Historical Trend of the Individualized Marriage and Genetic Assortative Mating in the United States

Yi Li
Center for Population Health and Aging, Duke University
Guang Guo
Department of Sociology, University of North Carolina at Chapel Hill

IGSS, Boulder
October 22, 2015

Assortative mating

- Assortative mating: non-random mate selection
- Intra-generational inequality: similarity between spouses
- Inter-generational inequality: characteristics of future generations

Genetic assortative mating

- Phenotypic assortative mating

- Genetic assortative mating

Current study

- Genetic similarity between husband and wife and social forces

- Sorting on genetically determined height

Historical change in the meaning of marriage

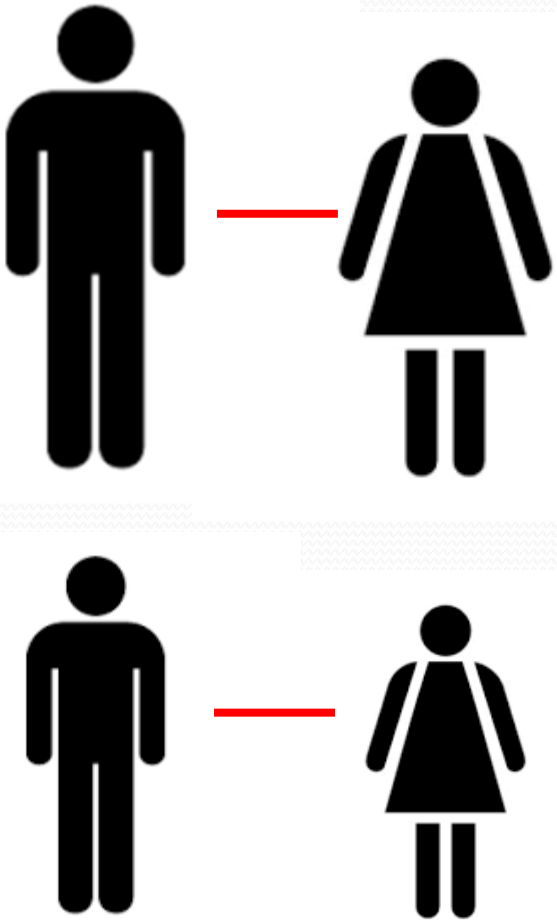
- Change in the societal perception of marriage

- The rise of the individualized marriage starting in the 1960s (Cherlin 2010)

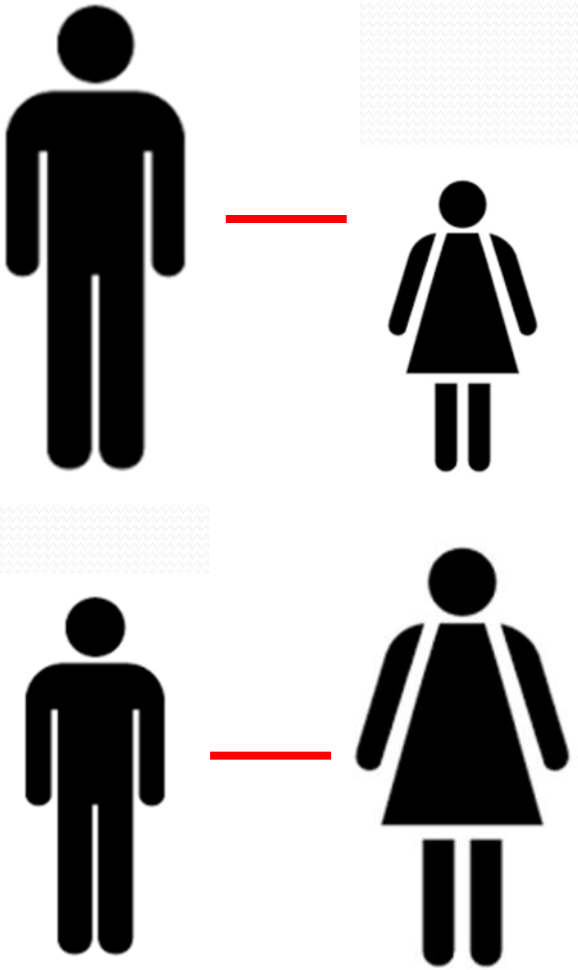
Individualized marriage

- Emphasis on self; individual feelings and decisions
- Decreased control over mate selection
- A decrease in sorting on ascribed characteristics

Non-individualized marriages



Individualized marriages



Why genetically determined height?

- Genes are fixed and inheritable
- Genetics of height: relatively well understood

Why genetically determined height?

