Gender Differences in the Effects of Obesity, Physical Inactivity, and Smoking on Mortality in Adult Americans

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REVES – Paris

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Research Question

- Obesity has little effect on mortality in adults 70+

- What about middle age and older adults?

- What effects do other lifestyle factors exert? (Smoking, Inactivity)

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DATA

- Health & Retirement Study
- 1998 (@ Baseline) through 2006
- Men, Women separately
  - Men n= 10,427
  - Women n= 15,323
- Ages 50+ (range 50-100)
- Dependent Variable: Dead (verified using NDI Dates of Death) vs. Not

Measures

- Obese = BMI 30+

- Obese1= BMI 30-34.9

- Obese2= BMI 35.-39.9

- Obese3= BMI 40.0+

- Physically Inactive = 1 Yes; 0 No

  – vigorous physical activity or exercise three times a week or more? (sports, heavy housework, or a job that involves physical labor)

- Current Smoker = 1 Yes; 0 No

Covariates @ Baseline (1998)

- Any ADL difficulty
- Presence of Conditions:
  - Hypertension, Cancer, Lung Disease, Heart Disease, Diabetes, Stroke, Arthritis
  - Pain or Falls
- Age Stratification:
  - 50-69; 70+
  - 50-59; 60-69; 70-79, 80+

Statistical Analysis

- Logistic Regression on the Probability of Dying between 1998 and 2006
- Odds Ratios (Conf. Int. on request)
- Interactions between:
  - Age * Obesity,
  - Age * Inactivity, and
  - Age * Smoking
- Model fit Statistics: Adj. R^2, -2LL, Hosmer-Lemeshow statistic

Descriptives

	Men	Women	Significance
Obese (at all)	19.6	22.4	***
Obese 1	11.7	14.1	*
Obese 2 (Morbid)	18.2	20.4	***
Obese 3 (Severe)	1.0	3.9	***
Age – Mean(SD)	73.5 (7.5)	73.8 (8.6)	**
In Age Groups: (%) 50-69	29.8	31.0	*
70+	70.2	69.0	*
NonWhite	11.7	14.1	***
Inactive	49.5	60.9	***
Current Smoker	12.7	13.6	*

PLUS: Significantly higher levels of hypertension, arthritis, pain, falls, and ADL difficulties among women; Significantly higher levels of diabetes, cancer, and heart disease among men; no difference in lung disease and stroke.

Odds Ratios from the Probability of Dying – Any Obesity – No Age Stratification

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Obese	0.91	0.82*	0.75***	0.91
Inactive	1.94***	1.72***	1.62***	1.46***
Current Smoker	1.46***	1.52***	1.71***	1.85***
Obese*Inactive		ns		0.63**
Obese*Smoker		ns		ns
Inactive*Smoker		ns		ns
R2	.1126	.1471	.1364	.1888
-2LL	8781.5***	8533.8***	10834.7***	10323.7***
H-L	.0031	0.0704	.0152	.0025

Model 1: Adjusted for Age, Age-quadratic, NonWhite
Model 2: Model 1 + Conditions, ADLs, and Interactions, if any

Odds Ratios from the Probability of Dying – Obese 1

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Obese	0.95	0.89	0.80**	0.69***
Inactive	1.93***	1.71***	1.60***	1.34***
Current Smoker	1.48***	1.53***	1.74***	1.79***
Obese*Inactive		ns		ns
Obese*Smoker		ns		ns
Inactive*Smoker		ns		ns
R2	.1124	.1465	.1353	.1843
-2LL	8782.8***	8538.0***	10844.9***	10365.7***
H-L	.0988	0.9380	.0007	.0025

Model 1: Adjusted for Age, Age-quadratic, NonWhite
Model 2: Model 1 + Diseases, ADLs, Falls, Pain, and Interactions, if any

Odds Ratios from the Probability of Dying – Obese 2

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Morbid Obese	0.73	1.39	0.57**	0.50***
Inactive	1.94***	1.76***	1.60***	1.34***
Current Smoker	1.47***	1.52***	1.74***	1.80***
Obese*Inactive		0.28***		ns
Obese*Smoker		ns		ns
Inactive*Smoker		ns		ns
R2	.1128	.1488	.1358	.1843
-2LL	8779.9***	8521.9***	10840.5***	10365.7***
H-L	.0197	0.3273	.0001	.0031

