Genetics in the Health of African Americans: Obesity and Ovarian Cancer
Creative Inquiry for a Senior Thesis

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Outline

- Introduction
  - Definitions
  - Research Questions
- Background
  - Why and how?
- Obesity and Ovarian Cancer
- Suggestions for Further Research

- Example of approaching health issues from interdisciplinary perspective
- Identifying questions, directions for further research, holes and conflict in available information... not answers yet!
- Too much information to go in-depth--surface analysis of areas for entry
Introduction

Exploring underlying causes of “genetic” diseases that follow racial categories

- Medical Humanities: intersection of science and the humanities
- Certain gene patterns correspond with certain races, including genes involved with disease
  - How? Why is this unexpected?
- *In health, your evaluation is only as accurate as your tool of measurement.*
  - Combating health disparities--must accurately identify cause of problem
Definitions: Genetics

- Genetics vs. epigenetics
  - What the instructions say versus what you actually did—room for deviance!
  - Selection pressure—different genes survive in different times and places
  - Random assortment—to heck with the rules!

- Gene interaction w/the external environment allows room for variety—and disease
  - Diversity in people—identity and health

What does this mean in health?

- Lots of variables—need accurate measurement!
Definitions: Humanities

- "Race" is sociological, NOT biological
  - Categorization by physical appearance and social groups; changes with politics
  - Measures appearance, NOT lineage

- No genetic code specific to a race—can’t guess someone’s race from their DNA
- Race (phenotype) and ethnicity (culture) ARE different, but do not appear to be differentiated in biological studies.

So when we evaluate health based on race, what are we really saying at a biological level?
Research Questions

Are race and health directly related—or are we missing something that connects them both?

- What is the point of intersection?
  - If not the variables themselves, it must be something outside the variables—the environment!

Can race accurately serve as a parameter for measurement in biology?

- Can studying health as a function of race give any meaningful information? If so, what conditions are required?
Background: Why Obesity and Ovarian Cancer?

- Intersection of medicine and humanities
  - Similar underlying genetic and social factors and contradictions
- African Americans are overrepresented in both these diseases--Even moreso than genetics would predict
- Obesity identified as direct factor in Ovarian Cancer--for better or for worse, which varies by race
- Breadth of information already collected
- Suitable models to examine connections between genetics, race, and health outcomes
Ob vs. Ca vs. BW

How do the health outcomes of Black Women compare with other races in Obesity and Ovarian Cancer?

- Ca x Ob → certain genes of interest only identified in African Americans for each disease. Higher incidence rate than predicted from genetic analysis.

- BA x Ob → cultural eating practices or local access to food may confound measurements of Obesity. Extent of genetic influence by race seems to vary.

- BW x Ca → Genetic analysis predicts lower incidence rate of Ca in BW than what occurs in reality.
Obesity

- Tool of measurement for obesity: *Body Mass Index* (weight-to-height)
  - AA are overburdened by obesity
- Tool of measurement for BMI: *Diet History Questionnaire*
  - Assesses obesity and cancer risk based on dietary habits
- Genetic tool of measurement: *BMI loci*
  - SNPs: single nucleotide polymorphisms
  - SNPs occur once in evolution and are permanently maintained throughout progeny—can trace inheritance
  - Salinas et al. BMC Genetics (2016) 17:78
- Study results show certain SNPs in BMI loci are ONLY found in certain races, and do *not* associate with higher BMI in others
Obesity by Race?

- “previous GWAS (genome-wide association studies) have primarily relied on data from subjects of European ancestry... rarely attempted to thoroughly compare and contrast findings across ethnic groups”
- “The top SNP effects were not generalizable across ethnicities. Ethnic-specificity... likely explains some previous failed replications of candidate obesity loci.”
- One SNP in AA was identified in a gene that was linked to impaired glucose tolerance and reduced insulin response in mice. However, various studies listed different SNPs.

Biological evidence of race? No... just diversity!

- In evolutionary history, genes shuffled and were isolated within continents. Someone with any racial phenotype may pick up an SNP if they traveled far enough to reproduce in that continent, but this rarely happened. This does not equate to our modern day usage of “race.”
  - It may appear to be a “race trait”... when really they’re just distant cousins.
- BMI is much more complicated to measure across races by genetics. More studies of genetic differences WITHIN groups need to be conducted to determine meaningful similarities and differences.
Current question: How do non-genetic measures of health match up, such as the Diet History Questionnaire, used to identify obesity?

- DHQ asks questions about food items that may or may not be accessible at all levels of economic status. This creates a **class artifact**, which may also correlate along **racial lines**.
  - confounds the accuracy of obesity risk assessment, as well as the underlying factors of risk

- Current step in research--differentiate questions as “Middle Class Markers (MCM) or Lower Class Markers (LCM)

  “If something seemed **traditionally expensive**, I assumed it was MCM, like steak. If something was **very specific, like low fat**, I also put that as MCM even if the general category, like cheese, was LCM. This is because **most LCM places, like an Aldi**, are focused on getting their customers goods and not worried too heavily on organic, non-GMO, etc. Those marketing tools would be more heavily seen in **MCM places like Marriano's**.”
Ovarian Cancer

- Identified several SNPs of interest in AA based on obesity... but were all different than previously mentioned studies.
  - Small sample size limits ability to identify trends, not enough across-ethnicity study, use of tools (DHQ) that may include class artifact

“AA OCs are much more aggressive, and associated with poor overall survival, compared to CA OCs. This suggests the **possibility of epigenetic modifications as factors that play a role in OC health disparity, an idea that has not yet been tested**... there is evidence in the literature suggesting an epigenetic basis of health disparity in endometrial cancers [35], particularly, differential ribosomal DNA methylation in AA vs. CA patients” (Velez Edwards, p. 5)

- **Race→dictates environment** (class access, cultural practices)→**Epigenetic changes**
  - Cause is socially driven, NOT biologically determined
Ob vs. Ca vs. BW
In conclusion... there is a lot more research to be done in Medical Humanities!
Research Questions

Are race and health directly related--or are we missing something that connects them both?

- What is the point of intersection?
  - Race affects social experiences shapes our health environment → environment creates genetic and epigenetic consequences that result in health disparities

Can race accurately serve as a parameter for measurement in biology?

- Not as a biological entity, but can be an indicator of one’s health environment if accurately defined
  - (Mexican ≠ White, Ethnicity ≠ Race)
Suggestions for Further Research

Understanding race in health—not as a biological cause in and of itself, but as a feature of one’s health “environment”

- Race affects one’s lived experiences → therefore it shapes one’s environment → and results in biological responses
  - Social conditions that directly affect race: Class, access to health resources in the neighborhood, proximity to pollution, etc.

- More research needs to be conducted to include larger sample sizes of African Americans to study in-group differences, as well as unbiased and precise tools of measurement, which will reveal much more about the role of genetics vs. epigenetics and the influence of our external environment on our health.
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Conwill, W. “Neoliberal Policy as Structural Violence


Salinas et al. BMC Genetics (2016) 17:78
