Implications of findings from social, behavioral and genetic interactions for common diseases?

Keith E. Whitfield
Department of Biobehavioral Health
The Pennsylvania State University

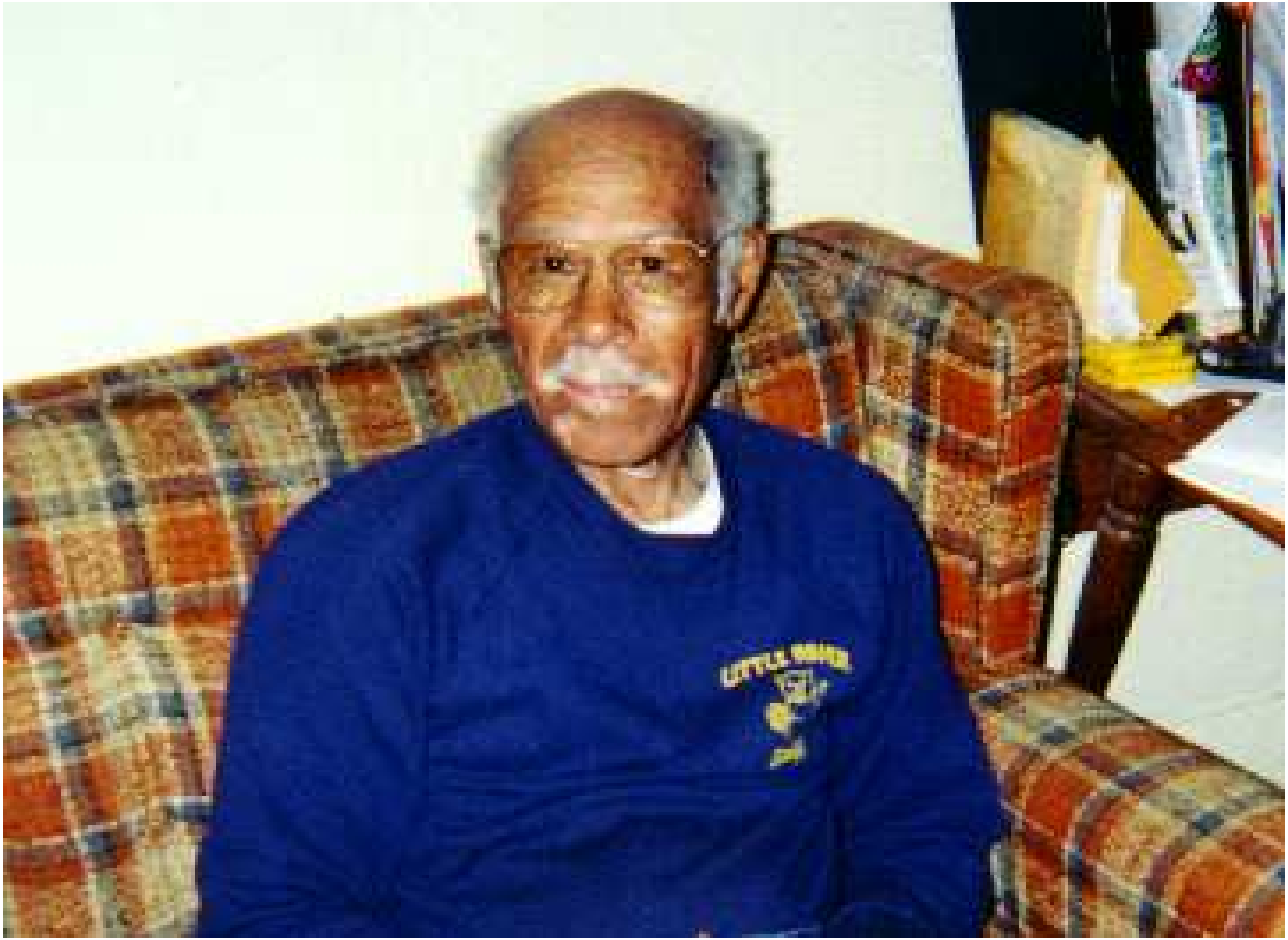
What could the implications be for models of health and disease that include GXE interactions?

- Better understanding of individual variability in health outcomes and behavior
- Better designed clinical interventions
- Better medical care
  - Individualized care
  - Improved understanding of how genotypic and environmental hazards for poor health work in concert
- More…….