- Tallness and reproductive success, health, and other outcomes

- Genetically determined height: a polygenic score based on 743 genetic variables (*Nature* 2010; *Nature Genetics* 2014)

Data

- Health and Retirement Study
- Non-Hispanic Whites

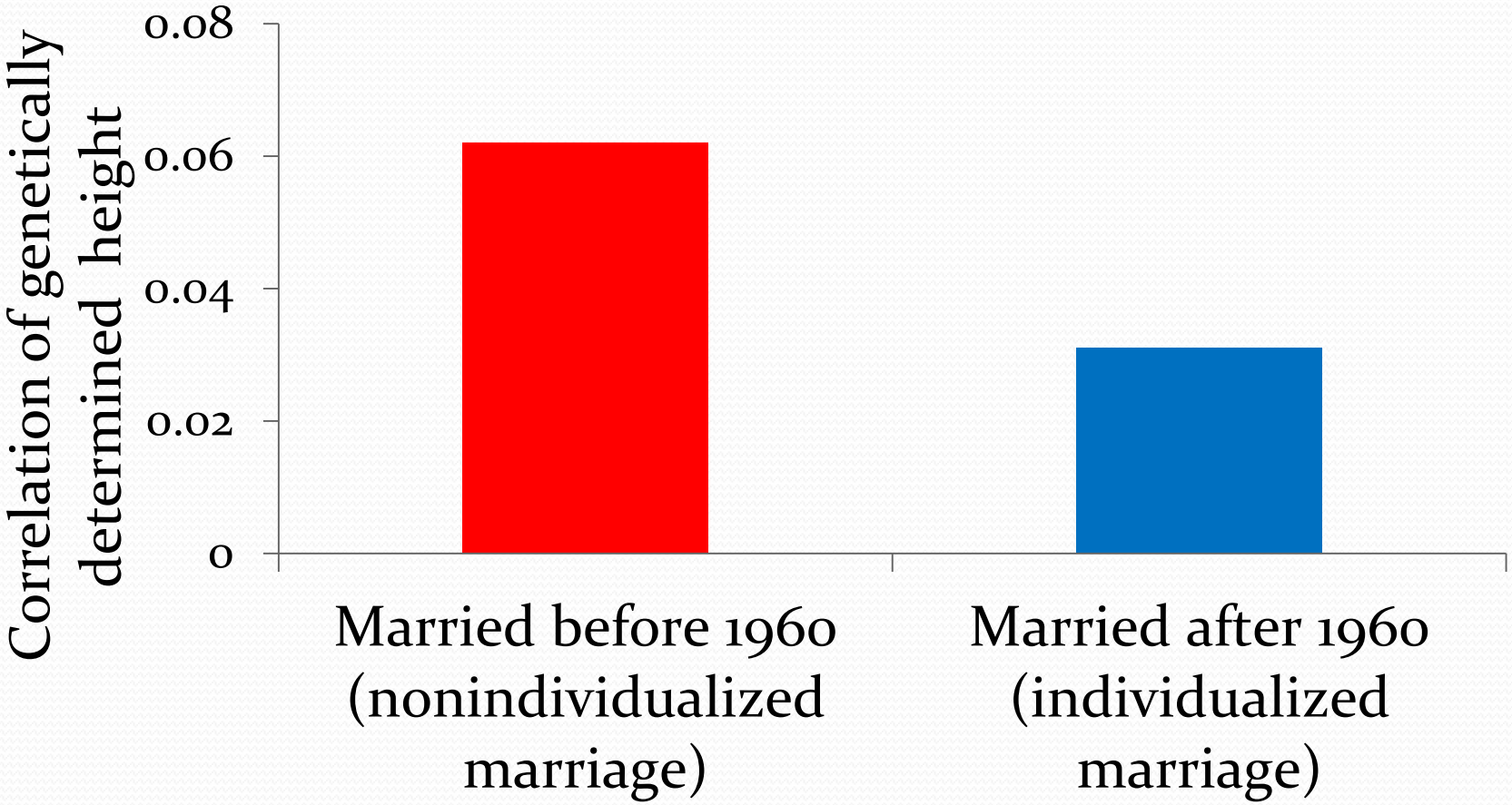
Correlation between spouses

- Mixed linear model

