT FOOTNOTE:

These data are specific to African Americans.

Many of these correlations are **not** found in Africa or in people of African ancestry living in the Caribbean or elsewhere. **For example, West African and Afro-Caribbean populations reportedly have prevalence rates of hypertension and diabetes 2 to 5 times lower than those of black Americans or black Britons (cited in Kawachi et al.).**

# And Hispanics, too...

- ▣ Chicago-area study: Non-Hispanic AA (1,240), Non-Hispanic whites (983), Hispanics (802), others (80) on stress & health. (Sternthal, 2011)
  - Relationship; financial; major life event (death of loved one; life-threatening illness; unemployment) had largest & most consistent negative effects.
- ▣ **US- born Hispanics & AA show higher levels of stress than whites and foreign-born Hispanics.**
- ▣ Increased depression, chronic illness (heart, cancer, high BP) & physical functional limitations correlate.

# Sexual orientation...

- ▣ Data from the Coronary Artery Risk Development in Young Adults (CARDIA) study longitudinal study (1989 questionnaire; 1992-3 exam) (Krieger & Sidney, 1997):
  - Self-reported experiences of **discrimination based on sexual orientation** (Sample Defined: 204/1,724 participants reported at least one same-sex partner (12%); M/F; black & white; ages 25-37 Y.O.)
    - ▣ 27 AA women - 33% reported discrimination.
    - ▣ 13 AA men - 39% reported discrimination.
    - ▣ 87 white women - 52% reported discrimination.
    - ▣ 77 white men - 56% reported discrimination.
  - Negative stressor similar similar race/ gender discrimination (also found in study), predicting elevated BP, etc.

# Women???

- ▣ Remember that women are 50% more likely than men to have experienced five or more ACE categories.
- ▣ You can take it from there...

# Race & Class

- ▣ Both are factors (Kawachi, Daniels & Robinson, 2005, 2013).
- ▣ In measures of death rates due to heart disease among both men and women (the rate is higher for men than for women), although the likelihood of dying from heart disease decreases with income level, mortality for Black Americans is always higher than for white Americans of comparable income level (citing: National Center for Health Statistics, 1998 data).

# Neighborhoods count: Moving to Opportunity (MTO) Study

- ▣ HUD project in NY/LA/Boston/Baltimore; mid-90s; random vouchers to 4,500 low-income families; mainly female head of household; neighborhood mobility vs. subsidized housing in neighborhood (as controls). Goal of improving income mobility.
- ▣ Better neighborhoods have fewer intrinsic stressors.
- ▣ When compared to those who remained in public housing, individuals given a housing voucher to move to a better neighborhood are:
  - 19% less likely to have a BMI of at least 40 (morbid obesity).
  - 22% less likely to develop diabetes (Ludwig et al. , 2011).
  - Significantly improved mental health & higher subjective well-being (happiness), although not significant income mobility (Ludwig et al., 2012).
- ▣ Earlier paper to remember: In 1994 Durkin et al. in a small-area analysis in northern Manhattan found that “children in predominately low-income households were twice as likely to receive injuries from all causes and four and one half times as likely to receive assault injuries.”

# THANK YOU

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