Overview

- Layman Interpretations
- Fellow Scholars Interpretations
- Environmental Models for Health Disparities
- Integrations of Concepts
- Alternative Model
- Delivering the Message

Mother was demented, One is cognitively intact and one is not



“Genetic testing is part of a Government Conspiracy to keep Blacks down”

Social Scientists

- “I don’t believe in genes”
- “I don’t want to be any part of a genetic explanation….”
- “I am afraid of what they say about genes and health”
- “I don’t think genetics has anything to do with health disparities”

Reasons

- Concern that assumptions of genetic differences will lead to less treatment not more
  - This happens with social and behavioral variables like SES and IQ
- Where does inequality exist in G X E?
  - How does differential access and medical treatment fit in?
- Race social construct so differences must be social

Environmental Models of Health Disparities

- Weathering Hypothesis
  - Early and long lasting stress creates disparities in mortality and morbidity
- Social Buffering Hypothesis
  - Supportive Social Networks can buffer from experiencing poor health
- Double Jeopardy Hypothesis
  - Race and SES = disadvantage

No Genes in these models

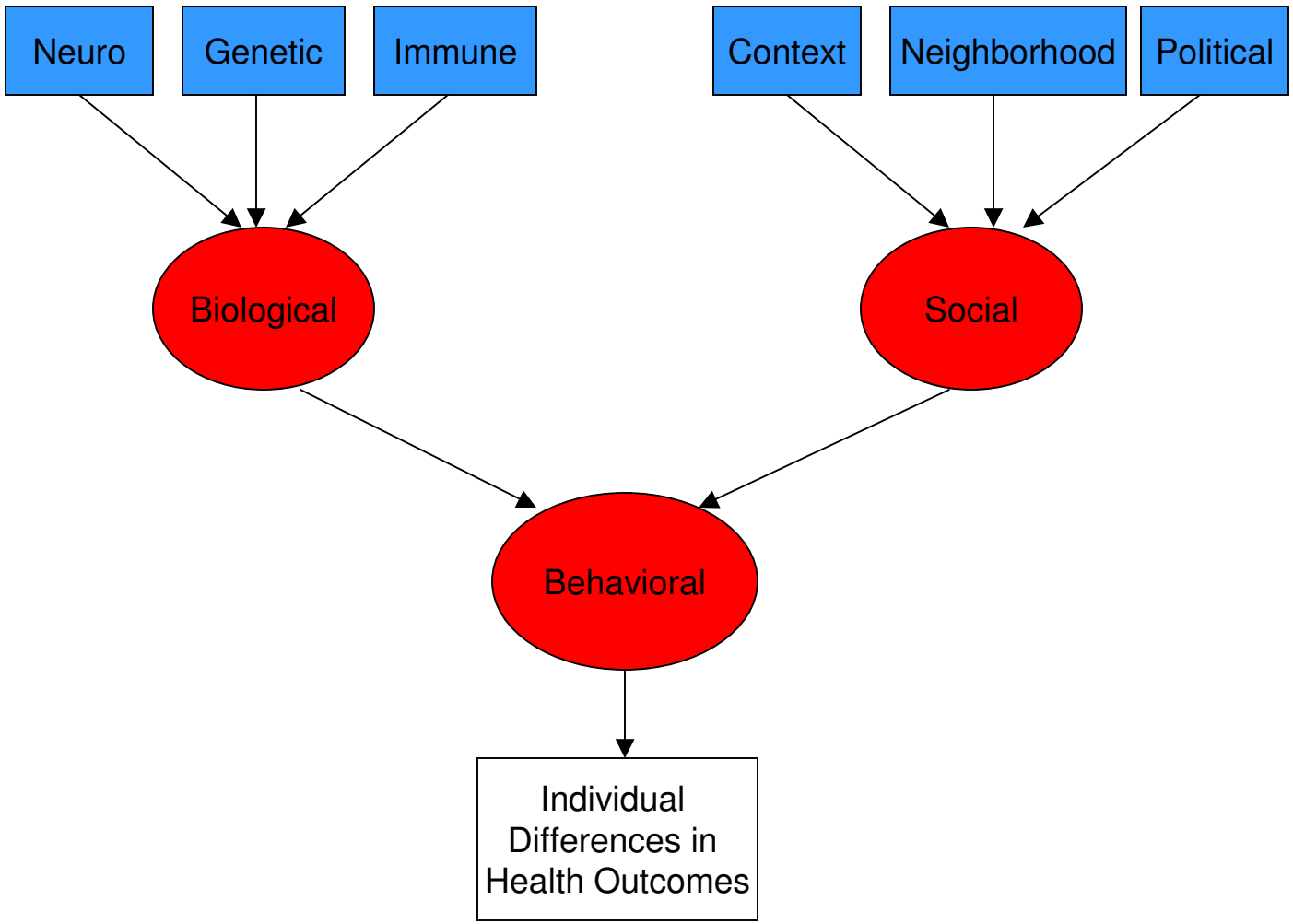
The uphill battle for integration of G X E

- Genetics as science relative to race is politically and socially charged
  - Tuskegee Experiment- biological (genetic differences)
- Many racially discriminatory practices have been argued to be based on genetic differences
  - Messages are often of inferiority
  - Typically based on small effects
- Scholars training is usually done in different disciplines
  - Genetics— Genetics, Biology, Anthropology
  - Environment– Sociology, Psychology, Epidemiology, Anthropology
  - Lack of minority scientists in field of genetics contributes to misconceptions

How Genes Contribute to Health Disparity *Conditions*?

