



# Being Poor and Coping With Stress: Health Behaviors and the Risk of Death

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# Stress and Health Behaviors

- Higher levels of stress are associated with less healthy behaviors
- Stress and unhealthy behaviors are each associated with the risk of death
- Prior research has not examined whether unhealthy behaviors moderate the relationship between stress and mortality



# Unhealthy Behaviors and the Stress-Mortality Relationship

- Aim 1: Do unhealthy behaviors moderate the stress-mortality relationship?
- Double jeopardy: unhealthy behaviors and stress may combine to increase the risk of death
- Effective coping strategy: unhealthy behaviors may allow individuals to cope effectively with stress



# Stress, Health Behaviors, & Socioeconomic Status (SES)

- Aim 2: Do health behaviors moderate the stress-mortality relationship differently by SES?
- Social vulnerability: unhealthy behaviors and stress may be particularly harmful among low SES individuals
- Blaxter Hypothesis: unhealthy behaviors may be less harmful among low SES individuals



# National Health Interview Survey (NHIS)

- 1990 Health Promotion and Disease Prevention Supplement (HPDPS) to the NHIS
  - » Representative of U.S. adults aged 18 and older
- Cross-sectional NHIS data are linked to prospective mortality in the National Death Index through 1997
  - » N=40,335, Deaths=3,441
- Gompertz hazard models examine the risk of death



# Key Variables

- Perceived stress in the last 2 weeks & in the last year
- Health behaviors:
  - » Number of cigarettes currently or previously smoked (never smoked is referent)
  - » Average number of drinks when drinking
  - » Exercise: whether exercise regularly, how many years exercised, level of exercise relative to others
- SES: family income and education



# Multiple Imputation for Missing Data

- Create multiple (5) “complete” data sets, each with different imputed values drawn from the posterior predictive distribution
- Adjusting for variance between data sets inflates the standard errors of the estimated coefficients, to reflect the increased uncertainty associated with using imputed data



## Weighted means and proportions of covariates, by SES

	Socioeconomic Status (SES)		
	Low	Middle	High
Perceived stress	1.60	1.78	1.97
Smoking			
Current packs smoked per day	0.29	0.27	0.18
Former packs smoked per day	0.25	0.28	0.30
Never smoker	0.47	0.47	0.54
Number of drinks per day	1.23	1.52	1.43
Index of physical inactivity	3.47	3.31	3.13
Overall mortality (died=1)	0.15	0.06	0.04
Duration in months	83.0	87.0	87.8
N (unweighted)	12,193	13,128	14,960



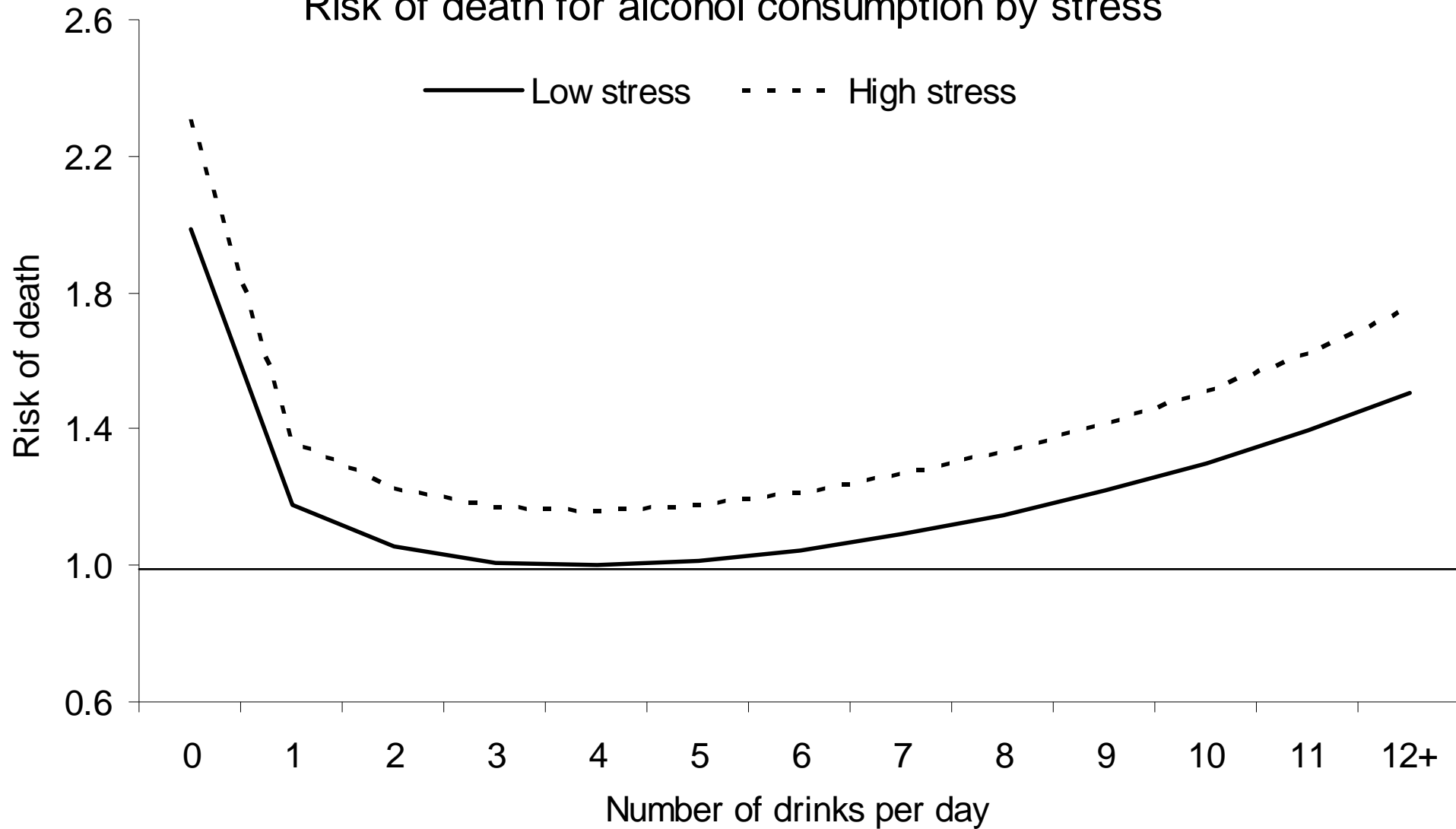
Gompertz hazard ratios for the relationships among stress, health behaviors, and the risk of death.

