Offspring’s Schooling and Inflammation of Older Adults

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Social relationships and wellbeing (Durkheim, 1897)

Family—the most significant institution that affects individuals’ wellbeing by providing psychosocial resources or strains (Carr et al., 2014)

• Social support and control are the most common means whereby family members affect an individual’s wellbeing (House et al., 1985; Umberson, 1992)

• Quality or efficacy of support from family members may vary by family member’s resources (e.g., education)
Changes in Family Influence over the Life Course

From childhood to young adulthood, parents have a strong effect on their children’s wellbeing (e.g., Conger et al., 1994)

In adulthood, marriage results in a decline of parents’ influence on health because marital partners tend to monitor one another’s health (Umberson, 1992)

In old age, the intergenerational influences from parents to children may flow in the opposite direction (Silverstein et al., 2002)
Children’s Education and Health of Older Adults

Having well vs. poorly educated children

- Lower functional limitations in Taiwan (Zimmer et al., 2002)
- Lower risk of mortality in Taiwan, the U.S., and Sweden (Zimmer et al., 2007; Friedman and Mare, 2014; Torssander, 2013)
- More exercise and less smoking in the U.S. (Friedman and Mare, 2014)
- Lower depressive symptoms in Taiwan (Lee et al., under review)

✓ No prior work on offspring’s schooling and biological risk

- Inflammation—a important biological mechanism linking education to functional limitations, morbidity, and mortality
Potential Mechanisms

**Behavioral (lifestyle)**
- Smoking
- Exercise
- Diet
- Alcohol use

**Psychological**
- Stress exposure
- Psychological distress
- Social class identity

**Health care**
- Access to care
- Insurance coverage
- Medication adherence

Well educated children

Network resources
- Social control
- Social support

Lower levels of inflammation

Health and wellbeing in old age
Gender Differences

**Resource substitution**

- Individuals who are otherwise disadvantaged are more likely to benefit from alternative resources to their own (Ross and Mirowsky, 2006)
  
  ✓ Given gender differences in SES, women may rely on well educated children more strongly than men

**Child and mother vs. father relationship**

- Child–parent ties may be especially deep for women (Bowlby, 1988)
  
  ✓ Mothers generally derive greater health benefits from increases in children’s schooling

**Network stress**

- Older women are more vulnerable than older men to network events that happen to family members (Lee et al., 2014)
1. **Children’s education** is negatively associated with **inflammation** of their **parents** even after accounting for a respondent’s own and other measures of SES

2. **Psychosocial** and **behavioral factors** partially explain the association

3. **Women** are more likely than men to benefit from children’s education
Data and Methods

Data: Taiwanese Longitudinal Study of Aging (TLSA) in 1996, 1999
Social Environment and Biomarkers of Aging Study (SEBAS) in 2000

Sample: 943 Taiwanese (aged 50+; 42% women) who, as of 1996, had a child

Measures:
Education of family members

- Years of education (measured in 1996), ranging from 0 to 17, for each family member—respondent, spouse, children
- For meaningful comparisons across generations, the measure of education for each family member was z-scored
- Children’s education: the mean education of all living children
Data and Methods

**Inflammation index** (range: 0-5) in 2000
CRP, IL-6, sIL-6 R, sE-selectin, and sICAM-1
- High risk-cutoffs: CRP (> 3.0), otherwise above the 80\textsuperscript{th} percentile

**Psychosocial factors** in 1999
- **Exposure to stressors** (range: 0-6)
  - Marital disruption, moving, children’s and spouse’s health, economic condition, changes in financial situation
- **Perceived stress** (range: 0-12)
  - Whether R’s work, family or daily life bring stress and worries

**Behavioral factors** in 1999
- Healthy diet: eating vegetables and fruits daily (yes/no)
- Exercise (0=none - 4=vigorous); Normal BMI (=18.5 - 22.9)
- Current smoking (yes/no); Daily drinking (yes/no)
Data and Methods

**Controls** in 1996:
- Age, ethnicity, marital status,
- Num of children, co-residence with children
- Occupational prestige (respondent, spouse)
- Health status (e.g., depression, num of chronic diseases)

**Analytic strategy**
- Step 1: children’s education $\rightarrow$ parental inflammation
- Step 2: children’s education $\rightarrow$ psychosocial and behavioral factors
- Step 3: children’s education $\rightarrow$ parental inflammation (after including psychosocial and behavioral factors)
- Sex-stratified models
  - OLS, Poisson, Ordered logit, or Logit regression
Children’s Education and Inflammation

Women

Poisson regression:

Model (M) 1: Children’s education

M 2: M 1 + R’s education

M 3: M 2 + Spouse’s education

M 4: M 3 + Occupational prestige (respondent and spouse)

Note: adjusted for sociodemographic, familial characteristics, and health status at baseline

** p < .01, *** p < .001
Children’s Education and Inflammation for Men

Poisson regression:
Model (M) 1: Children’s education
M 2: M 1 + R’s education
M 3: M 2 + Spouse’s education
M 4: M 3 + Occupational prestige (respondent and spouse)

Note: adjusted for sociodemographic, familial characteristics, and health status at baseline
** p < .01, *** p < .001
### Children’s Education and Psychosocial and Behavioral Factors for Women

<table>
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<tr>
<th></th>
<th>Exposure to stress (O)</th>
<th>Perceived stress (OLS)</th>
<th>Healthy diet (L)</th>
<th>Exercise (OL)</th>
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<tr>
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<td>-0.413**</td>
<td>-0.282*</td>
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<th>Current smoking (L)</th>
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<th>Normal BMI (L)</th>
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<td>Children’s Education</td>
<td>-1.03*</td>
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<td>0.376</td>
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*Note: O=ordered logit regression; OLS= OLS regression; L= logit regression adjusted for sociodemographic, familial, health characteristics, occupational prestige, respondent’s and spouse’s education

* p <.05, ** p <.01, *** p <.001
## Children’s Education and Psychosocial and Behavioral Factors for Men

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<td>-.187</td>
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<td>.201</td>
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<td>-.326**</td>
<td>-.023</td>
<td>-.129</td>
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*Note: O=ordered logit regression; OLS= OLS regression; L= logit regression adjusted for sociodemographic, familial, health characteristics, occupational prestige, respondent’s and spouse’s education*

* p <.05, ** p <.01, *** p <.001*
Reduced Effects of Children’s Education by Psychosocial and Behavioral Factors for Women

Poisson regression:
**Model 1**: R’s and spouse’s education, occupation, and other covariates

**Model 2**: Model 1 + psychosocial and behavioral factors

* $p < .05$
Summary

1. Having well educated children is associated with lower inflammation risk for mothers, but not for fathers.

2. Mothers with well educated children are less likely to be exposed to stressors, report lower perceived stress, and tend to report a healthy diet, vigorous exercise, and non-smoking.

3. Fathers who have well educated children are less likely to smoke.

4. Psychosocial and behavioral factors moderately attenuate the association, the main effect remains significant for mothers.
Discussion

- Parents, particularly mothers, who devote resources to their offspring’s schooling may have better biological profiles in old age.

- Well-educated children may promote their parents’ wellbeing by encouraging a healthy lifestyle and buffering the negative impact of later life adversities.

- The benefits from well-educated children may be more prominent in societies where adult children are obliged to support their elderly parents.

- Future studies should aim to replicate this study in societies with different family norms and educational opportunities.
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