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# Life course socio-economic status and obesity among older Singaporeans

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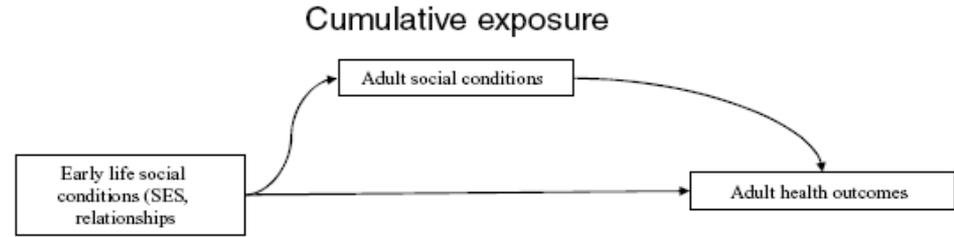
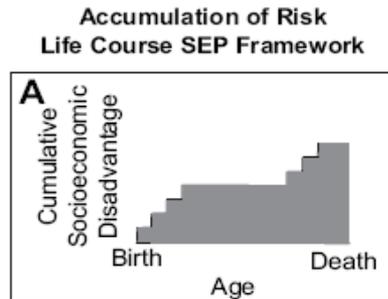
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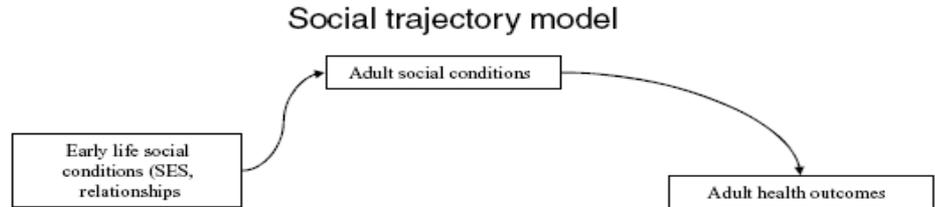
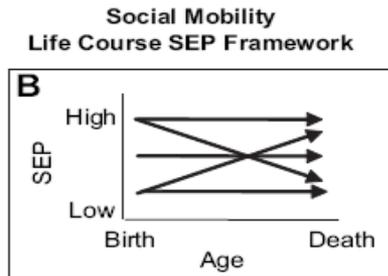
**1<sup>st</sup> World Congress on Healthy Ageing**  
**Kuala Lumpur, Malaysia**  
**20<sup>th</sup> March 2012**

# Life course SES frameworks

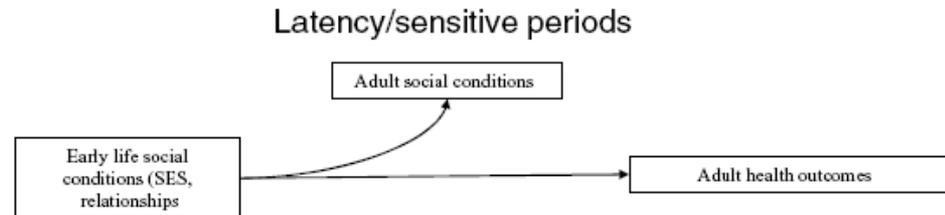
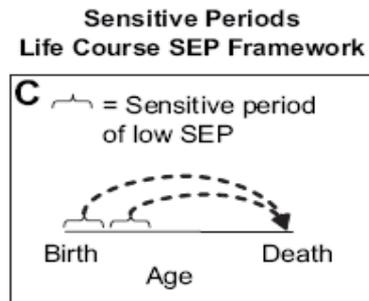
## 'Accumulation of Risk' (AR)



## 'Social Mobility' (SM)



## 'Sensitive Periods' (SP)



-Loucks EB, Pilote L, Lynch JW, Richard H, Almeida ND, Benjamin EJ, Murabito JM. Life course socioeconomic position is associated with inflammatory markers: the Framingham Offspring Study. *Soc Sci Med*. 2010 Jul;71(1):187-95.

-Berkman LF. Social epidemiology: social determinants of health in the United States: are we losing ground? *Annu Rev Public Health*. 2009 Apr 29;30:27-41.

# Life course SES and Obesity

- Recent studies do utilize these frameworks
  - **Mostly the SP framework:**
    - Inverse or no association of childhood SES with adulthood obesity.
  - Need to **simultaneously apply > 1 framework.**
  - **Most studies** pertain to **Caucasian** populations (US, Europe), and to **middle-aged** individuals.
  - **Asian setting? Older adults?**

# Objective

To describe the association of life course SES and (current) obesity among older Singaporeans, using the AR, SM and SP frameworks.

Data from the Singapore **Social Isolation, Health and Lifestyles Survey (SIHLS)** 2009.

