Obesity and Subjective Survival Expectations in a Latin American Country: Costa Rica

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Motivation and Background

- **Increasing obesity trend accompanied by increasing prevalence of obesity-related comorbidities**

- **Evidence from Costa Rica of increased mortality rates among overweight and obese older adults aged less than 75 years** (Rosero-Bixby et al., 2009)

- **Evidence from Mexico of life expectancy losses among older adults due to excess body weight** (Monteverde et al., 2010)

What we do Know about Individuals' Perceptions of Obesity-Related Health Risks?

- Low levels of knowledge (Swift et al., 2009)

- Males relate their BMI and their own health risk knowledge only when their BMI reaches higher obesity levels (Kan and Tsai, 2004)

- Subjective survival differences between normal weight individuals and individuals at higher levels of BMI substantially lower than differences obtained from survival curves estimates (Falba and Busch, 1983)

First Objective: Determinants of Subjective Survival Expectations
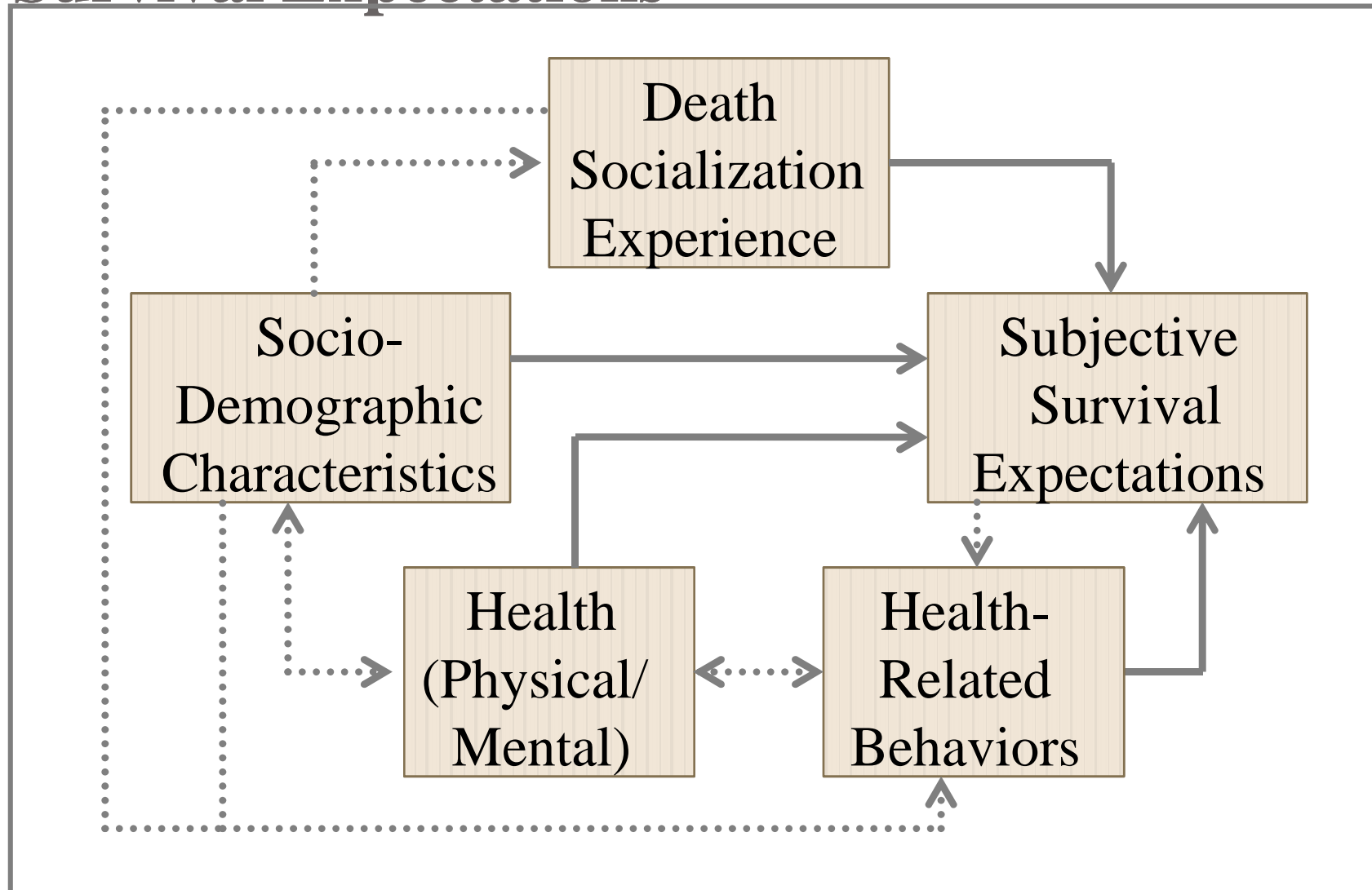
Second Objective: Subjective Survival Expectations and Mortality
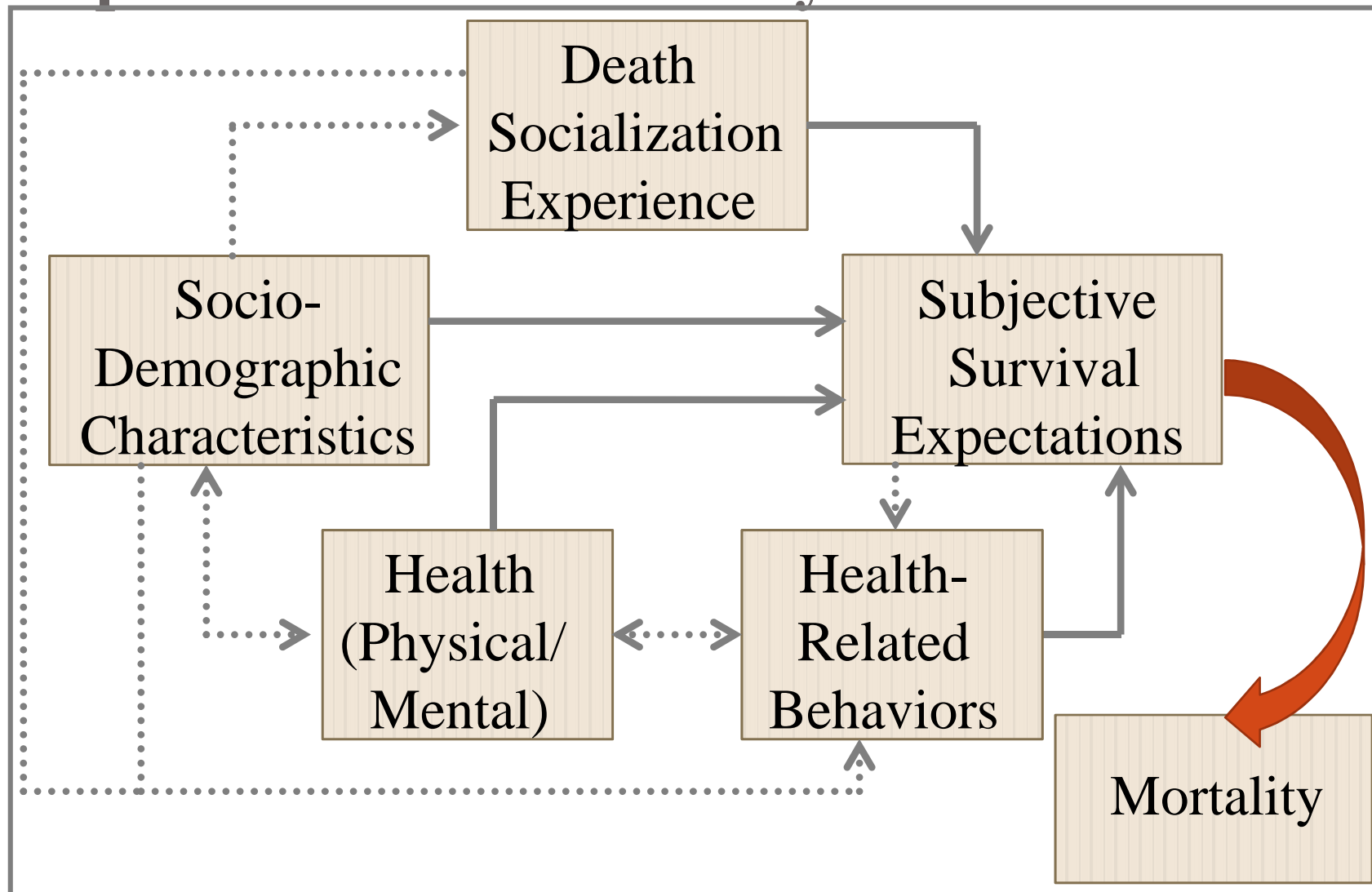
Data

