UNDERSTANDING EVOLVING GENDER DIFFERENCES IN HEALTH AND SURVIVAL AMONG U.S. ADULTS IN THE AMERICANS’ CHANGING LIVES STUDY

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Recent trends in sex differences in mortality (SDIM) in the U.S. & elsewhere

- Since about 1980, female mortality advantage in US and many other wealthy societies has been declining
- U.S. situation striking: women lost 1-6 years LE relative to women in wealthy countries, 2-3 years relative to U.S. men
- Some recent findings creating concern about inequality in U.S.
  - Olshansky et al 2012: 1990-2008, white men <HS lost 4 yrs LE
  - 1990-2000 $e_{25}$ declined by almost a year for women with 0-12 years of education (Meara et al. 2008); other findings for an increase in mortality or decline in LE among low-educated women (Jernal et al 2008, Miech et al 2011, Montez & Zajacova 2013a,b)
  - 1992–96 to 2002–06, female mortality increased in 42.8% US counties, male rates increased in only 3.4% (Kindig & Cheng 2013)
Possible explanations for changing SDIM: Drawing on international comparisons

- Nat’l Academies panel evaluated candidate explanations
- Smoking: women started in later cohorts than men, so mortality effects are evident more recently for women, waning for men
- Other factors evaluated: physical activity/obesity, health care, hormone replacement therapy, social networks/social interaction, inequality
- Quality of data limited cross-national investigation of many factors, but smoking & obesity among strongest candidates
- Cullen et al 2015 use data from 1900-present to examine “SDIM transition” & show consistent longer term evolution that first favors men, then women, then men catching up, implicate maternal mortality, health behaviors, other social changes
Existing evidence compelling, but to understand mechanisms more fully, we need micro data too

- Nearly all previous research used vital statistics records or mortality follow-up of cross-sectional surveys
- Often, direct estimation techniques have been used to establish importance of risk factors (e.g., role of smoking derived from smoking related causes of death)
- While essential, such data cannot capture range of dynamic behaviors & detailed life experiences
- Panel data might provide a way to assess possible role for major changes in health behaviors, conditions of life & work in U.S.
Health behaviors & beyond: explaining SDIM & anticipating future changes

- Women’s lives have changed more than men’s in past several decades in US – sharp rise in educational attainment, labor force participation, also in divorce, single parenting
- Women’s economic fortunes & power in households increasing, but “male” risk factors increasing too – from driving more to adoption of riskier health behaviors
- Cullen et al 2015 argue that because of this - especially in good economic times - SDIM will narrow as men → women
- Some women left behind –those with more education & roles (employment, marital, parenting) surviving longer than other women (e.g. Montez et al 2013, Montez & Zajacova 2013)
Aims today

- Can we observe changing SDIM pattern in prospective data on U.S. adults?
- If we find this pattern, what are contributions of smoking & other health behaviors, social & economic factors when we use individual-specific measures?
- Do results differ if we use baseline versus wave-specific predictors?
Began in 1986, nationally-representative in-person interviews of 3617 noninstitutionalized adults 25+

African Americans & people over 60 oversampled

In person re-interviews 1989 (83% of survivors), telephone (or in person) 1994 (83%), 2001/2 (74%), and 2011/12 (81%)

Respondents matched to NDI to verify reported deaths, we confirm >96% with death certificates also
Key measures

- **Time-constant predictors** (from 1986): gender; race/ethnicity; educational attainment; ever a single parent before 1986

- **Potentially time-varying predictors**: age; age-squared; current, former or never smoker; CDC- basis BMI category; physical activity scale category; household income of R & spouse in 1986 dollars (<15K, 15-30K, 30K+); currently employed; currently a parent of a minor child; currently married/cohabiting; scale score for work, parental & spousal strain; total hours paid & unpaid work; serious or life-threatening health shock past three years or since last interview
General analytic approach