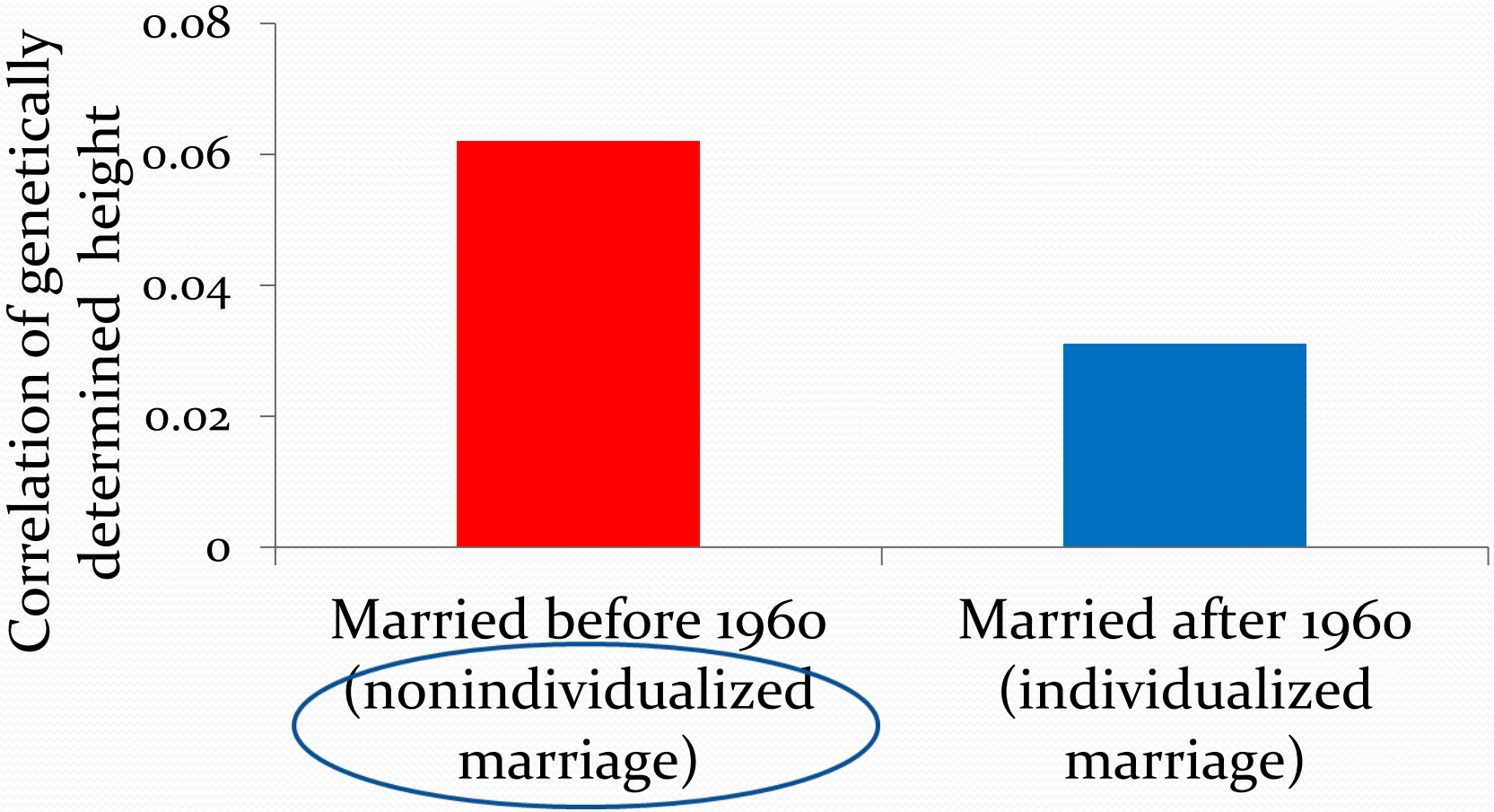
- $\text{GeneticHeight}_{ij} = \text{TenPrincipleComponents}_{ij} + \text{Error}_{ij}$

- $\text{Correlation} = \frac{\sigma_{between}^{2}}{\sigma_{between}^{2} + \sigma_{within}^{2}}$ (intra class correlation)

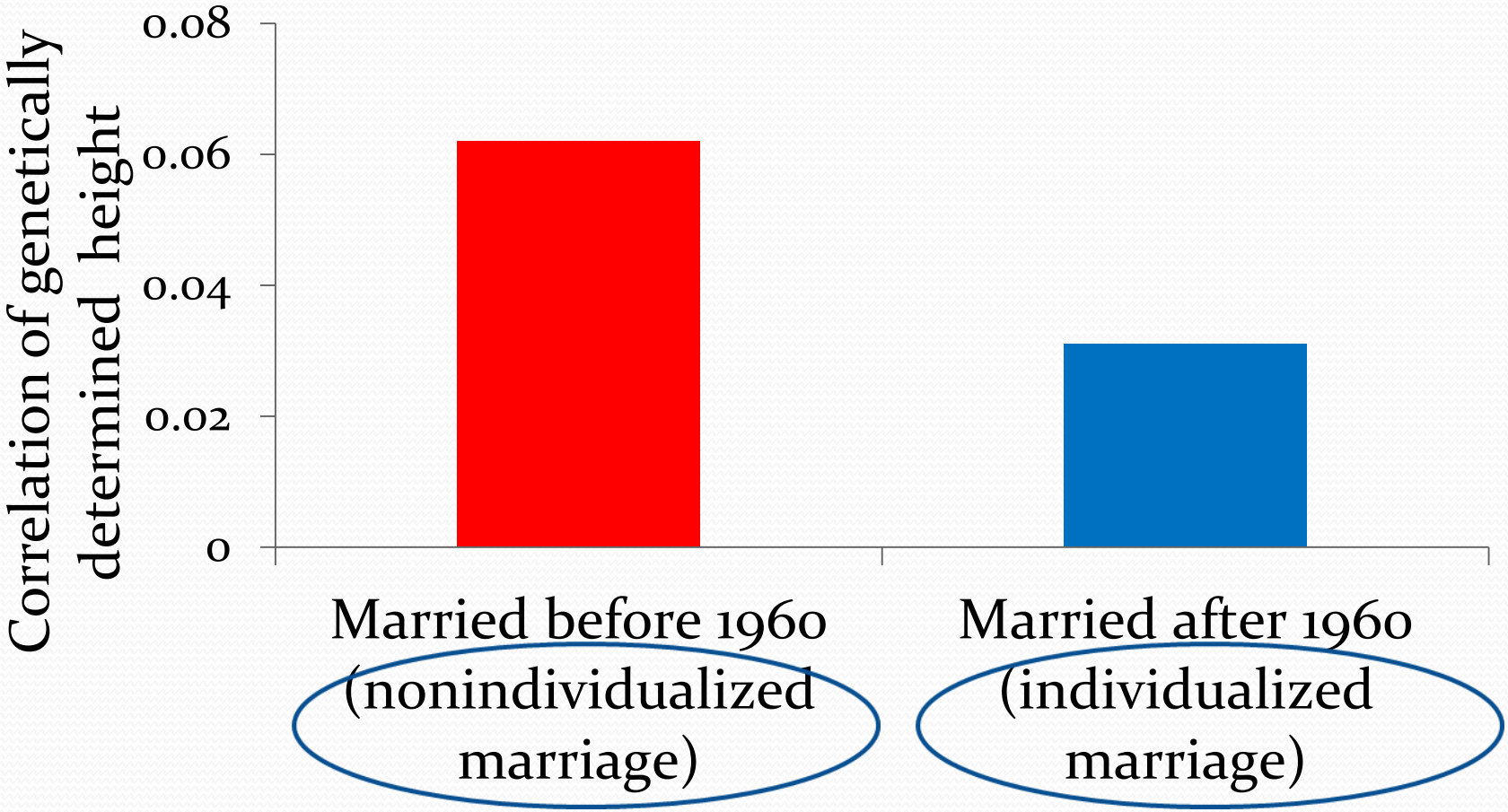
Genetic height similarity of spouses, by marriage period