Costa Rican Study of Longevity and Healthy Aging

- 2004 - 2006 wave

- Individuals over 60 years (2827 individuals)
  246 deaths until June 2007

- N=1210 (60-90 years old - 53.7% Females)
  194 deaths

Classification according to BMI, Waist Circumference (WC), and Waist-Hip-Ratio (WHR)

	BMI	WC	WHR	
Group 1	Normal Weight	Not at Risk	Safe	↓ Increasing Health-Risk
Group 2	Overweight	Action level 1	Unsafe	
Group 3	Obese	Action level 2	Danger	
Classification according to:	WHO (2000)	Han et al. (1995)	NIH (1998)	

Distribution by BMI, Waist Circumference (WC), and Waist-Hip-Ratio (WHR) Levels – Age 60-70
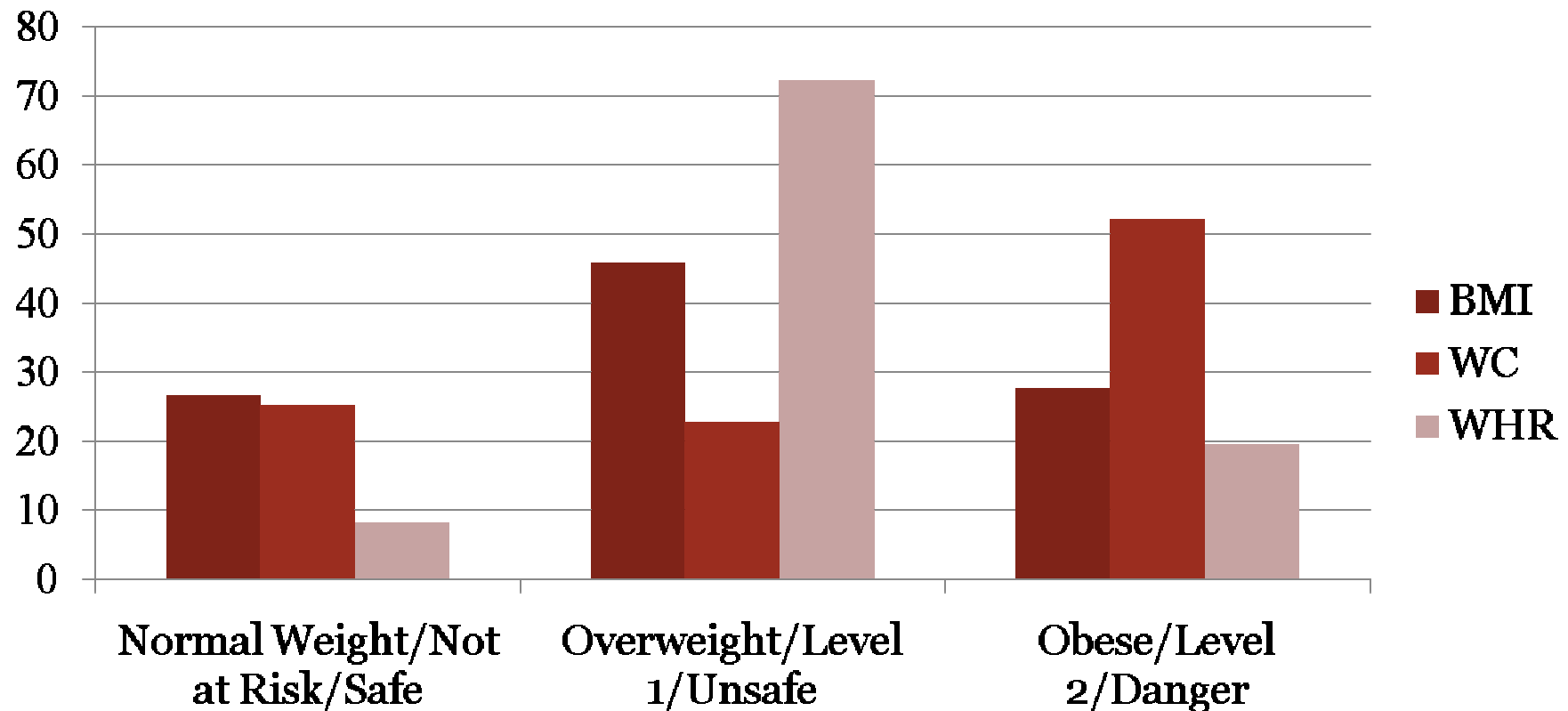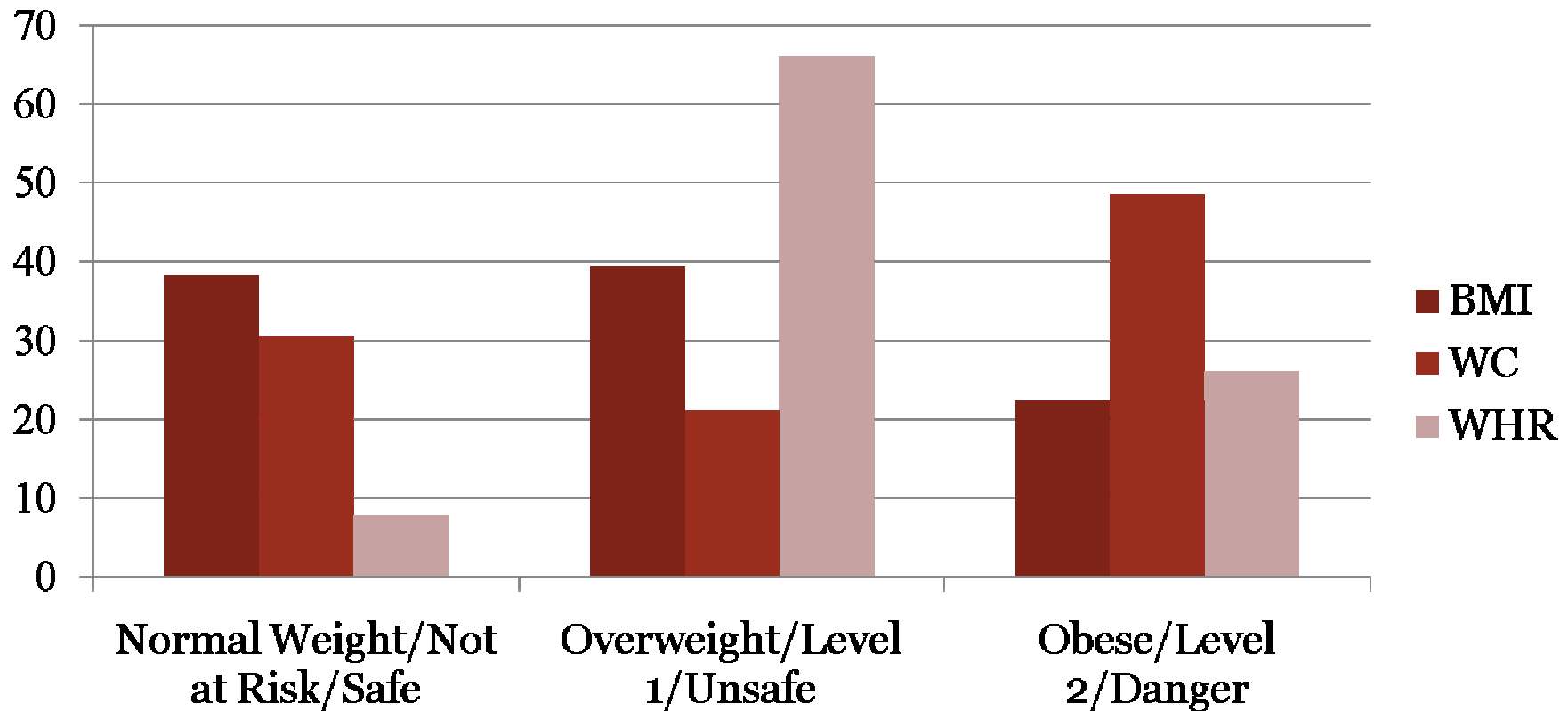

