what don’t we know? (YET!)
plan

introduction

i · variations within a sex

ii · systems interconnections

iii · bodies in context

iv · how the world writes on the body

epilogue
If politics is the art of the possible, research is surely the art of the soluble. (Medawar, 1969, p. 97)
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epilogue
daily mood varies

- 39 Items
  - 15 mood Items
  - Health questions: exercise, sleep, food
  - Social support
  - Are you menstruating today: yes/no
  - Neutral question: Daylight hours
- Mood Items
  - **Positive:** Enjoyment, Confidence, Happiness, Motivation, Energetic, Felt on top of things, Getting along with people
  - **Negative:** Irritability, Anxiety, Sadness, Couldn’t cope, Under stress

During the past day, how happy have you felt?
Least ever -------------------------------Most ever
mood & menstrual cycle phase
mood & estrogens

mood & progestagens
variations within a sex

- there is a relationship between daily mood and daily hormone levels

but

- mood does not correlate with one stage of the menstrual cycle (such as premenstrual or late luteal phase)

- population and individual results differ

- need to measure daily hormones for each individual
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epilogue
brca1/2 mutations

• women with brca1/2 mutations have a 45 - 87% lifetime risk of developing breast cancer and 15-45% risk of developing ovarian cancer.

• prophylactic bilateral salpingo-oophorectomy (pso), the surgical removal of both ovaries and fallopian tubes reduces risk of breast cancer by 50% and ovarian cancer by 80%.

but

what happens to the brain?

• bso results in the rapid reduction of 17beta-estradiol, triggering surgical menopause, as many as 10 years prior to natural menopause.

• estrogen receptors are found throughout the brain especially in the frontal cortex and hippocampus. Estrogens are implicated in verbal, spatial and working memory.
• **bso** (n=8)  
  brca1/2 mutation  
  39-51 years old  
  6 months to 8 years post-oophorectomy  
  no serms or ais  
  3 women on ert  

• **age control** (n=8)  
  40-50 years old  
  pre or peri-menopausal  
  no hormone  

• **brca control** (n=4)  
  brca1/2 mutation  
  34-35 years old  
  no bso  
  1 woman on oral contraceptives  

<table>
<thead>
<tr>
<th></th>
<th>BSO</th>
<th>Age Control</th>
<th>BRCA Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>44.5 (5.043)</td>
<td>44.53 (2.560)</td>
<td>34.00 (1.155)</td>
</tr>
<tr>
<td>body mass index</td>
<td>23.06 (2.783)</td>
<td>23.95 (4.435)</td>
<td>22.55 (1.630)</td>
</tr>
<tr>
<td>education (in years)</td>
<td>16.75 (1.669)</td>
<td>18.13 (1.533)</td>
<td>16.75 (2.630)</td>
</tr>
<tr>
<td>iq (estimated by naart)</td>
<td>110.25 (7.340)</td>
<td>110.97 (6.477)</td>
<td>110.445 (7.437)</td>
</tr>
<tr>
<td>e1g (ng/ml)</td>
<td>0.00 – 40.76</td>
<td>4.94 – 37.30</td>
<td>7.46 – 46.88</td>
</tr>
<tr>
<td>pdg (μg/ ml)</td>
<td>0.05 – 0.57</td>
<td>0.11 – 8.43</td>
<td>0.23 – 2.93</td>
</tr>
</tbody>
</table>
logical memory

- Immediate vs. Delayed Recall
- Bar graph showing recall differences

ravlt

- Immediate vs. Delayed Recall
- Line graph showing recall differences

object placement

- Immediate vs. Delayed Object Placement
- Bar graph showing placement differences

Words recalled vs. Time since oophorectomy

- Scatter plot showing relationship

Immediate Object Displacement vs. E1G Concentration

- Scatter plot showing relationship

**p<0.05
systems interconnections

surgery on the reproductive system affects the nervous system

• verbal memory performance decreases post oophorectomy
• time since oophorectomy is correlated with decreased performance on short delay recall
  but
• regression and correlation analyses suggest that improved spatial memory correlates with decreased estrogens
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epilogue
95% girls in somalia undergo female genital circumcision/mutilation/cutting (fgc) between the ages of 5 & 13
are there neurobiological repercussions?

bulbocavernosis sling around shaft of clitoris, surrounds vaginal opening

ischiocavernosus surrounds clitoral crux, contracts during orgasm

superficial transverse perineal underlies labia minora

deep transverse perineal underlies labia majora

pudendal clitoris, perineum & inner thigh

hypogastric cervix & proximal 3/5 uterus

pelvic vagina, cervix, perineal skin

vagus cervix & deep pelvis

http://www.uth.tmc.edu/scriptorium/gallery/kelly/i1-1.html
very mixed methods (vmm)

- qualitative
  1) interviews—themes of pain
- quantitative
  2) mcgill—pain
  3) general health questionnaire & medical history
- physiological
  4) qst

1st

1) what is it like to be you?