Genetic height similarity of spouses, by marriage period



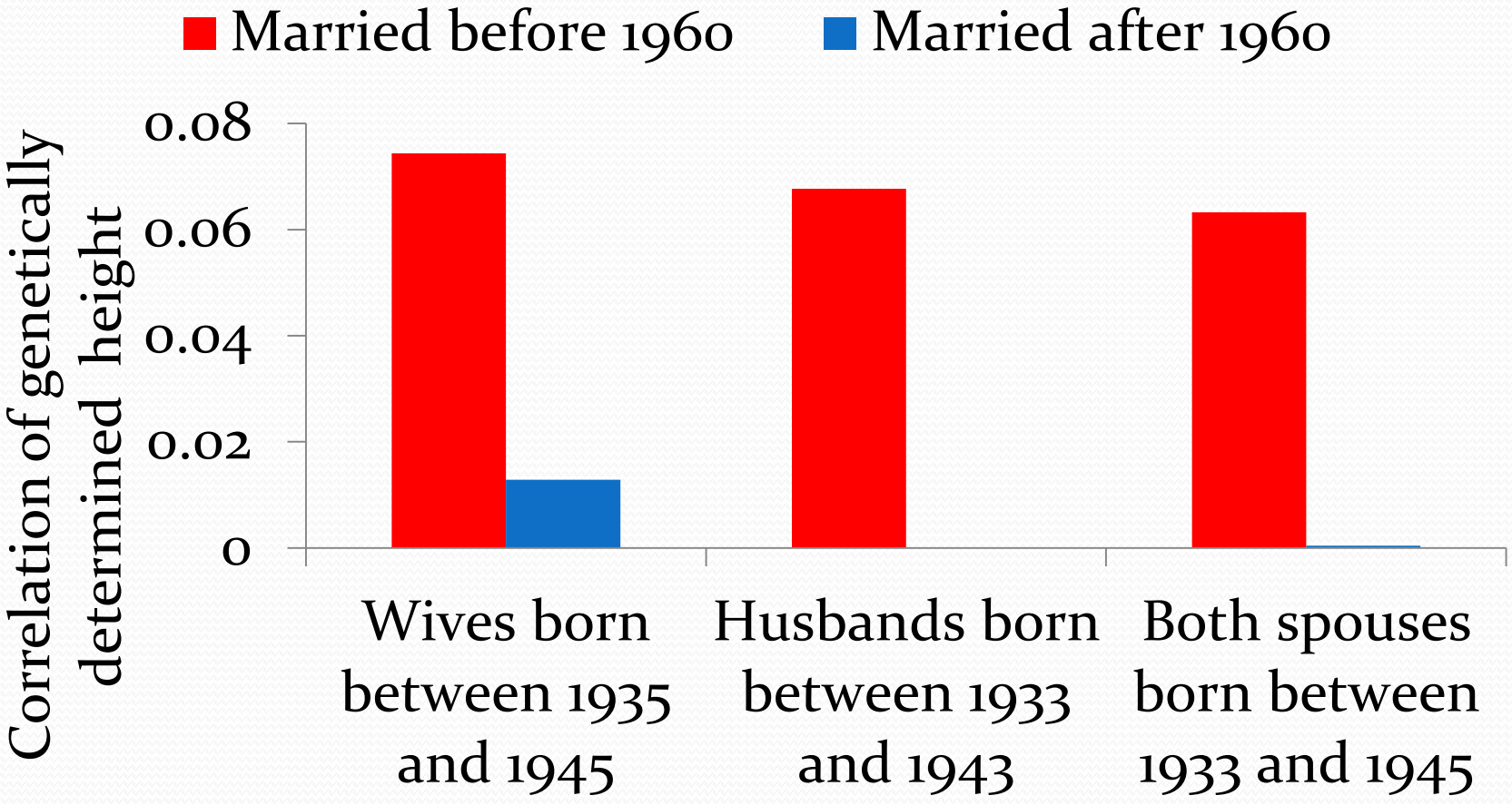
Genetic height similarity of spouses, by marriage period



Cohort

- Cohort as a confounder
- Individuals born between 1935-45 (wives) or 1933-43 (husbands)
- Around 1960, 15-25 years old (wives) or 17 to 27 years old (husbands)