Note : Normal Weight: 18.5≤BMI<25; Overweight: 25≤BMI<30; Obese: BMI≥30
Not at Risk: WC<94cm for males, <80cm for females; Level 1: 94cm≤WC<102cmj for males, 80cm≤WC<87cm for females;
Level 2: WC≥102 for males, WC≥87 for females
Safe: WHR≤90 for males, ≤80 for females; Unsafe: 90<WHR<1 for males, 80<WHR<1 for females; Danger: WHR>1

Distribution by BMI, Waist Circumference (WC), and Waist-Hip-Ratio (WHR) Levels – Age 70-90

Note : Normal Weight: 18.5≤BMI<25; Overweight: 25≤BMI<30; Obese: BMI≥30

Not at Risk: WC<94cm for males, <80cm for females; Level 1: 94cm≤WC<102cmj for males, 80cm≤WC<87cm for females;

Level 2: WC≥102 for males, WC≥87 for females

Safe: WHR≤90 for males, ≤80 for females; Unsafe: 90<WHR<1 for males, 80<WHR<1 for females; Danger: WHR>1

Subjective Survival Question

"How likely do you think it is you will live until age …

- 80 (if age is < 69 years)?
- 85 (if age is 70 - 74 years)?
- 90 (if age is 75 - 79 years)?
- 95 (if age is 80 - 84 years)?
- 100 (if age is 85 - 90 years)?"

1: Very Likely; 2: Likely;
3: Unlikely; 4: Very Unlikely

Subjective Appraisal of Chances of Surviving 10-20 Years More by Self-Reported Health Status – Individuals Aged 60-90
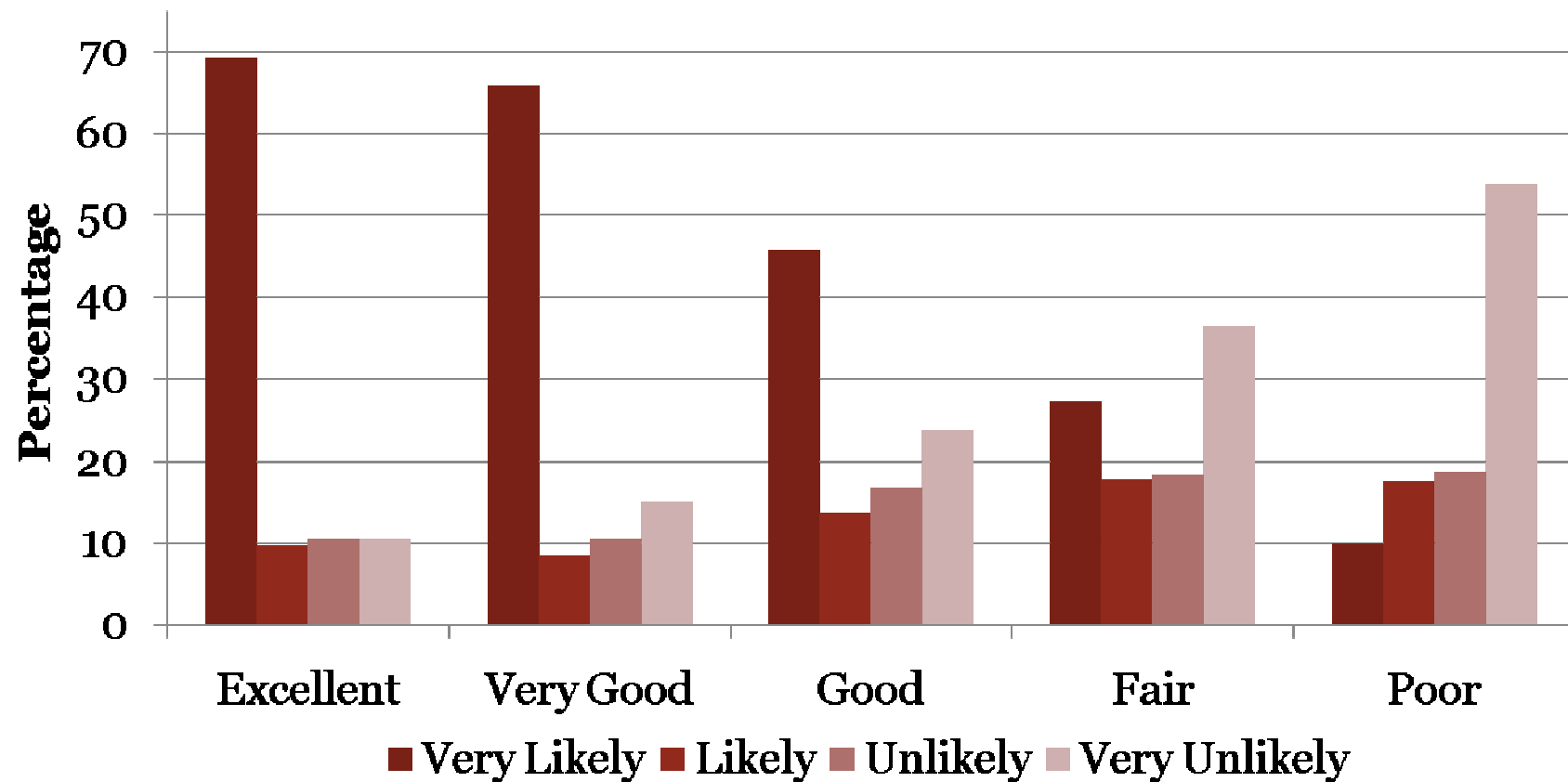
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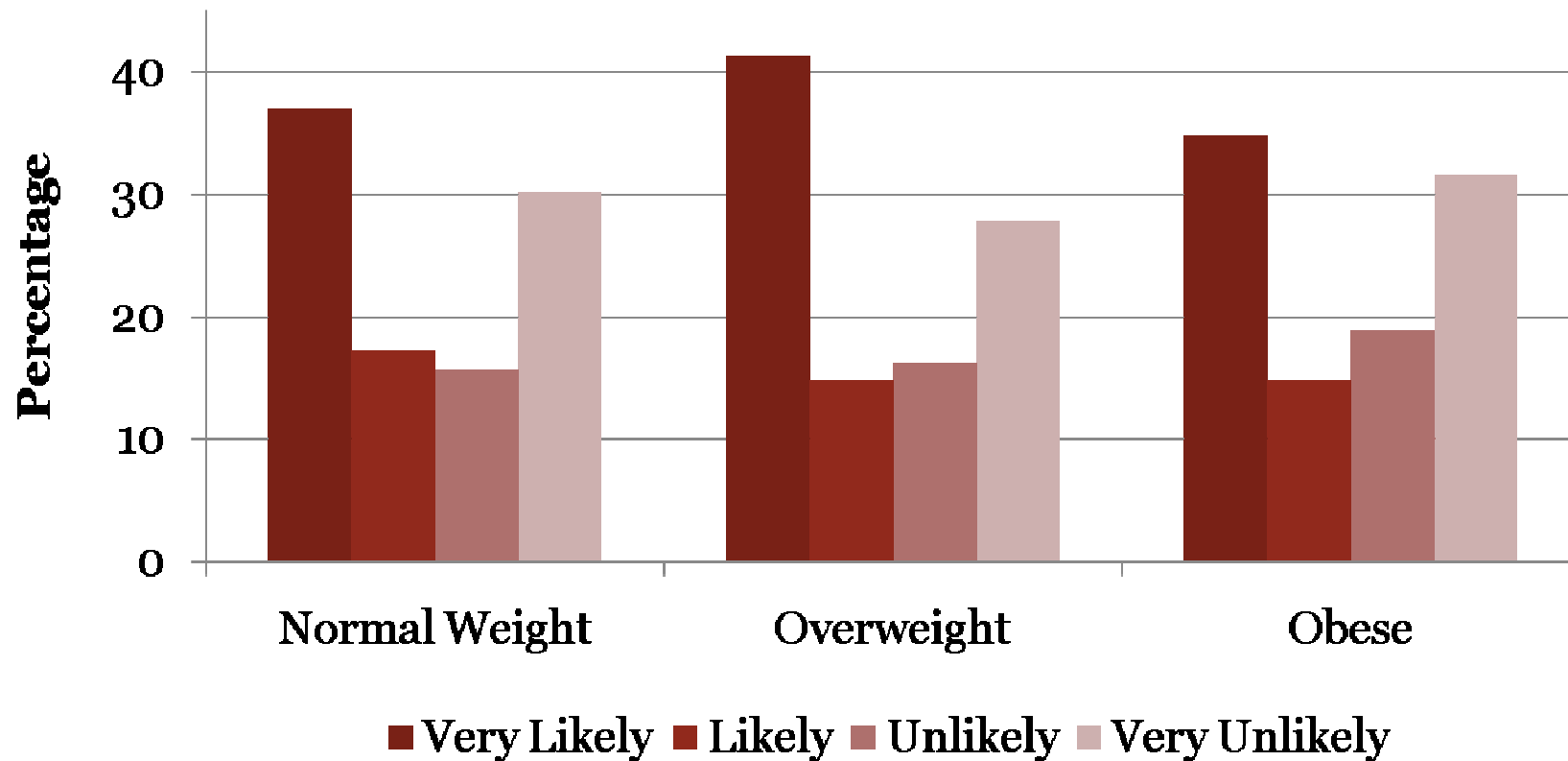
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First Objective: Methodology

