

FAMILY ADVERSITY,
CONJOINT TRAJECTORIES OF BMI AND
AFFECTIVE SYMPTOMS, AND
PHYSICAL ILLNESS
FROM MIDDLE TO LATER ADULTHOOD

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FAMILY ADVERSITY, CUMULATIVE DISADVANTAGE & HEALTH

- **Cumulative health impacts** of socioeconomic adversity over the life course are well documented.
- However, little is known about **risk mechanisms** through which family adversity in early-middle years influence later physical health outcomes.
- In the present study (40-65 yrs), we investigate the progression of health-risks over the middle years and their **social stratification and health consequences** in later years.

HEALTH RISK TRAJECTORIES - PREVIOUS STUDIES

- Consistently high BMI trajectories are associated with poor physical health during the middle years (Wang et al., 2016)
- Consistently high and increasing depressive and anxiety symptom trajectories predict the onset of cardio metabolic diseases (Rugulies, 2002; Wickrama, O'Neal, & Lorenz, 2017)
- The co-occurrence of weight problems and elevated affective symptoms are a major risk factor for disease (Faulconbridge et al., 2011)

CUMULATIVE DISADVANTAGE THROUGH RISK TRAJECTORIES

- **Cumulative Disadvantage** : The health effect of early adversity may compound through risk trajectories.
- **Risk trajectories** (e.g. BMI, affective symptoms) have **additive and interactive effects** on later health.

Interactive Effects:

- **Level-level interaction**: If health risks co-occur, they may produce a persistent synergistic effect on health in later years.
- **Change-change interaction** or temporal comorbidity: health risks may compound over time, producing a synergistic health effect.
- These qualitatively different health processes can be examined by examining the **conjoint risk trajectories** with different patterns.

SPECIFIC STUDY HYPOTHESES

- A. **Heterogeneity** exists in conjoint trajectories of BMI, depressive, and anxiety symptoms over the middle years.
- B. **Health risk is socially stratified**; that is, socioeconomic profiles are associated with heterogeneous conjoint trajectory classes of BMI and affective symptoms.
- C. These risk classes are associated with **multiple health outcomes in the later years**.

MEASURES: SOCIOECONOMIC ANTECEDENTS

- **Gross family income** - Incomes from wages, self-employment including farming, dividends, rents and other sources (both husband and wives) were summed to create a measure of gross family income in 1991.
- **Total family assets** - Respondents' reports of values of all family assets (e.g., houses, vehicles, savings, and other reported assets) were summed to create a measure of the total family assets in 1991.
- **Family economic problems** - 27 items were summed to indicate the number of economic problems experienced by the family during the previous year (1 = yes, 0 = no). The list of economic problems included items such as "borrowed money to help pay bills," "sold possessions or cashed in life insurance," and "changed food shopping or eating habits to save money."
- **Making ends meet** - Mothers indicated how constrained they felt by current economic conditions (1 = *strongly disagree*, 5 = *strongly agree*). Respondents were prompted with items such as "Our income never seems to catch up with our expenses."
- **Divorced/separated** - Reports about their marital status in 1991 were used to create a dichotomous variable distinguishing mothers who were divorced/separated (1) from those who were married (2).
- **Educational level** - Respondents' years of education in 1991 was used to assess their education level.

MEASURES: HEALTH RISKS

- **Depressive symptoms (1991-2001)** - Nine items from the Symptom Checklist (SCL-90-R) (Derogatis & Melisaratos, 1983). Sample items include, “thoughts of ending your life,” “feelings of worthlessness,” and “feeling hopeless about the future.” These items were scored on a 5-point Likert scale from 1 = *not at all* to 5 = *extremely*. The internal consistencies were more than .90 for 1991, 1994, and 2001.
- **Anxiety symptoms (1991- 2001)** - SCL-90-R (Derogatis & Melisaratos, 1983). Sample items include, “nervousness or shakiness inside,” “feeling tense or keyed up,” and “feeling fearful.” The internal consistencies were more than .80 for 1991, 1994, and 2001.
- **BMI** - Respondents reported their height and weight in 1991, 1994, and 2001. From these responses, their BMI values, the ratio of weight to height squared ($[\text{lbs} \times 703] / \text{inches}^2$), were calculated.