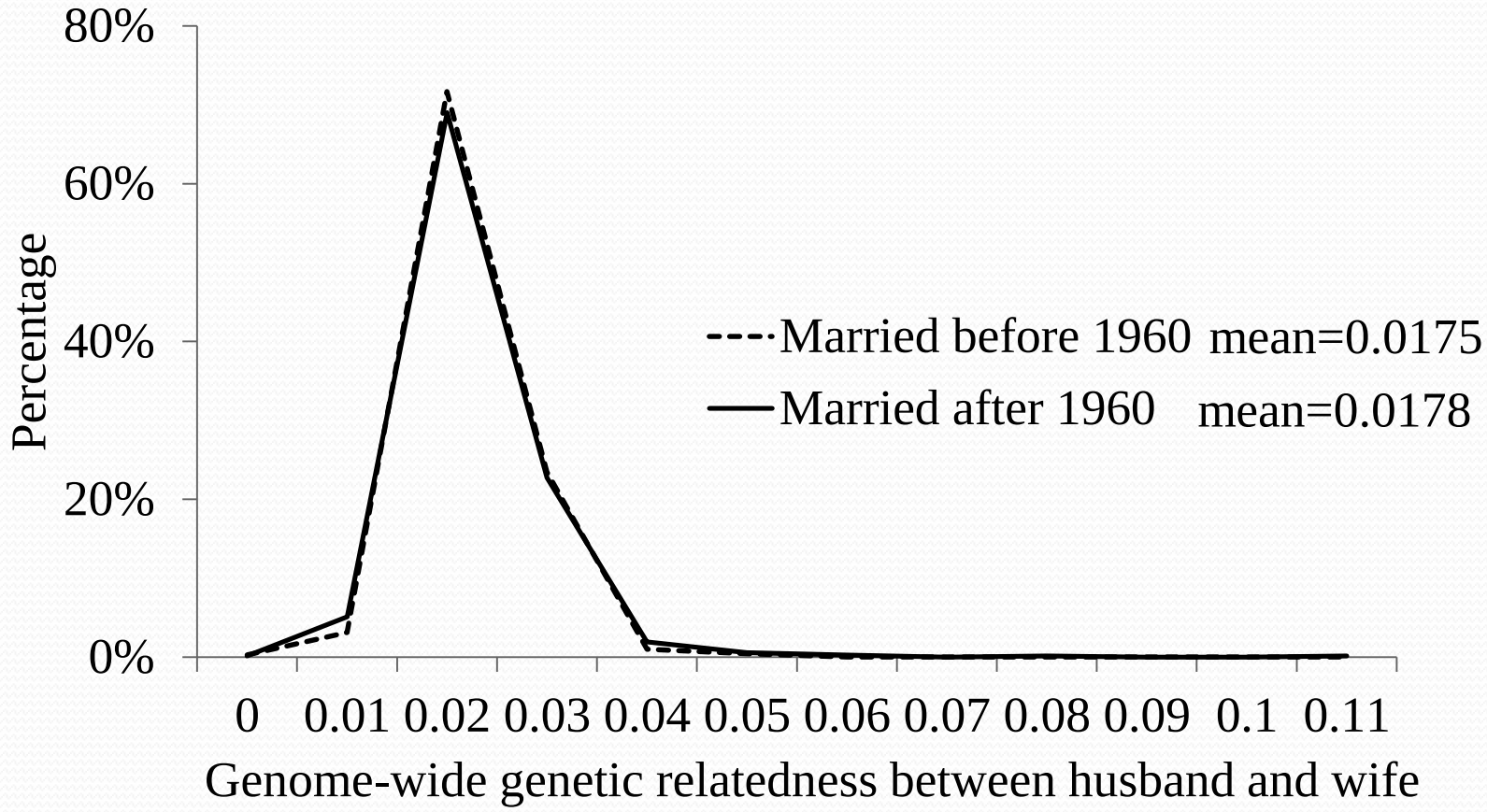
Genetic height similarity of spouses, by marriage period



Population stratification

- Before 1960 related individuals got marred?
- Compare similarity across the whole genome
- Standardized genomic relatedness estimated by GCTA; parent-offspring is 0.5, ego-ego is 1.0

Distribution of genome-wide similarity of spouses



Conclusion

- Robust effect of the individualized marriage

- Historical trend, genetic similarity, and the next generations' genetic and phenotypic characteristics

Thank you!