Ordered Logit Models - Dependent Variable: Subjective Survival Expectations

- M1: BMI categories versus Normal Weight

- M2: M1 + Socio-Demographic

- M3: M2 + Physical and Mental Health

- M4: M3 + Health-Related Behaviors

- M5: M4 + Death Experience (Mother)

Ordered Logit - DV Subjective Survival Expectations - Percentage Change in Odds per Standard Deviation Increase in the IV

†: p<0.1; *: p<0.05; **: p<0.01; ***: p<0.001

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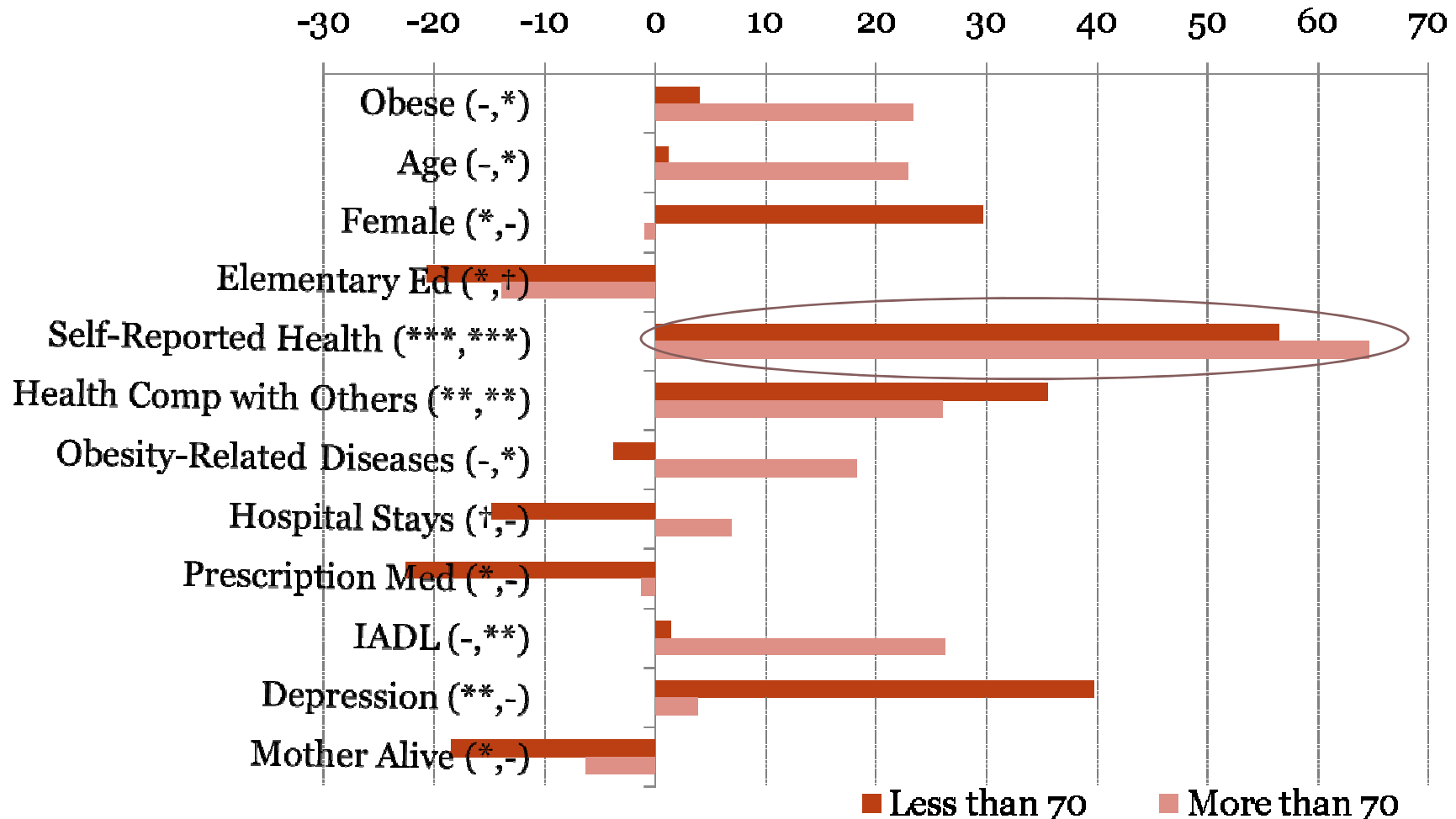
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Last Objective: Relationship of Subjective Survival and Mortality
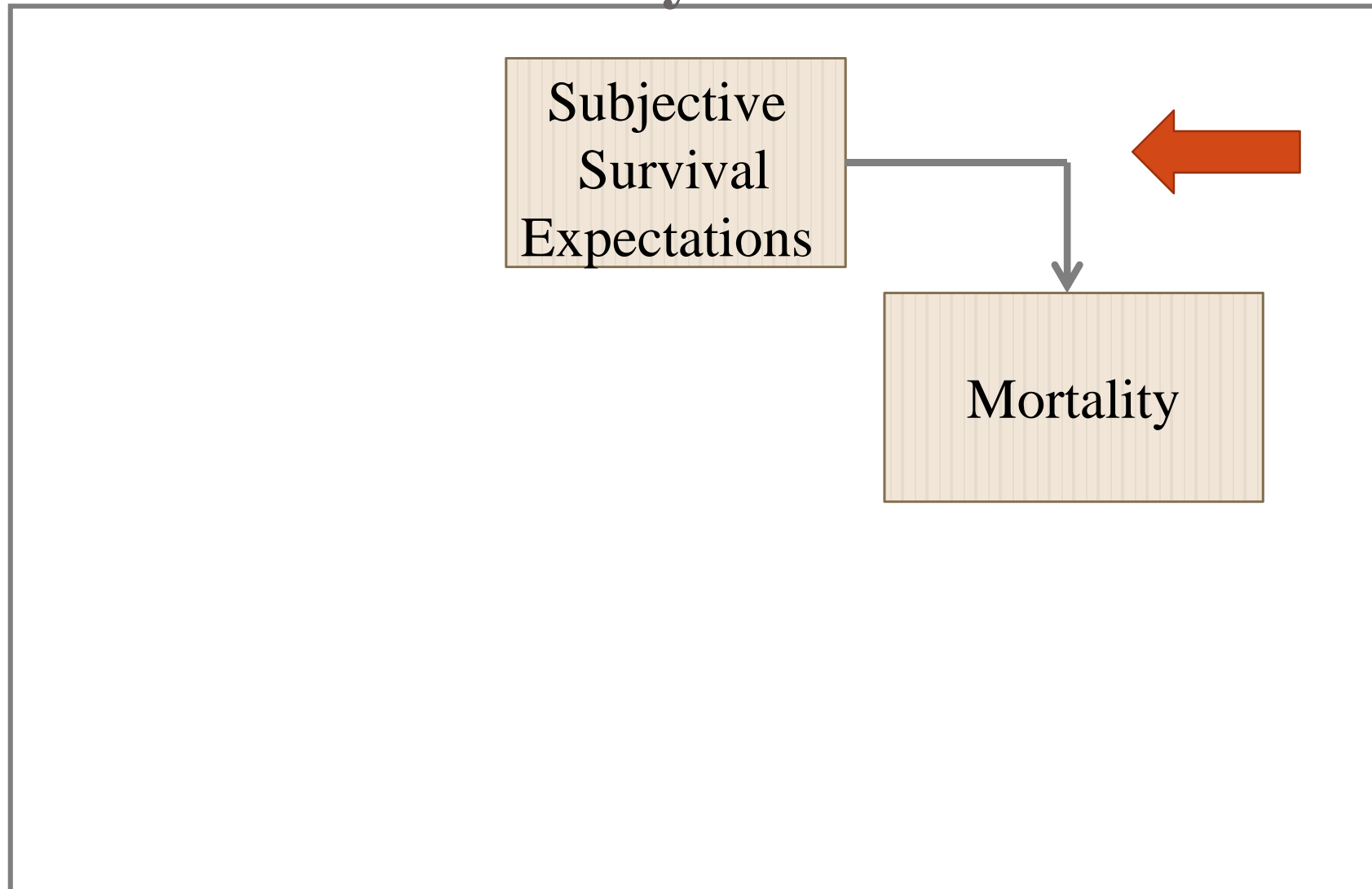
Subjective Survival Expectations