Model 1: Adjusted for Age, Age-quadratic, NonWhite
Model 2: Model 1 + Diseases, ADLs, Falls, Pain, and Interactions, if any

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Odds Ratios from the Probability of Dying – Obese 3

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Severe Obese	1.05	0.95	0.92	2.45***
Inactive	1.93***	1.70***	1.58***	1.38***
Current Smoker	1.48***	1.54***	1.76***	1.88***
Obese*Inactive		ns		0.24***
Obese*Smoker		ns		0.11**
Inactive*Smoker		ns		ns
R2	.1123	.1461	.1344	.1855
-2LL	8783.2***	8538.0***	10852.5***	10354.7***
H-L	.0246	0.1751	.0001	.0021

Model 1: Adjusted for Age, Age-quadratic, NonWhite
Model 2: Model 1 + Diseases, ADLs, Falls, Pain, and Interactions, if any

Other explanations:

Men

- Any obesity:
  - All but hypertension, cancer, arthritis, and pain
- Obese 1, 2, and 3:
  - Same

Women

- Any obesity:
  - All but NonWhite, and arthritis
- Obese 1,2 and 3:
  - Same

Findings

- Obesity:
  - Obese Women slightly less likely to die, but effect is explained by conditions & ADLs
  - Obese Men – no real difference
  - BOTH: Being Inactive or Being a Smoker significantly increase the probability of dying
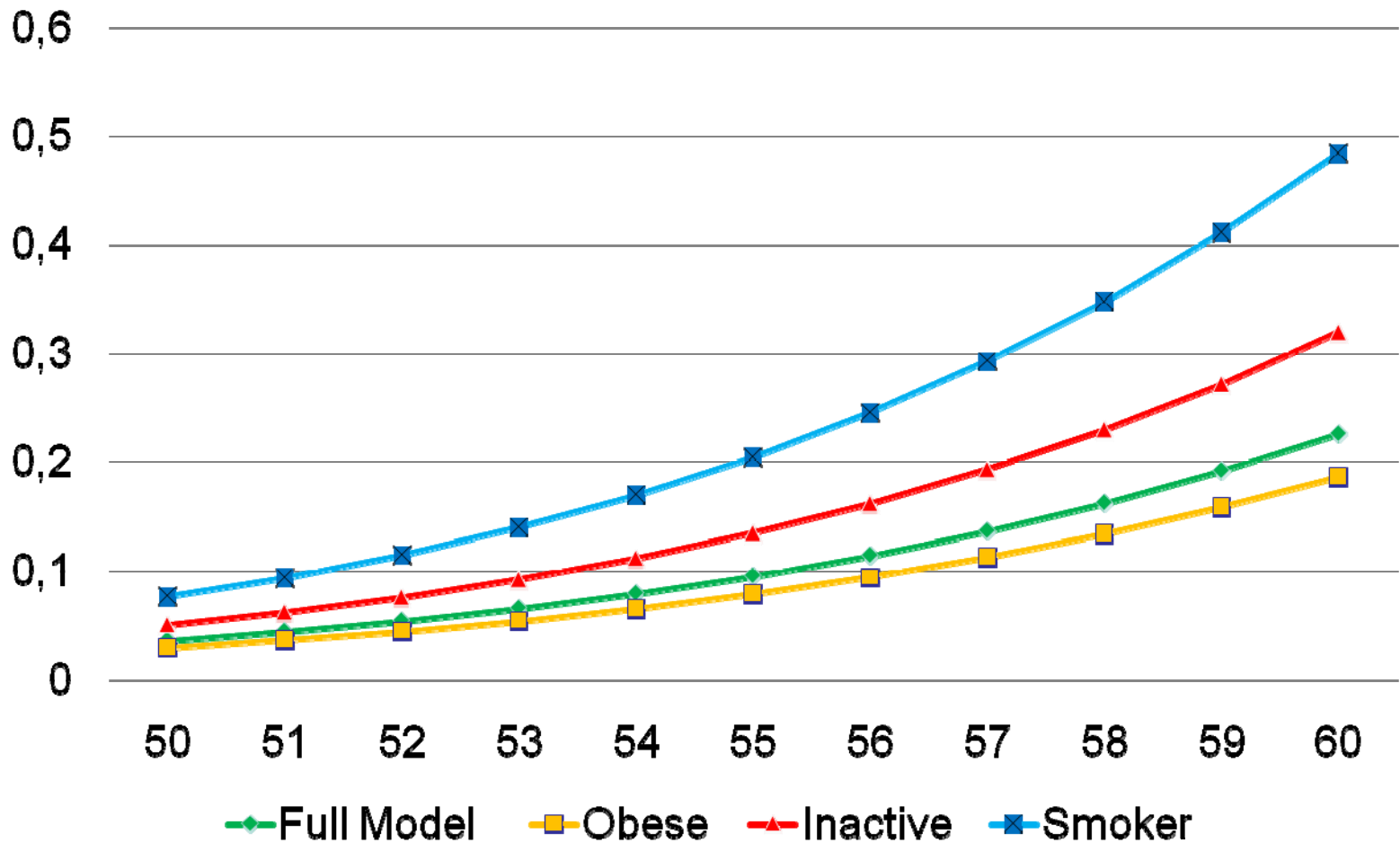   - Only partially explained by conditions & ADLs