Height similarity of spouses, by marriage period

	1960 and before	After 1960
Correlation of height	0.19	0.17

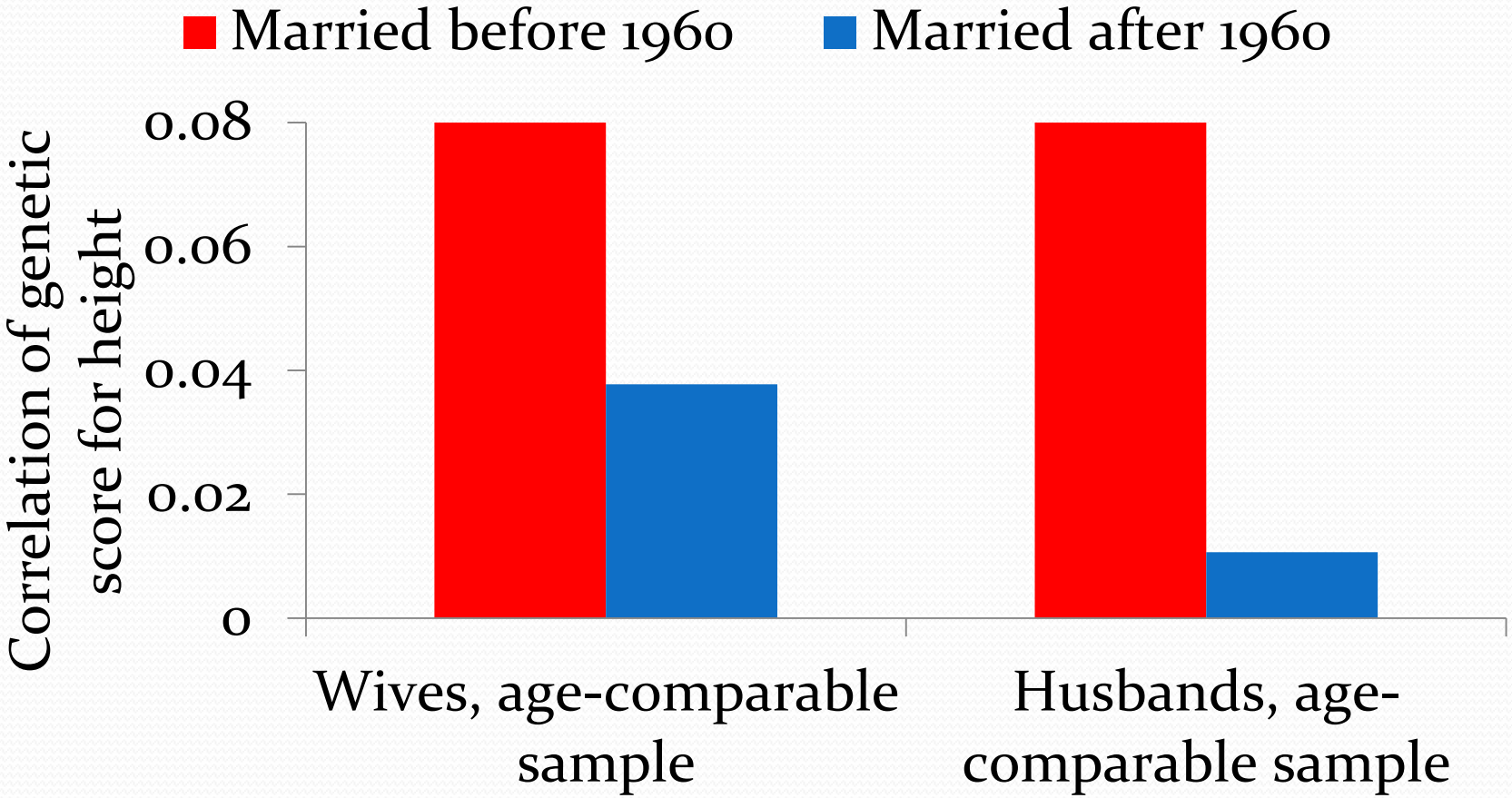
Genetically determine height predicts height

	Coefficient and standard error
Genetically determined height	0.22*** (0.01)
R squared	0.06