Mortality

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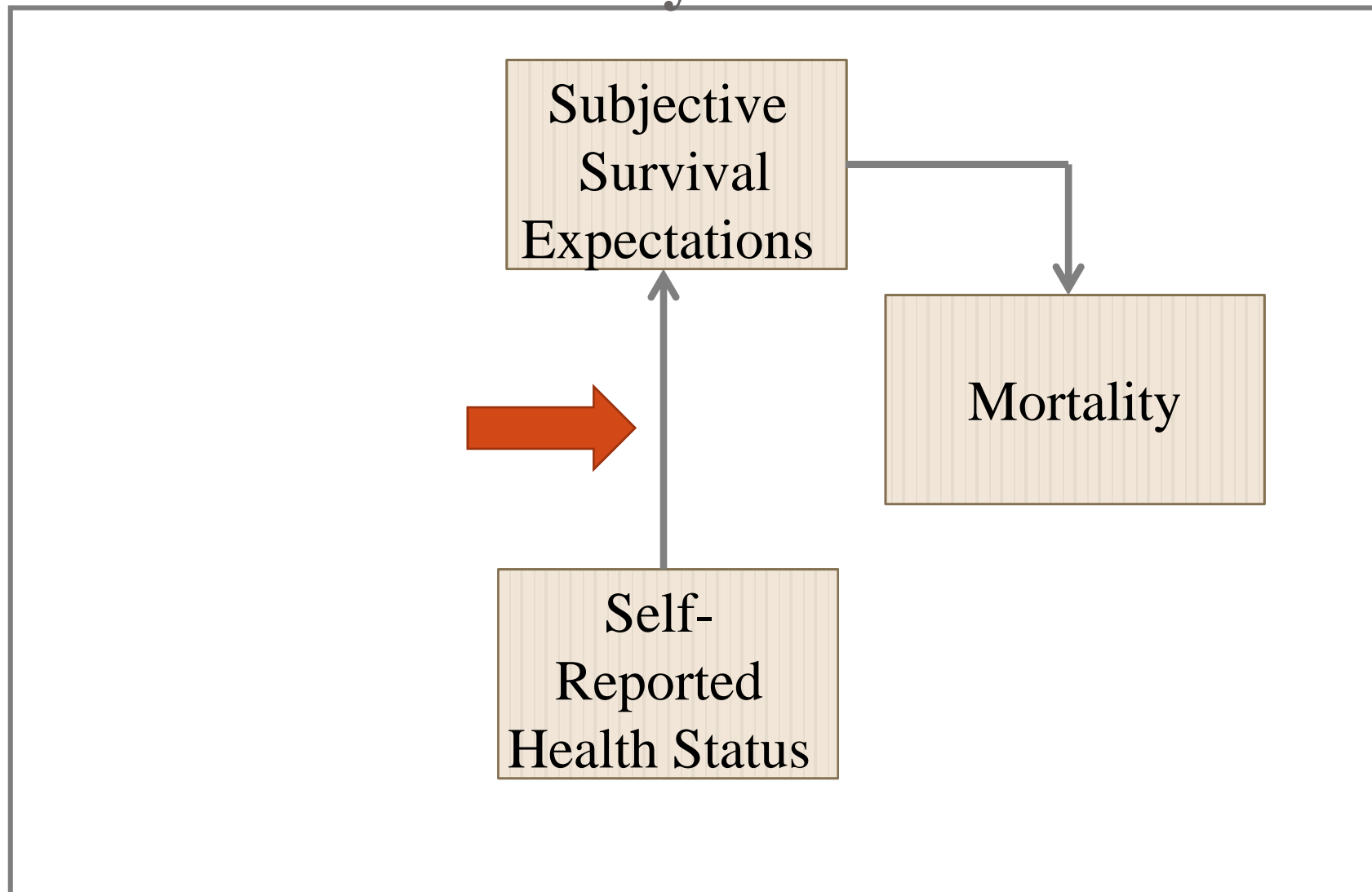
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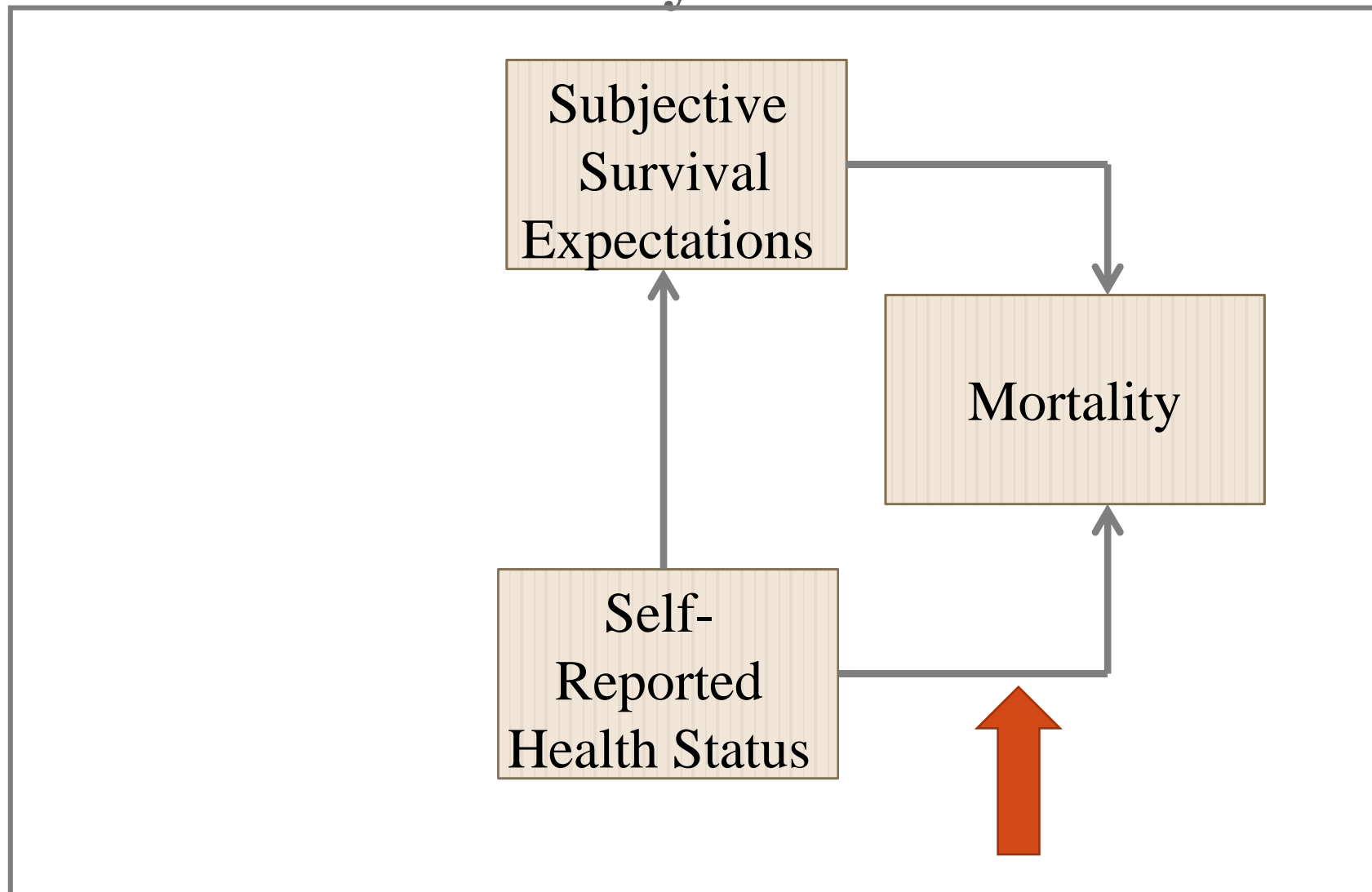
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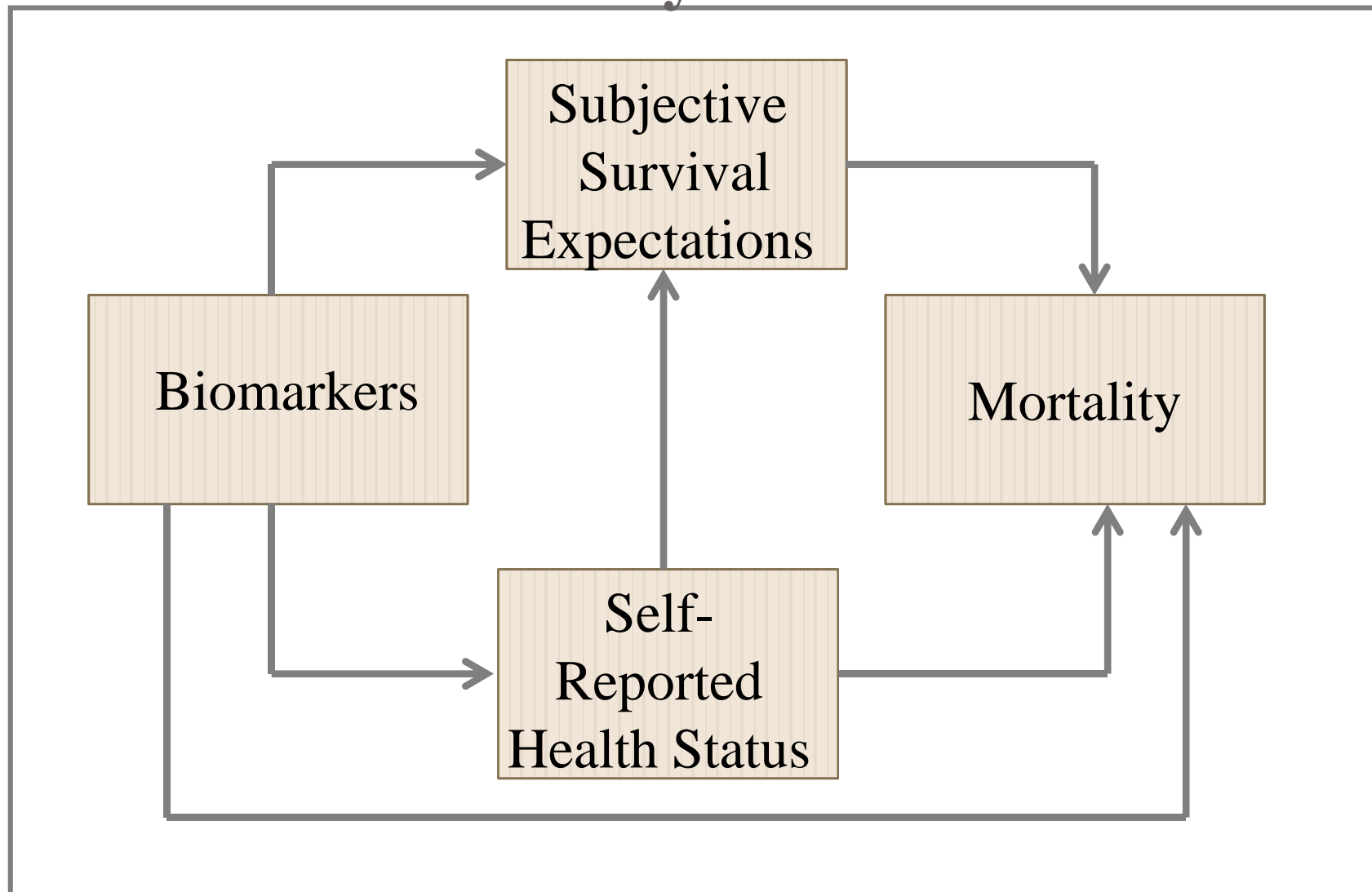
Last Objective: Methods