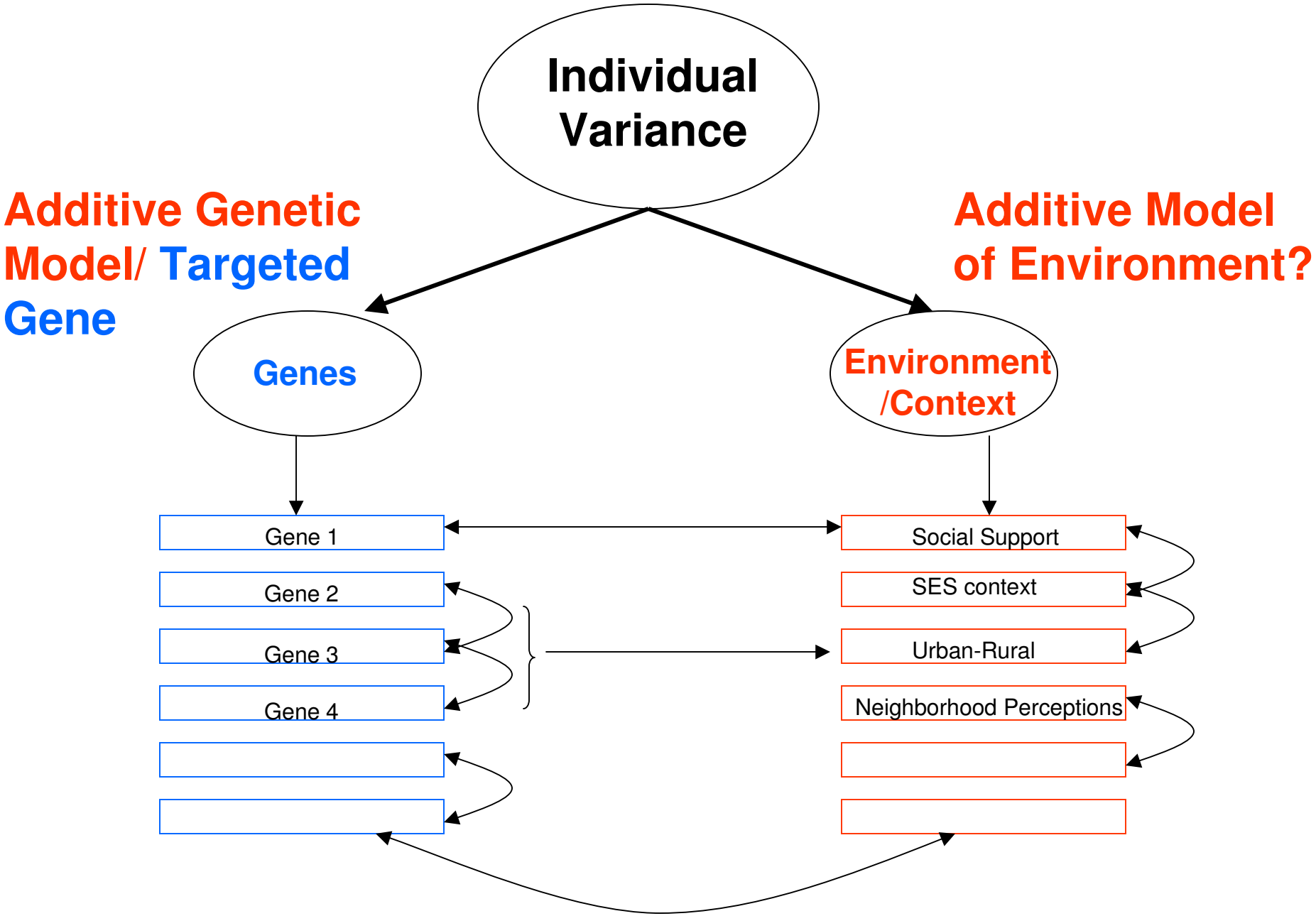
- Combinations of alleles can be risk factor for disease
- Allelic combinations can be more prevalent in one group than another
- Environmental conditions work to trigger, exacerbate, and/or interact with individual allelic combinations
- Both genes and environment may also be protective against some conditions, behaviors, or diseases

Conceptual Issues for Impact of Genes and Environment on Health Behaviors



GXE and Health Behaviors

- Pathways is quite complicated
  - Environmental pathway may be easier to identify
- Social behavioral link has more evidence than biological-behavioral
  - More evidence will come with:
    - FMRI
    - Stress


Individual Variance
Additive Genetic Model/ Targeted Gene
Additive Model of Environment?
Genes
Environment /Context
Gene 1
Gene 2
Gene 3
Gene 4
Social Support
SES context
Urban-Rural
Neighborhood Perceptions

Delivering the Message

- The less informed need to understand that genes play a role in the risk of disease and environment may modify that risk
  - Protective
- There may be differences in allelic combinations between races but when taken in conjunction with environmental influences:
  - Differences do or don't show up
  - Need empirical examples
- Avoiding the socio-biological explanations will be hard but required.
  - Need explanations that are dynamic to represent processes
- Present family models of transmission and how G X E interactions may work
  - Use example like Sickle cell and discuss all variants in disease and what impact environment can make.
- May need to limit discussion to disease processes and limit discussion of health behaviors
- May need more within group analyses to get at interactive processes before making effective and accurate comparisons.