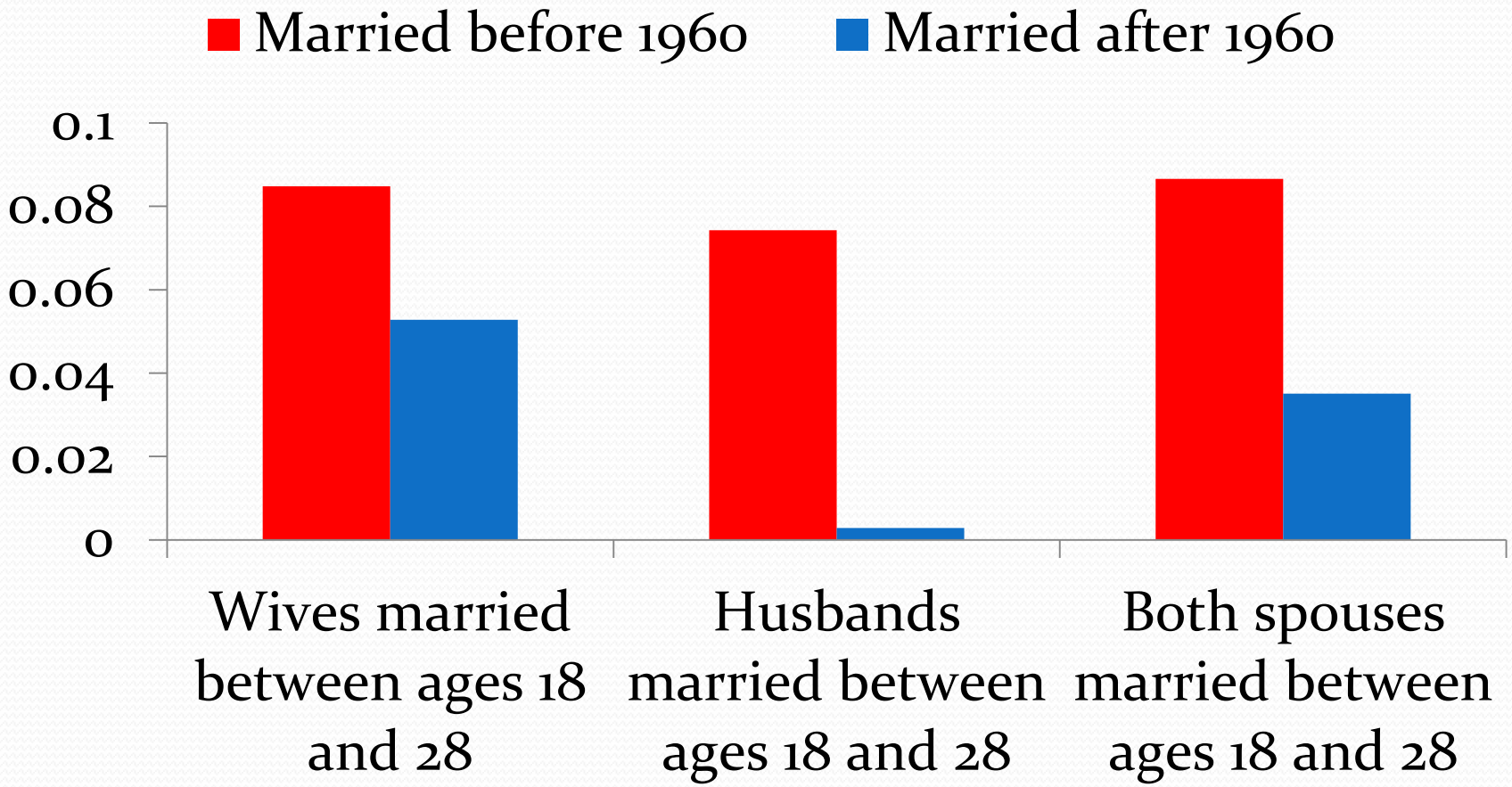
Age at marriage

- Age as a confounder
- Randomly exclusion of individuals
- Same mean ages at marriage for pre- and post-1960 marriages