Parametric Survival Analysis (Gompertz)

- M1: Self-Rated Health (adjusted for Socio-Demographic, Physical/Mental Health, Health -Related Behaviors)

- M2: Subjective Survival (adjusted)

- M3: Self-Rated Health + Subjective Survival (adjusted)

- M1+B: M1 + Biomarkers (Body Functioning)

- M2+B: M2 + Biomarkers

- M3+B: M3 + Biomarkers

Does Subjective Survival Predict Actual Mortality? Yes

Males 60-69	M1	M2	M3
Subjective Survival	1.34†	---	1.27
Self-Reported Health	---	1.54†	1.45†
	M1+Bio	**M2+Bio**	**M3+Bio**
Subjective Survival	1.43*	---	1.37†
Self-Reported Health	---	1.49†	1.39
Females 60-69	**M1**	**M2**	**M3**
Subjective Survival	1.06	---	1.10
Self-Reported Health	---	0.76	0.74
	M1+Bio	**M2+Bio**	**M3+Bio**
Subjective Survival	1.07	---	1.11
Self-Reported Health	---	0.74	0.72

$\dagger$: $p<0.1$; *: $p<0.05$; **: $p<0.01$; ***: $p<0.001$

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Conclusions

- In general, determinants of Subjective Survival behave as expected in the literature for developed countries.

- Survival Expectations are an important predictor of mortality, especially for men

Individuals at higher levels of body weight/risky fat distribution are surprisingly unaware of deleterious effects of obesity on future survival

THANK YOU
GRACIAS

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Ordered Logit - DV Subjective Survival Expectations - Percentage Change in Odds per Standard Deviation Increase in the IV

Obese (-,*)
Age (-,*)
Female (*,-)
Elementary Ed (*,†)
Self-Reported Health (***,***)
Health Comp with Others (**,**)
Obesity-Related Diseases (-,*)
Hospital Stays (†,-)
Prescription Med (*,-)
IADL (-,**)
Depression (**,-)
Mother Alive (*,-)

Less than 70   More than 70

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Ordered Logit - DV Subjective Survival Expectations – Predicted Probabilities

Are There Differences in Estimated Odds Ratios across Body Weight/Composition Levels? No

BMI	Normal Weight	Overweight	Obese
Obesity-Related Diseases	1.14	1.17	0.61*
Not Obesity Related Diseases	0.88	0.91	0.85
"Other" Diseases	0.85	1.02	0.65*
Waist Circumference	**Not at Risk**	**Level 1**	**Level 2**
Obesity-Related Diseases	2.60**	0.71	0.93
Not Obesity Related Diseases	0.35†	0.46†	1.36
"Other" Diseases	0.84	1.55*	0.72**
Waist-Hip-Ratio	**Safe**	**Unsafe**	**Danger**
Obesity-Related Diseases	3.01	0.76†	1.97†
Not Obesity Related Diseases	1.36	0.90	2.03†
"Other" Diseases	2.12*	0.81*	1.15