- Descriptive Kaplan-Meier survival plots
- Discrete time to event model, binary regression with a complementary log-log link, person-month data
- Consider deaths from 1986 through 2011, survivors censored at end of December 2011
- Can we observe & explain SDIM changes in individual-level, prospective data?
  - Focus on our measure of changing SDIM over follow up 1986-2011: male * time interaction (is this negative & significant?)
  - What roles do SEP, health behaviors, social roles play?
More than half of all respondents over 50 at baseline have died by end of 2011.
Educational differences in survival among 50+ at baseline

- Wider educational difference in survival for men
- <high school disadvantaged, particularly for women
- Differences magnified if we include all respondents 25+

![Graph showing survival analysis by educational attainment for males and females.](image-url)
Differences by baseline smoking status among 50+ at baseline

- Among men, never smokers have highest survival, current smokers lowest
- Among women, former smokers appear to have highest survival, current smokers lowest
Differences by baseline BMI category among 50+ at baseline

- Underweight respondents highest risk men & women
- Men are if anything, initially protected by overweight/obesity
Differences by baseline physical activity among 50+ at baseline

- More educational difference in survival for men
- Gradient, but sedentary most disadvantaged
- Scale includes frequency of taking walks, working in garden or yard & other active sports or exercise
### Key coefficients comparison (baseline predictors) & percent of change in SDIM explained

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<th>+ Race &amp; Education</th>
<th>+ Smoking</th>
<th>+ BMI &amp; Phys Act</th>
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**% M*T explained**

All models adjust for age squared and whether proxy respondent
Predicted log-risk of death by year & sex for 55 year old ACL respondents

Blue = male predicted log-risk of death
Red = female predicted log-risk of death
Predicted log-risk of death by age, sex & year

Blue = male predicted log-risk of death

Red = female predicted log-risk of death

1986 – youngest respondents age 25
2011 – youngest are age 50
Key coefficients - baseline predictors
% change in SDIM explained

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% M*T explained
-1.3% 10.6% 3.8% 14.5% 20.4%

All models adjust for age squared and whether proxy respondent
Significant predictors of mortality in fully adjusted model using baseline predictors

- Current smoker (+) former smoker (+)
- Current smoker * age (-) former smoker * age (-)
- Underweight (+) morbidly obese (+)
- Bottom (+) & second lowest physical activity quintile (+)
- Low (+) & middle household income (+) categories
- Currently employed (-)
- Serious/life threatening health shock (+)
- Ever a single parent <1986 (marginal +)
### Key coefficients – time-varying predictors

% change in SDIM explained

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All models adjust for age squared and whether proxy respondent
Strengths & weaknesses

- Long mortality follow up: 1986 to end of 2011
- Detailed prospective histories of potential social, economic, behavioral, psychosocial explanatory mechanisms
- ACL low-educated not highly “selected” (about 25% of our 1986 sample <HS)
- Many respondents in appropriate window for mortality in 80s, 90s, 2000s not followed prospectively in midlife
- Self reports on all but mortality; selective mortality before recruitment of older adults
- Small sample, synthetic cohort, moderation tests challenging
- Captures only ethnic composition of 1986 US
Interesting issues

- Role of selective mortality over follow up – what is or should be comparable when comparing with aggregate trends?
- Health selection: into health behaviors & behavior change, into work, family, marital roles & reciprocal relationships
- Age, period, cohort issues in a synthetic cohort
- Comparisons going forward: use HRS & SHARE – other counterfactuals?
Preliminary findings & next steps

- We can see change in SDIM over follow up in ACL
- Also: non-significant interaction between male * time * <HS
- Health behaviors critical, sedentariness perhaps more evident, employment status & SEP also predictors – decomposition to look at relative magnitudes?
- Time-varying wave-specific income, employment, roles, health shocks do less to explain than baseline measures of these, but need to incorporate nuanced trajectories, account for reciprocal relationships with health change
- Could we use younger respondents to assess changing morbidity? Similar patterns? Overlap in any explanatory factors? Future mortality implications?
Race differences in survival among 50+

- White females more distinctively advantaged than white males

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[Graphs showing survival analysis for Males and Females 50+ at baseline]