Genetic height similarity of spouses, by marriage period



Genetic height similarity of spouses, by marriage period

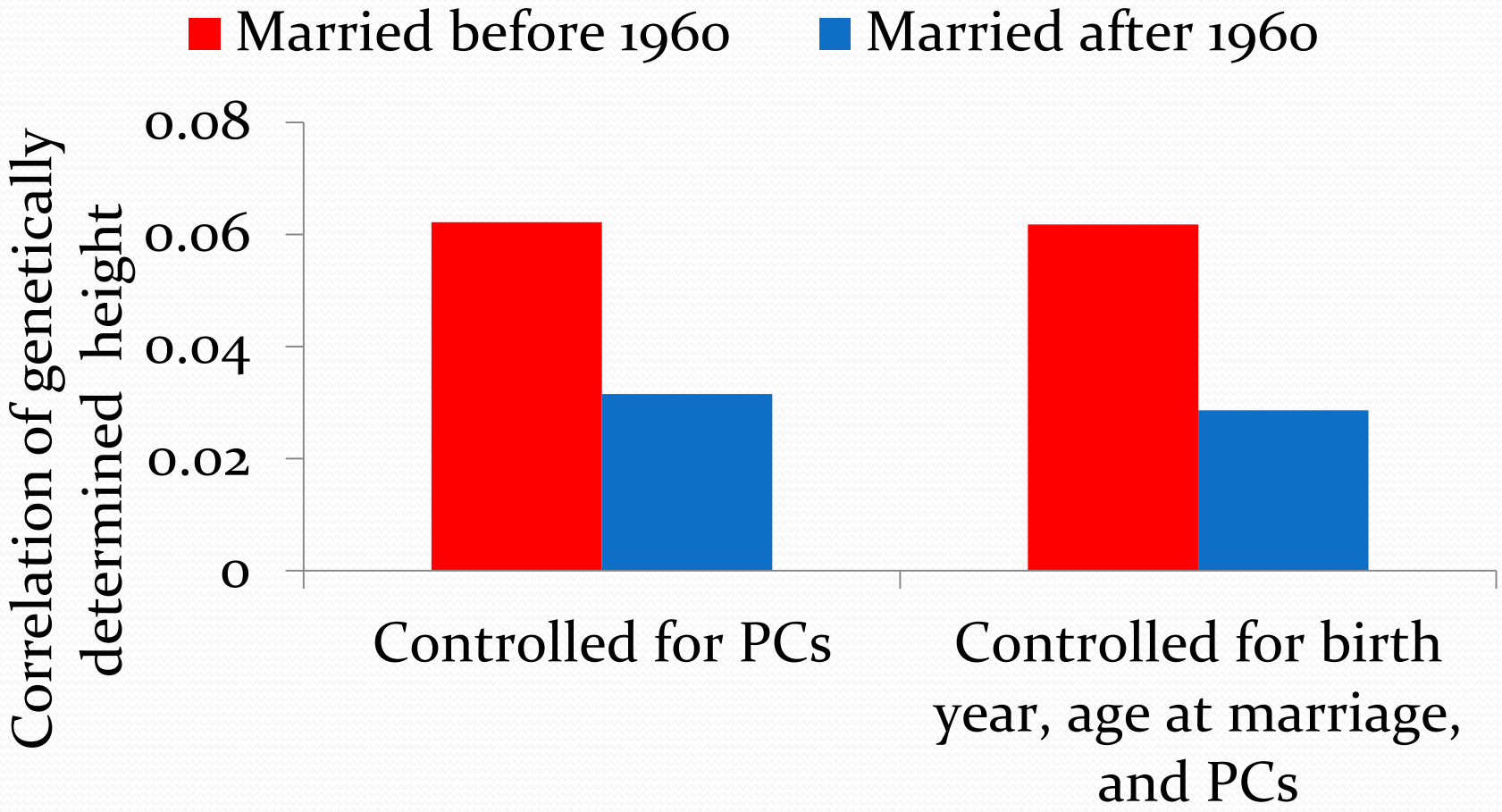


Cohort and age at marriage

- $\text{GeneticHeight}_{ij} = \text{TenPrincipleComponents}_{ij} + \text{Error}_{ij}$

- $\text{GeneticHeight}_{ij} = \text{TenPrincipleComponents}_{ij} + \mathbf{BirthYear_{ij}} + \mathbf{AgeAtMarriage_{ij}} + \text{Error}_{ij}$

Genetic height similarity of spouses, by marriage period



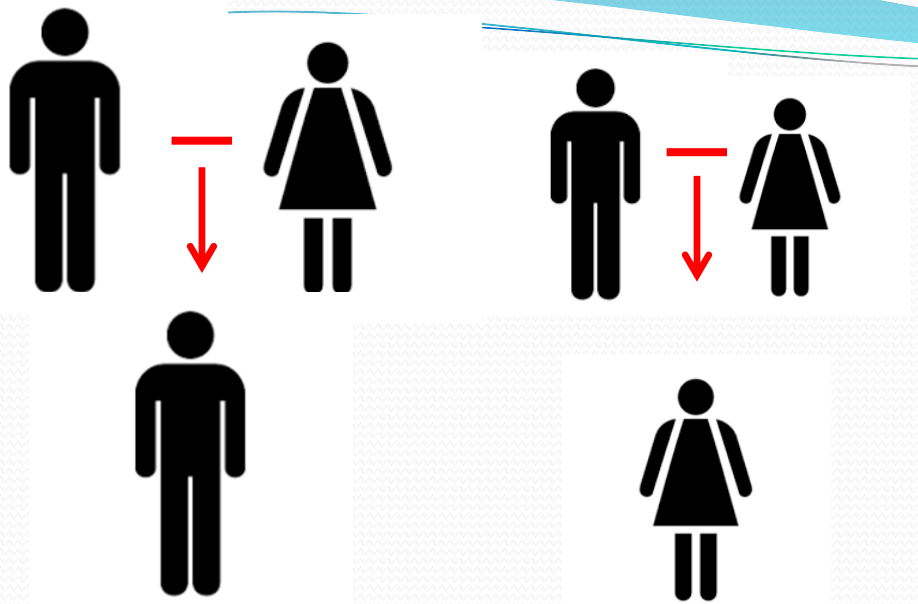
Genetic assortative mating

- Genetic assortative mating across the whole genome
- Sorting on different phenotypes
- Likes attract (homogamy) and opposites attract (heterogamy)

Genetic assortative mating

- Sorting on phenotypes A is positive and B is negative
- Genetic sorting on A is positive and B is negative
- Average similarity does not reflect the difference between sorting on A and B

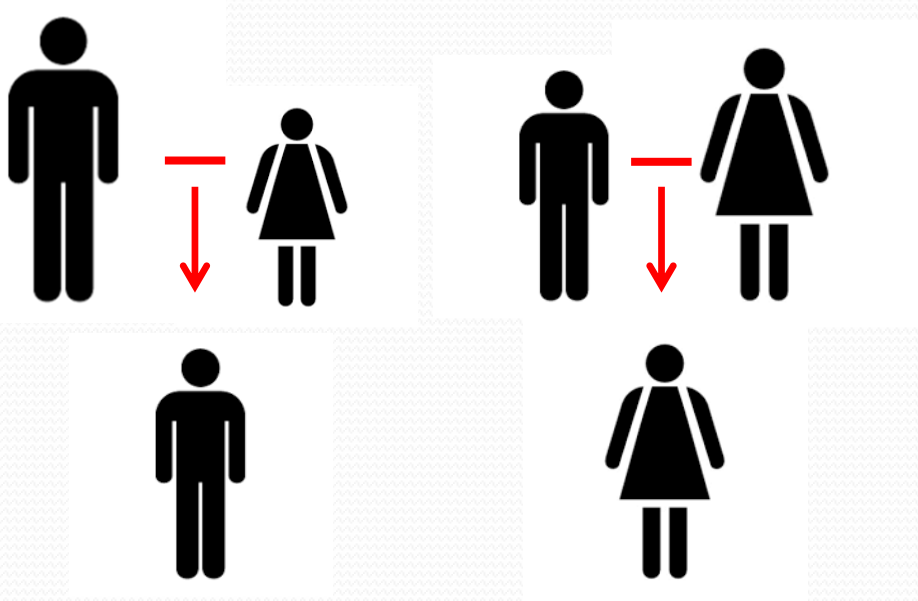
Non-individualized marriage



G 1

G 2

Individualized marriage



G 1

G 2