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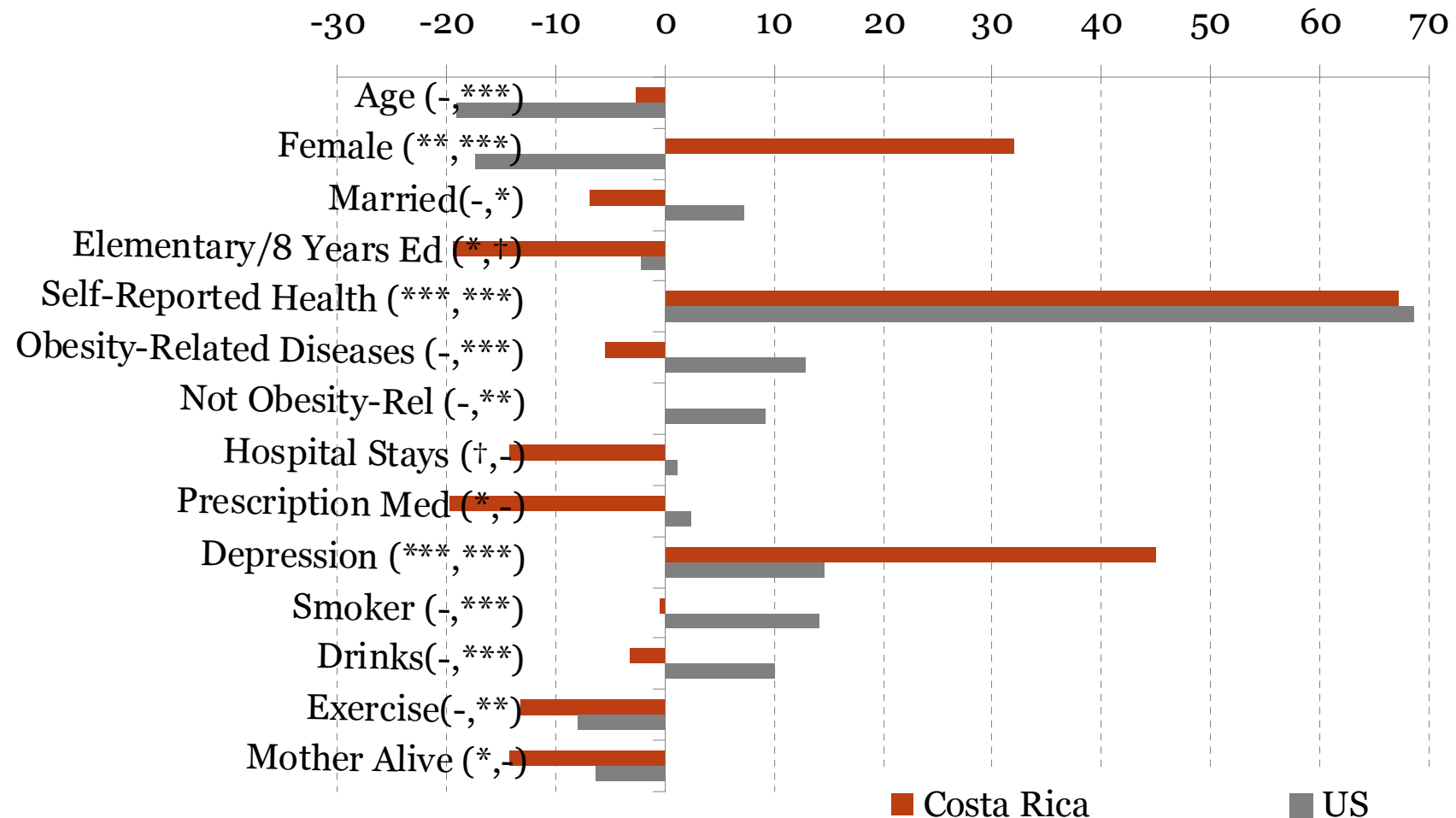| BMI	Normal Weight	Overweight	Obese
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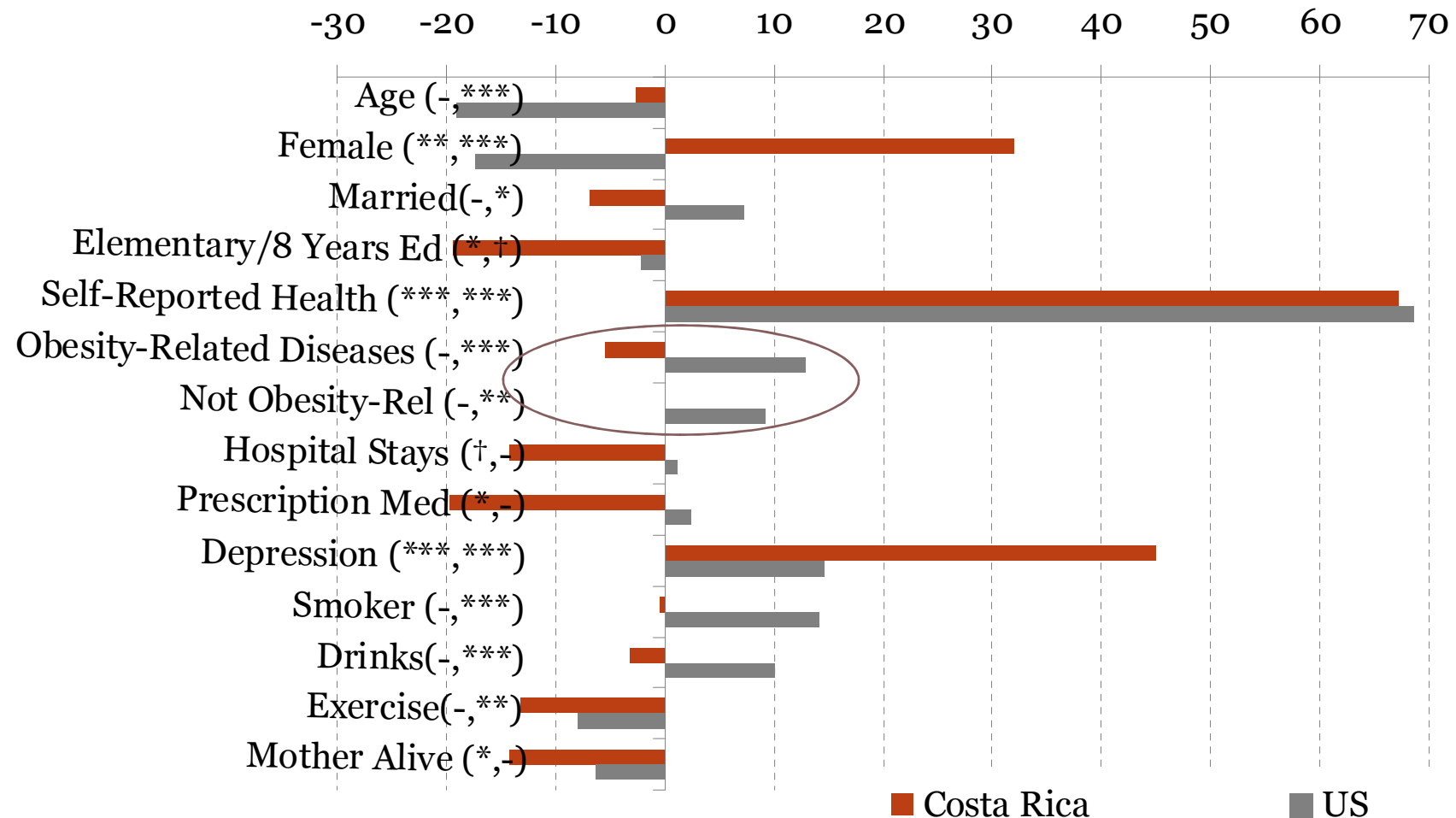