Levels of Obesity

- 30.0-34.9
  - Men – nothing
  - Women – same as overall obesity
- 35.0-39.9
  - Same thing
- 40.0 +
  - No real effect on Men's mortality
  - Women – in full model – significantly increases probability of dying
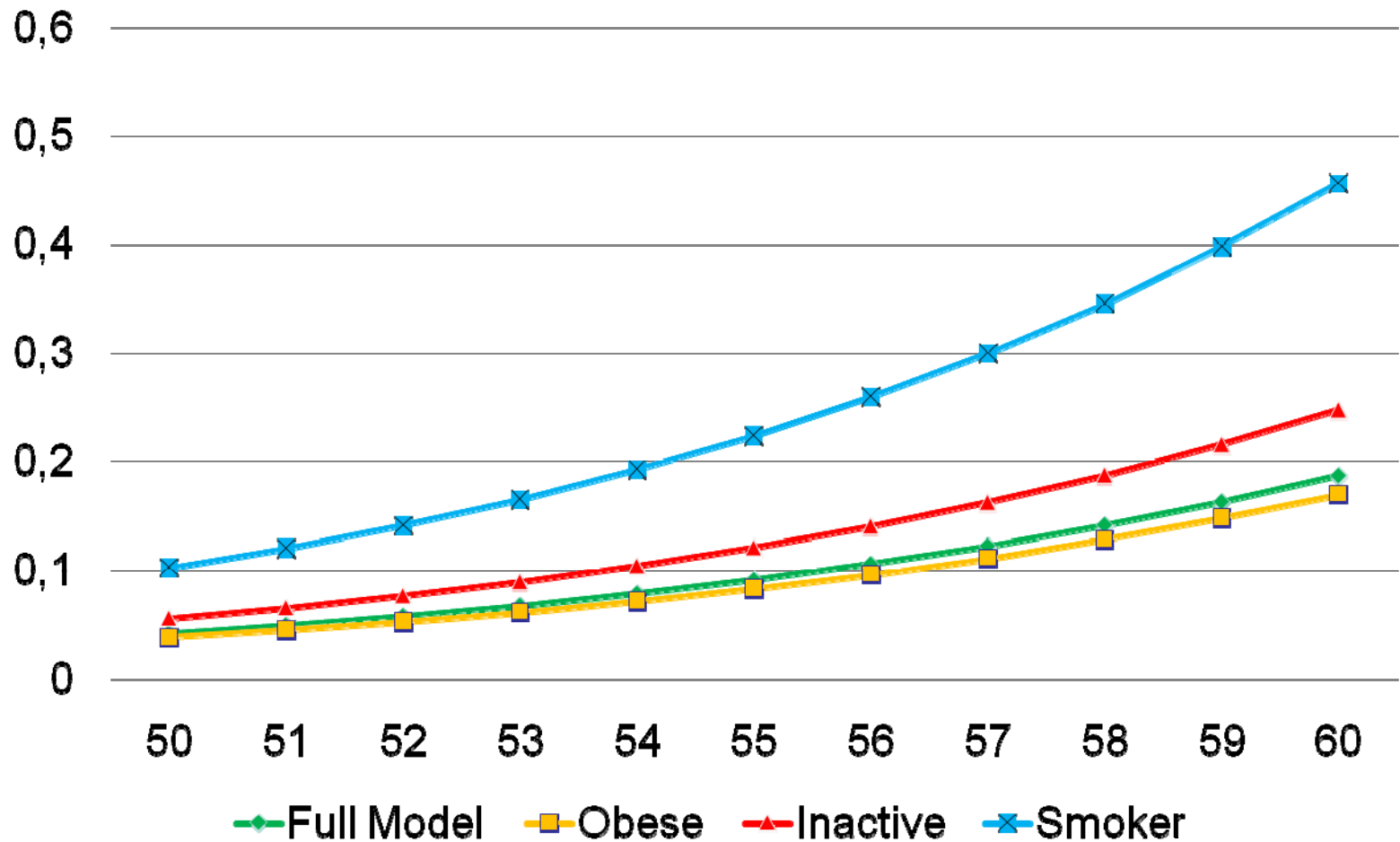   - Interactions negative…