	Model 1	Model 2
Perceived stress	1.05**	0.94
Smoking		
Current packs smoked	1.55**	1.46**
Former packs smoked	1.14**	1.09
Never smoker	ref.	ref.
Stress by current packs smoked		1.04
Stress by former packs smoked		1.03*
Alcohol consumption		
(Number of drinks) <sup>0.5</sup>	0.50**	0.64*
(Number of drinks) <sup>1.0</sup>	1.20**	1.12**
Stress by (number of drinks) <sup>0.5</sup>		0.85
Stress by (number of drinks) <sup>1.0</sup>		1.04
Physical inactivity		
Index of physical inactivity	1.31**	1.20**
Stress by index of physical inactivity		1.06*

\*  $p < .05$ ; \*\*  $p < .01$  (two-tailed tests).



## Risk of death for alcohol consumption by stress





# Aim 1

- Do unhealthy behaviors moderate the stress-mortality relationship?
  - » Former smoking levels increase the relationship between stress and mortality
  - » Physical inactivity increases the impact of stress on mortality
- In support of the double jeopardy perspective, some unhealthy behaviors increase the impact of stress on mortality



Gompertz hazard ratios for the relationships among stress, health behaviors, and the risk of death, by SES.

	Low SES	Middle SES	High SES
Perceived stress	0.80	0.88	1.29
Smoking			
Current packs smoked	1.56**	1.24	1.47*
Former packs smoked	1.11*	1.09	1.04
Never smoker			
Stress by current packs smoked	0.98	1.12	1.06
Stress by former packs smoked	1.03*	1.02	1.04
Alcohol consumption			
(Number of drinks) <sup>0.5</sup>	0.81	0.63	0.37
(Number of drinks) <sup>1.0</sup>	1.00	1.18	1.34
Stress by (number of drinks) <sup>0.5</sup>	0.79	1.03	0.79
Stress by (number of drinks) <sup>1.0</sup>	1.08	0.97	1.06
Physical inactivity			
Index of physical inactivity	1.21	1.19	1.21
Stress by index of physical inactivity	1.13*	1.03	1.02

\*  $p < .05$ ; \*\*  $p < .01$  (two-tailed tests).



## Aim 2

- Do health behaviors moderate the stress-mortality relationship differently by SES?
- Former smoking levels and physical inactivity increase the impact of stress on mortality among low SES individuals
- The combination of high perceived stress levels and unhealthy behaviors is particularly harmful among those who have few socioeconomic resources



# Summary and Conclusion

- Unhealthy behaviors increase the impact of stress on mortality, especially among low SES individuals
- The unhealthy behaviors that are prevalent among low SES individuals augur poorly for their health



# Strengths of these Analyses

- Nationally representative sample of non-institutionalized adults
  - » 7 years of prospective mortality matches
- Multiple imputation helped to preserve sample size and more accurately accounts for uncertainty about missing values than other methods



# Limitations of these Analyses

- Prior research has not validated our stress measure for mortality
- Cross-sectional data at baseline preclude insight into the temporal ordering of the risk-variables.
- The health behavior measures did not capture all dimensions of behaviors in question.



# Implications

- Perceived stress, unhealthy behaviors, and low SES combine to form a truly vulnerable segment of the population
- Policies or public health interventions might be most effective if they simultaneously target unhealthy behaviors and poor strategies for coping with stress in low SES populations

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# Notes and Additional Slides



# Power Polynomials

- Allow for the flexible characterization non-linear relationships
  - » More parsimonious than using dummy variables
  - » Wide array of possible curves allowed

### Power polynomial functions for the effect of X (alcohol consumption) on Y (risk of death)