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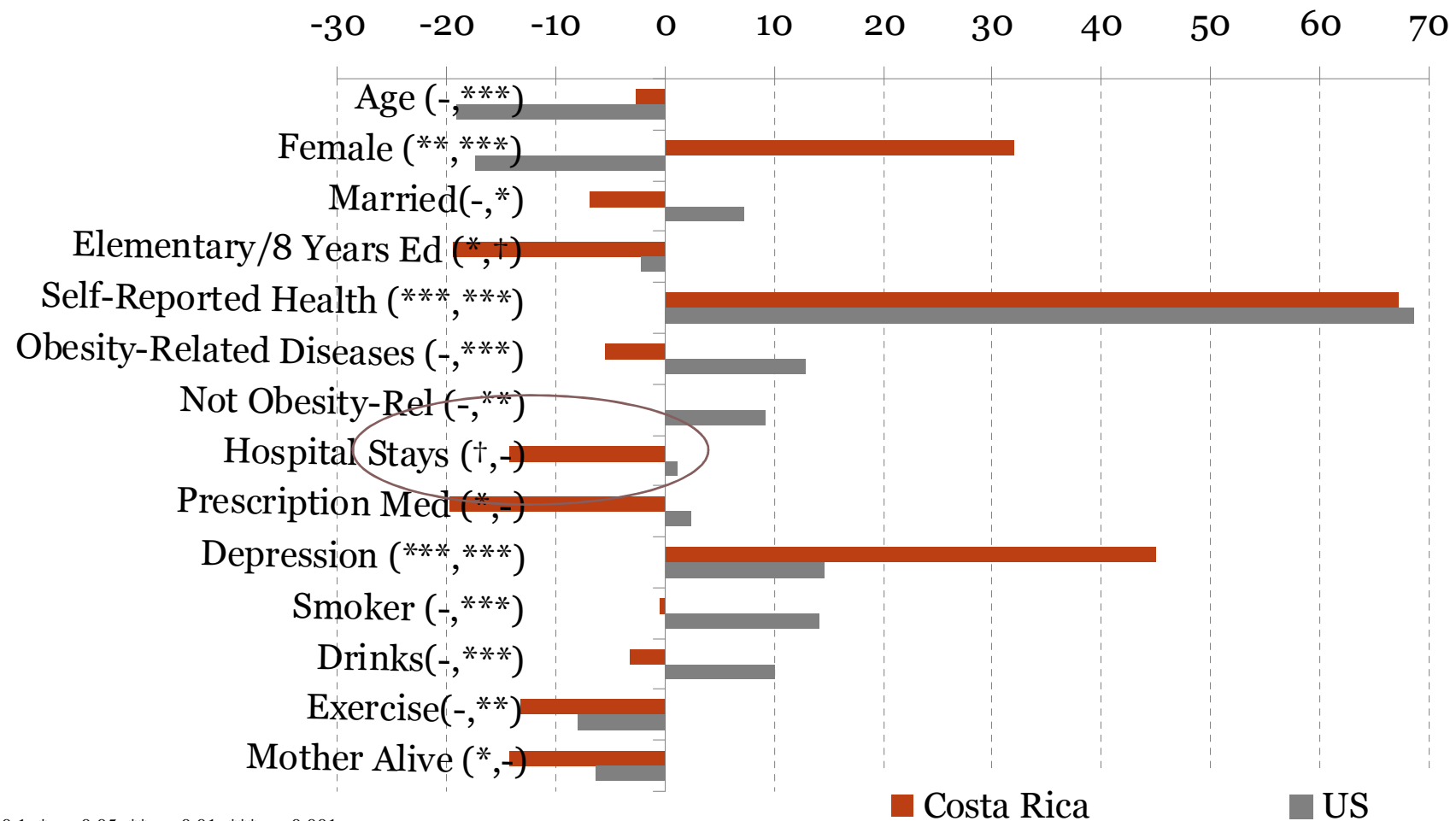
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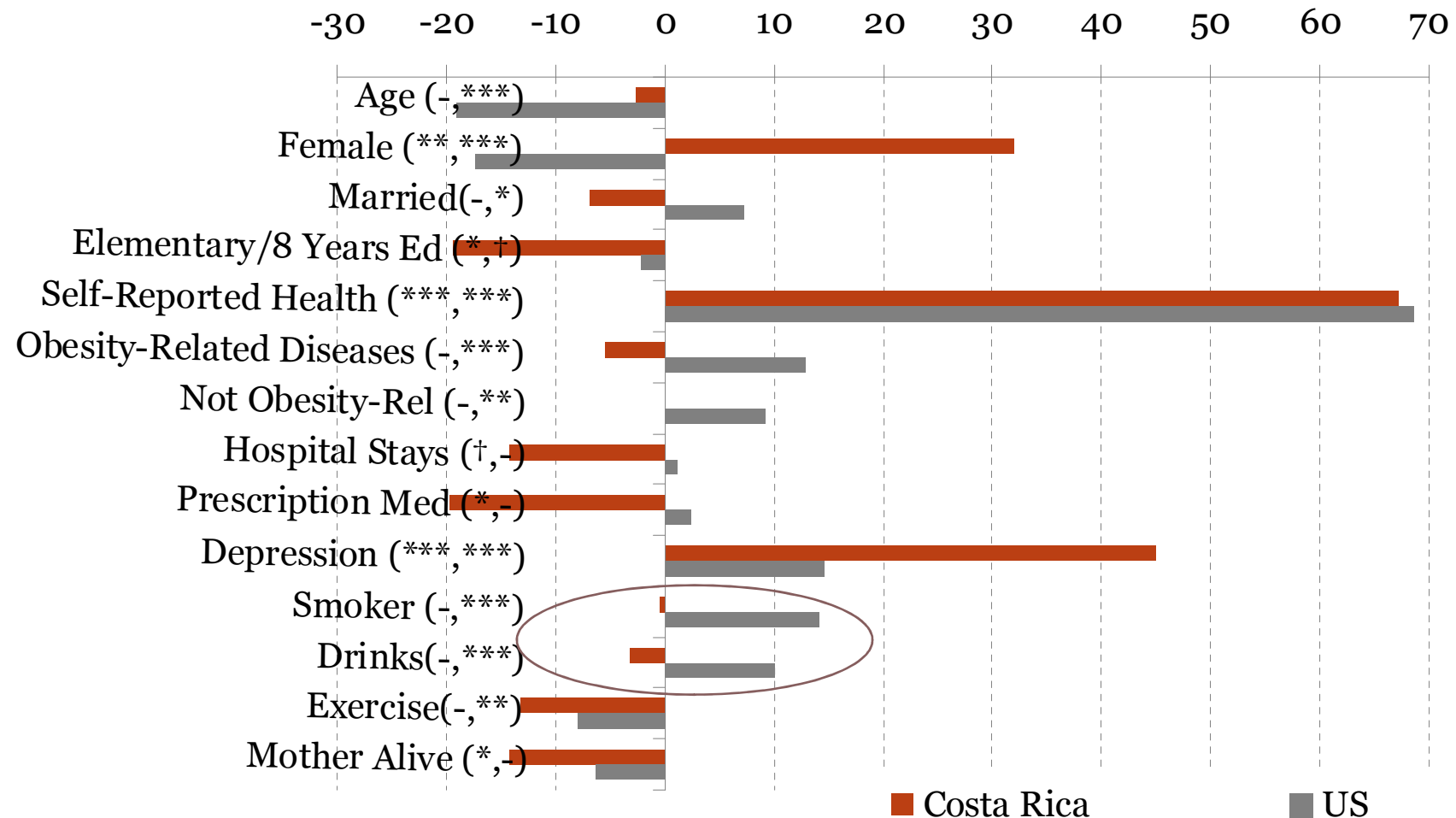

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Conclusions

- In general, determinants of Subjective Survival behave as expected in the literature for developed countries.

- Survival Expectations are an important predictor of mortality, especially for men

- Unexpected findings in Costa Rica may be revealing lack of health education/information and/or "defensive optimism"

- Individuals at higher levels of body weight/risky fat distribution are surprisingly unaware of deleterious effects of obesity on future survival