# Methods: Dataset and Outcome

- **SIHLS 2009**
  - 5000 community-dwelling elderly (60+) Singaporeans.
  - Height (n=4460) and Weight (n=4532) measures.
  - Body mass index (BMI; weight [kg] / height [m]<sup>2</sup>): 4424 (88.5%) participants.
- **Obesity: BMI  $\geq$  27.5 kgm<sup>-2</sup>** (Asian classification).

# Methods: Childhood, Adult and Older Adult SES

SES	Indicator	Low	High
<b>Childhood</b>	<b>Family financial status:</b> “Now think about your family when you were growing up, from birth to age 16. Would you say your family during that time was .....?”	Response: “Poor”	Response: “Average” or “Pretty well off”
<b>Adult</b>	<b>Educational status</b>	≤ primary	≥ secondary
<b>Older adult</b>	<b>Type of housing</b>	1-3 room public [HDB] housing	≥ 4 room HDB or private housing

# Methods: Life course SES

- **SP framework**

- Independent effect of each life time-point SES indicator (i.e. after adjusting for the other two SES indicators).

- **AR framework**

- '1' for 'low' and '0' for 'high' for each SES indicator.
- **Cumulative socio-economic disadvantage** score.

- **SM framework (H:High, L: Low)**

- Eight mutually exclusive and exhaustive trajectories.

L/L/L 	L/L/H 	L/H/L 	L/H/H 
H/L/L 	H/L/H 	H/H/L 	H/H/H 

# Methods: Data analysis

- **Analysis sample: 4193 (84.9%).**
  - 807 (576: missing BMI, 231: missing SES) excluded.
- **SES life course frameworks / obesity association:**
  - Unadjusted and adjusted (for current age and gender) logistic regression models.

# Results: Participant characteristics

**Table 1: Demographic characteristics of and prevalence of obesity among older Singaporeans in the analysis sample**

<b>Variable</b>	<b>Weighted % (n)*</b> <b>N = 4193</b>
<b>Age (in years)</b>	
60-69	<b>60.6 (1875)</b>
70-79	29.9 (1608)
≥80	9.5 (710)
<b>Gender</b>	
Male	46.6 (1956)
Female	<b>53.4 (2237)</b>
<b>Ethnic group</b>	
Chinese	<b>82.7 (2973)</b>
Malay	9.5 (717)
Indian	6.4 (453)
Others	1.4 (50)
<b>Obesity (BMI ≥ 27.5 kg/m<sup>2</sup>)</b>	<b>18.9 (875)</b>

\* weighted by survey sample weights

# Results: Sensitive periods framework

**Table 2: Sensitive periods framework**

Life time point SES indicator	Weighted % (n) N = 4193	Obesity prevalence Weighted row %	Adjusted OR* (95% CI) for Obesity
<b>Childhood SES</b>			
Low	<u>57.1 (2372)</u>	<u>16.5</u>	<b>0.64 (0.54, 0.75)</b>
High	42.9 (1821)	22.1	1.0
<b>Adult SES</b>			
Low	<u>65.5 (2962)</u>	<u>20.3</u>	<b>1.44 (1.20, 1.74)</b>
High	34.5 (1231)	16.2	1.0
<b>Older adult SES</b>			
Low	34.3 (1514)	19.7	1.05 (0.89, 1.23)
High	<u>65.7 (2679)</u>	18.5	1.0

\* Adjusted for the other two life time-point SES indicators, current age and gender

**Low *childhood* SES: Lower odds of obesity**

**Low *adult* SES: Higher odds of obesity**

# Results: Accumulation of risk framework

**Table 3: Accumulation of risk framework**

<b>Cumulative socio-economic disadvantage</b>	<b>Weighted % (n) N = 4193</b>	<b>Obesity prevalence Weighted row %</b>	<b>Adjusted OR* (95% CI) for Obesity</b>
3 (max. disadvan.)	19.1 (878)	18.2	0.89 (0.69, 1.16)
2	35.9 (1549)	19.3	0.97 (0.77, 1.21)
1	27.9 (1116)	18.5	0.93 (0.74, 1.18)
0 (min. disadvan.)	17.1 (650)	19.3	1.0

\* Adjusted for current age and gender

**No association with cumulative socio-economic disadvantage**

# Results: Social mobility framework

**Table 4: Social mobility framework**

SES trajectory	Weighted % (n) N = 4193	Obesity prevalence Weighted row %	Adjusted OR* (95% CI) for Obesity
L/L/L (stable low)	19.1 (878)	18.2	0.91 (0.71, 1.18)
L/H/L	2.9 (101)	14.8	0.71 (0.42, 1.20)
L/L/H	24.5 (1059)	17.4	0.87 (0.68, 1.11)
<b>L/H/H</b>	10.6 (334)	<b>11.8</b>	<b>0.57 (0.40, 0.80)</b>
<b>H/L/L</b>	8.5 (389)	<b>26.6</b>	<b>1.49 (1.10, 2.00)</b>
H/H/L	3.8 (146)	15.2	0.77 (0.48, 1.23)
<b>H/L/H</b>	13.5 (636)	<b>24.7</b>	<b>1.32 (1.01, 1.72)</b>
H/H/H (stable high)	17.1 (650)	19.3	1.0