MEASURES: PHYSICAL HEALTH OUTCOMES

- **Poor global health (2015)-**

“How would you rate your overall physical health?” and

“Compared to 1 year ago, how would you rate your physical health in general now?”

- **Physical diseases (2015)-** respondents indicated if they had been diagnosed by a physician in the previous two years using a list of 48 physical health ailments. Sample items include: “diabetes,” “high cholesterol,” “high blood pressure,” and “peptic ulcer.” Responses were truncated at 8 to reduce the skewness of this variable

- **CVD counts after 2001 -** In 2015, respondents reported timing (year) of cardiovascular disease (CVD) onset (including hardening of the arteries, blood clot in the lung, blood clot in the vessels, heart failure, stroke, and heart attack).

MEASURES: PHYSICAL HEALTH OUTCOMES

- **Physical impairment (2015)- (10 items)**

Rand Health Science Program in Health Survey 1.0 (1986). Respondents were asked to indicate their physical impairment on a 3-point scale ranging from 1 = *no, not limited at all* to 3 = *yes, limited a lot*.

e.g., “Vigorous activities such as running, lifting heavy objects

“walking more than a mile” “one block”

- **Bodily pain (2015) (2 items)-** Rand Health Science Program in Health Survey 1.0 (1986).

“How much bodily pain did you experience in the four preceding weeks?” “How much did pain interfere with your normal work?”

STATISTICAL PROCEDURE

- Mplus (version 7.4)
- We begin by estimating latent growth curves (LGCs) over 10 years (from 1991 to 2001)
- Growth mixture modeling (GMM) was used to identify latent classes (LC) of conjoint health risk trajectories
- Differences in socioeconomic antecedents and health outcomes were analyzed using MANOVA