Conclusion:

- Even beginning at age 50, obesity has little effect on mortality in the presence of conditions and ADL difficulties
  - (exception is severely obese women)
- Both men and women, Physical Inactivity and Smoking appear to "trump"

Men's Predicted Probability of Dying: Full adj. Model, then Obesity, Activity, and Smoking

Women's Predicted Probability of Dying: Full adj. Model, then Obesity, Activity, and Smoking

Further research

- Add time-varying covariates
  - Onset of ADL difficulties
  - Onset of Diseases/conditions
- Other potential mechanisms for mortality

With age stratification – 50-69

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Obesity	0.49***	0.01***	0.62**	0.01***
Inactive	1.67***	1.30	1.75***	1.82***
Smoker	1.25	1.51*	1.21	1.43*
Age*Obese		1.42***		1.37***
Age*Inactive				0.36***
Age*Smoker				
R2	.0282	.1238	.0177	.1449
-2LL	1805.3***	1662.5***	1895.6***	1682.9***
H-L	.0140	.1674	.0842	.1865
Not significant: NonWhite, Arthritis, Pain, ADLs (Both); Cancer (Men); Lung Disease (Women)				

With age stratification – 70+

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Obesity	0.85***	0.03***	0.61***	0.01***
Inactive	2.14***	1.92***	1.86***	1.63***
Smoker	1.11	1.15	0.20	1.30**
Age*Obese		1.08***		1.10***
Age*Inactive				0.60**
Age*Smoker				
R2	.0376	.0785	.0262	.0987
-2LL	7248.9***	7040.2***	9463.8***	8961.6***
H-L	.2269	.0001	.1826	.6879
Not significant: Hypertension, Arthritis, and Pain (Men); NonWhite (Women)				

Odds Ratios from the Probability of Dying – Underweight

	MEN		WOMEN	
	Model 1	Model 2	Model 1	Model 2
Underweight	2.56***	2.81***	1.54***	1.68***
Inactive	1.93***	1.70***	1.58***	1.33***
Current Smoker	1.46***	1.05***	1.70***	1.77***
Under*Inactive		ns		ns
Under*Smoker		ns		ns
Inactive*Smoker		ns		ns
R2	.1141	.1483	.1360	.1843
-2LL	8770.8***	8525.5***	10837.9***	10365.7***
H-L	.0121	0.1456	.0000	.0130

Model 1: Adjusted for Age, Age-quadratic, NonWhite
Model 2: Model 1 + Diseases, ADLs, Falls, Pain, and Interactions, if any

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