\* Adjusted for current age and gender

**'High' childhood to 'Low' adult SES: Highest prevalence**

**'Low' childhood to 'High' adult SES: Lowest prevalence**

# Discussion: SP framework

- **Low childhood SES ~ Lower odds of obesity**
  - Previous studies: Inverse or no association.
  - Setting and time period for 'childhood' (0-16 years).
    - Analysis sample participants: Born 1912 to 1949; Singapore or Malaysia.
    - Childhood years (all or a considerable part):
      - Developing economy; Colonial rule (British [till 1962] and Japanese[1942-45]).
      - Periods of economic and (food) insecurity:
        - » Depression in the West (early 1930s); Japanese Occupation; Post WW II.
      - **Poorer families: disproportionately exposed to a nutritionally inadequate diet or to limited caloric intake.**
      - Continuing influence of childhood nutritional or caloric inadequacy.

# Discussion: SP framework

- **Low adult SES ~ Higher odds of obesity**
  - Previous studies: Similar findings.
  - Lower levels of knowledge and of adoption of healthy lifestyles.
  - Greater consumption of cheaper but calorie dense foods.

# Discussion: AR framework

- **No association in current analysis.**
- Previous studies: Higher odds of obesity with accumulation of socio-economic disadvantage.
- Childhood and adult SES acting in opposite directions versus in the same direction.
- Important to look at independent effects of life time point SES to understand AR framework findings.

# Discussion: SM framework

- **Evidence of SM, and of its association with obesity.**
- Again, key drivers were childhood and adult SES.
  - Moving  ('L' in childhood to 'H' in adulthood): Lowest prevalence
  - Moving  ('H' in childhood to 'L' in adulthood): Highest prevalence

# Conclusion

- The **three frameworks complement each other.**
- The **association** of life course SES with obesity in adulthood is **context specific.**
- **All the three frameworks can be simultaneously utilized** to gain a broader understanding of this association.

# Acknowledgements / Funding

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  - Ministry of Community Development, Youth and Sports, Singapore.
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- **Analyses:**
  - Tsao Foundation Ageing Research Initiative, NUS.
  - A\*STAR infrastructure grant to the Duke-NUS Program in Health Services and Systems Research.

**THANK  
YOU**



# Methods: SIHLS 2009

- Survey of **community-dwelling elderly Singaporeans**, aged 60 years and above
- Commissioned by the Ministry of Community Development, Youth and Sports (**MCYS**), Singapore
- Random sample of 8400 elderly
- 1195 (14.2%) addresses: Invalid
- **5000 elderly interviewed** at their residence after written informed consent (Response rate: 69.4%)
- Proxy interviews: 458 (9.2%) elderly

# Discussion: SP framework

- **Low childhood SES ~ Lower odds of obesity**
  - Previous studies: Inverse or no association.
  - Setting and time period for 'childhood' (0-16 years).
    - Analysis sample participants: Born 1912 to 1949; Singapore or Malaysia.
    - Childhood years (all or a considerable part):
      - Developing economy; Colonial rule (British [till 1962] and Japanese[1942-45]).
      - Periods of economic and (food) insecurity:
        - » Depression in the West (early 1930s); Japanese Occupation; Post WW II.
      - **Poorer families: disproportionately exposed to a nutritionally inadequate diet or to limited caloric intake.**
        - » **Average lower limb length: Lower** for those with **low** versus high **childhood SES** (76.71 cm [95% CI: 76.47-76.97]) vs. 77.37 cm [77.04-77.70](p = 0.002; unpaired t-test).
      - **Continuing influence of childhood nutritional or caloric inadequacy.**

# Discussion: SP framework

- **Low childhood SES ~ Lower odds of obesity (contd...)**
  - Alternative explanations:
    - Financial hardship more sensitive.
    - Residual confounding.
    - 'Healthy' survivor bias.

# Discussion: SM framework

- Previous studies hypothesize:
  - Those moving up the SES ladder have a better health status than those they leave and a worse health status than those they join.
  - Those moving down the SES ladder have a better health status than those they join and a worse health status than those they leave.
- Current study- partial support in context of obesity:
  - Upward mobile (LHH and LHL) not only have a lower odds of obesity relative to LLL but also relative to HHH.
  - Downward mobile (HLL and HLH) not only have higher odds of obesity relative to HHH but also relative to LLL.
  - Social protection?

# Discussion: Limitations and strengths

- **Limitations:**

- Retrospective recall of childhood SES.
- Dichotomization of each life-time point SES.
- Education as adult SES indicator, esp. for females.

- **Strengths:**

- Large representative sample.
- Among the few studies assessing the association of life course SES with obesity in adulthood from Asia, and among older adults.
- Results hold in sensitivity analysis (Obesity: BMI  $\geq 30.0$  kgm<sup>-2</sup>)