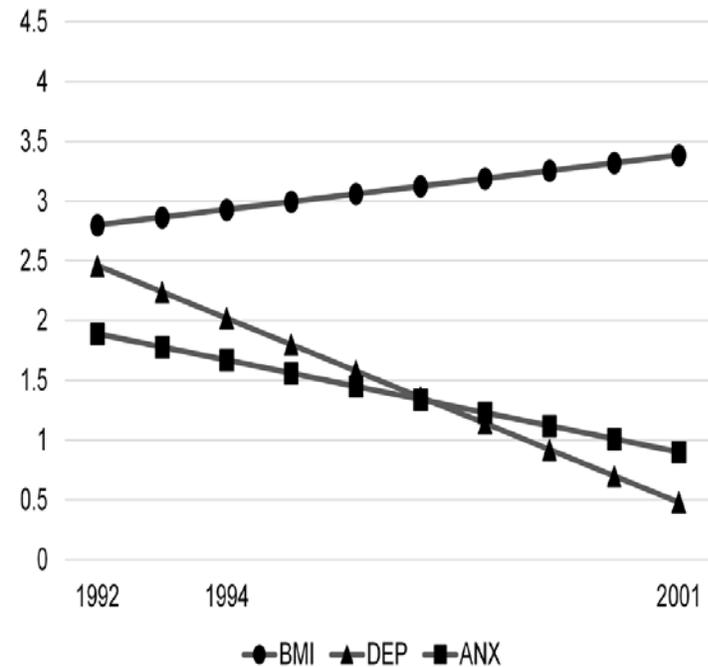
RESULTS – INDIVIDUAL RISK TRAJECTORIES

Table 1. Risk-Specific Univariate Growth Curve Results

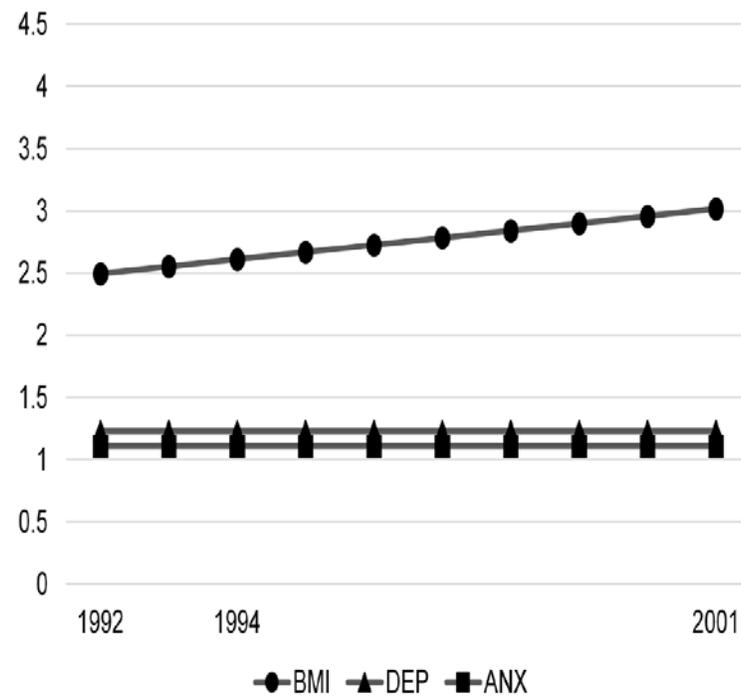
	Initial level		Slope		χ^2	CFI	TLI
	Mean	Variance	Mean	Variance			
Depressive symptoms	1.50*	0.22*	0.00	0.03*	18.91 (1)	0.93	0.80
Anxiety symptoms	1.26*	0.11*	0.00	0.01*	4.71 (1)	0.99	0.96
Body mass index	26.35*	30.22*	0.71*	0.13*	1.32 (1)	1.00	0.99

Note: N = 349; CFI = comparative fit index, TLI = Tucker-Lewis index; * $p < .05$, two-tailed test.

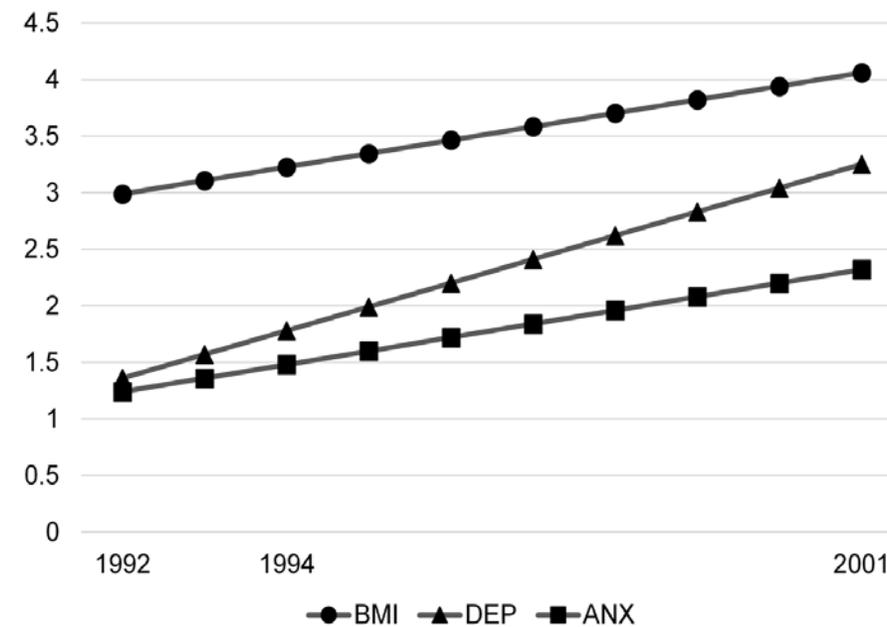
Class 1: Initially High;
N = 55



Class 2: Low-Stable, Normative;
N = 236



Class 3: Increasing;
N = 58



PATTERNING OF CONJOINT TRAJECTORIES

Table 3. Socioeconomic Antecedent and Physical Health Profiles

Panel A. Socioeconomic Antecedent Profiles (1991 or before), reference group is Class 2 (normative group with low and stable values)