2nd

4) does your perception/response change with environment/how you are treated?

3rd

2) how do standardized measurements relate to what you are saying?

3) how do physiological tests relate to what you are saying?
Innovations in gender, sex & health research

circumcision is just something everyone does; it’s normal

many begged their parents to let them be circumcised

fathers/uncles not in favour—mother sees to having it done

sexual desire is not absent

<table>
<thead>
<tr>
<th>interview type</th>
<th>participant 1</th>
<th>participant 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>birth place</td>
<td>interpreter</td>
<td>no interpreter</td>
</tr>
<tr>
<td>current age</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>year leaving Somalia</td>
<td>left Somalia for Italy in 1982, came to Canada in 1991</td>
<td></td>
</tr>
<tr>
<td>education level</td>
<td>school in Somalia, ESL in Canada</td>
<td>post-secondary, college</td>
</tr>
<tr>
<td>FGC age</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>FGC where</td>
<td>clinic</td>
<td>hospital</td>
</tr>
<tr>
<td>FGC anesthesia</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>FGC practitioner</td>
<td>doctor (male)</td>
<td>doctor</td>
</tr>
<tr>
<td>parent involvement</td>
<td>mother and father want</td>
<td>mother wanted and father did not support</td>
</tr>
<tr>
<td>FGC experience</td>
<td>other people went thru a lot of procedures</td>
<td>people from city/small town totally different. She’s from city. She got lighter circ than others. FGC wasn’t as bad as expected. Doctor’s, nurses normal hospital - other’s stories from friends of midwives “two different procedures” hers versus friend.</td>
</tr>
<tr>
<td>no. children</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>type of birth</td>
<td>daughter=s- section in Italy, sons born in Canada</td>
<td>vaginal</td>
</tr>
<tr>
<td>bisexual experience in Canada</td>
<td>shocked when move to Canada, circ as bad</td>
<td>docs/nurses in Canada treat women with FGC differently</td>
</tr>
<tr>
<td>qualitative reports of pain</td>
<td>sensitive, painful neck, more sense than pain, can be pleasure; back when lifting, hard to get up in a.m.; whole-body ache; sometimes rests after work, lies down</td>
<td>pain in sex inside vagina, sharp, ears, breasts, neck, sensitive, too busy working to have pain, not feeling anything. Tired in evening, busy, neck, back, stress, ache. But stretching legs wide hurts, difficult perineum pain. Body feels fine, feels good in her body, still has feeling, whereas others affected by circ have no feeling.</td>
</tr>
<tr>
<td>traits of interview</td>
<td>“accept”, no choice, “proud” culture belonging, cultural feeling</td>
<td>not much talk about sex in Somalia = how to handle with FGC girls still in shell, of being a girl. Everyone talks about FGC as fact, something to be proud of. FGC means, people would tease.</td>
</tr>
<tr>
<td>McGill</td>
<td>headache</td>
<td></td>
</tr>
<tr>
<td></td>
<td>r: 2.32, i: 3.83, o: 2.83, a: 4.25, n: 1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>back</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o: 2.55, c: 4.50, i: 2.83, a: 1.75, n: 0.83</td>
<td></td>
</tr>
<tr>
<td>GBQ</td>
<td>6/10</td>
<td></td>
</tr>
<tr>
<td>Vulvar appearance</td>
<td>clitoris totally removed; labia minora - totally removed; labia majora - intact; stitched?</td>
<td>clitoris totally removed; 1 minora a totally removed; 1 majora intact but stitched</td>
</tr>
<tr>
<td>QST</td>
<td>12/00=40g, needles 1, 3:00=45g, burning 2; 6:00=80g, like a scratch 2, 9:00=250g, like a needle 2</td>
<td>12:00 = t until 3:00g; 3:00 = 300g; 6:00 = 150g; 9:00 = 25g; pressure</td>
</tr>
</tbody>
</table>
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epilogue
still to learn:

how is the female body surface laid out in the brain? we don’t know. where are the uterus, ovaries, internal clitoris located? we don’t know

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epilogue
sex • gender

when considering the human body various points of view, genetics, sex, age, time of day, time of month, language, culture, geography

• biological diversity exists within a category
• the body has no independent parts
• context is critical
• the world writes on the body

in the context of the CNS, the world makes bodies of *difference*
not bodies of *absence*

human biology of diversity
research teams

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astrid bellem, bs

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jan angus, phd
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lubheen baghat
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michael marxen, phd
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sarah romans, md
donna stewart, md
kathryn morgan, phd
brenda toner, phd
anthony levitt, md
david kreindler, md
sheila laredo, md

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maryann barre

habiba adan

hawa abdi