	Class 1 <hr/> Initially High	Class 3 <hr/> Increasing	Univariate <i>F</i>
Gross Family Income (1991 in \$1000s)	-2.82**	-2.01	2.44*
Family Assets (1991 in \$1000s)	-71.00**	-27.00	2.41*
Family Economic Problems	3.01*	2.23	6.18**
Making Ends Meet	0.46*	0.15*	4.70*
Divorce/Separated (1991)	0.07	0.04	1.90
Education (1991)	0.12	-0.15	2.00
Multivariate <i>F</i> (12, 360) = 7.38**			

Note: *N* = 349; class comparison *p* < .05 if +1 vs 2, *1 vs 3, ^2 vs 3; *p* < .01 if ++1 vs 2, ** 1 vs 3, ^^2 vs 3; for *F* tests, **p* < .05, ***p* < .01; two-tailed tests presented.

**RESULTS: SOCIAL STRATIFICATION OF
HEALTH RISK PATTERNS**

Panel B. Physical Health Profiles in 2015, reference group is Class 2 (normative group with low and stable values)

	Class 1	Class 3	
	Initially high	Increasing	Univariate <i>F</i>
Global Poor Health 2015	0.23*	0.64*	17.68**
Disease Count 2015	2.50*	1.87*	12.23**
CVD Onsets since 2001	0.05	0.07**	2.00*
Physical Impairment 2015	0.20*	0.46*	17.30**
Bodily Pain 2015	0.05*	0.26*	9.87**
Multivariate $F(10, 360) = 5.80^{**}$			

Note: $N = 349$; class comparison $p < .05$ if +1 vs 2, *1 vs 3, ^2 vs 3; $p < .01$ if ++1 vs 2, ** 1 vs 3, ^^2 vs 3; for F tests, * $p < .05$, ** $p < .01$; two-tailed tests presented.

RESULTS- HEALTH OUTCOMES IN LATER YEARS

Panel C. Change in Health for Each Class

	Class 1	Class 2	Class 3	
	Initially high	Low and stable	Increasing	Univariate <i>F</i>
Change in Disease Count (1991–2015)	0.29*	0.76 [^]	2.19	6.09**
Change in Disease Count (2001–2015)	1.36 ⁺⁺	0.87 ^{^^}	1.42	2.10*
Change in Global Poor Health	0.11*	0.22 [^]	0.40	2.40
Change in Bodily Pain	0.03	0.00	0.01	0.90
Change in physical impairment (2001–2015)	0.77	0.55 ^{^^}	1.48	3.40*
Multivariate <i>F</i> (12, 360) = 3.40*				

Note: *N* = 349; class comparison *p* < .05 if *1 vs 2, *1 vs 3, ^2 vs 3; *p* < .01 if ++1 vs 2, ** 1 vs 3, ^^2 vs 3; for *F* tests, **p* < .05, ***p* < .01; two-tailed tests presented.

RESULTS: HEALTH DECLINE OVER MIDDLE YEARS

SUMMARY

- **The patterning of conjoint trajectories** was highly heterogeneous and produced qualitatively different health processes.
- Conjoint trajectory patterns are **socially stratified**.
- **Level-level comorbidity** and **longitudinal comorbidity** may have produced qualitatively different synergistic health influences.
- The health effect of high initial levels of risk (severity), regardless of risk-decline, may be attributed to early physiological damage becoming stronger over time (i.e., time interaction).

IMPLICATIONS

- Findings advance life course perspective
 - Both the **cross-sectional and longitudinal comorbidities of multiple risks** are important in life course investigations.
- Health consequences of risk patterns in middle years include **an array of health problems** in later years.
- Risk sub-populations can be identified in advance, probably in early middle years - **a prognostic tool**.