Resilience in the Face of Multimorbidity: Why some individuals adapt to adversity better than others

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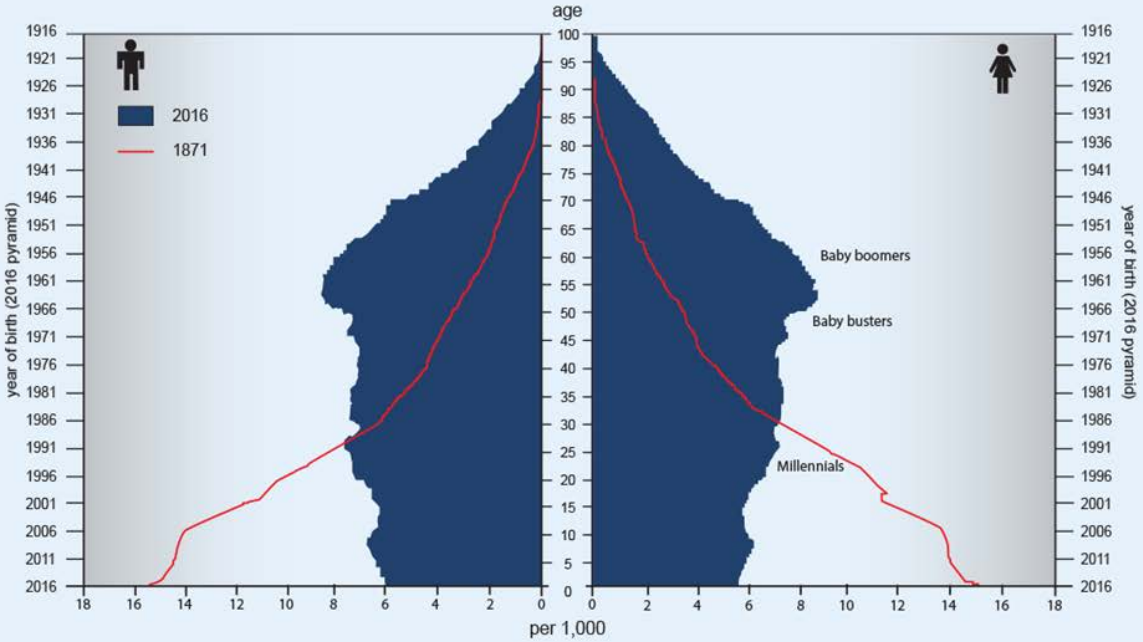
Resilience in Aging: Exploring People, Places, and Policies

AGE PYRAMID OF CANADA IN 1871 AND 2016: 150 YEARS OF DEMOGRAPHIC HISTORY

2016



Source:
Statistics Canada, Census of Population, 1871 and 2016.


Resilience
The ability to rebound from adversity
Multimorbidity Resilience
The ability to rebound from illness adversity

Defining Multimorbidity

- Multiple concurrent chronic conditions that are slow in progression and long in duration, and episodic.

- Synergetic negative effects especially among older people.

Effects of Multimorbidity

- Physical challenges such as episodic pain, loss of function, loss of independence, mortality.
- Social-psychological feelings of stress, anxiety, depression, loneliness, low self-esteem, social isolation and alterations in social roles (American Geriatrics Society, 2012; Institute of Medicine, 2012).

Multimorbidity Prevalence

- In the US it has been estimated that:
  - 62.0% of those aged 65-74,
  - 75.7% of those aged 75-84,
  - 81.5% of those aged 85+
- …have 2 or more of 15 possible prevalent chronic conditions (Salive, 2013).
- Similar patterns have been observed in both Australia and Canada.

Wister, A., Kendig, H., Mitchell, B., Fyffe, I., & Loh, V. (2016b). Multimorbidity, health and aging in Canada and Australia: a tale of two countries. *BMC Geriatrics*, *16*(163).

How do We Measure Multimorbidity?

Multimorbidity Lists (Griffith, 2017)

Disease System[5]	CLSA Chronic Conditions	Diederichs List[6]	Fortin List[7]	Fortin[3] [12 most prevalent]	Willadsen[8]		
					Diseases	Risk Factor	Symptom
Musculoskeletal	Osteoarthritis	✓	✓	✓	✓		
	Rheumatoid arthritis						
	Osteoporosis		✓	✓		✓	
Respiratory	Asthma		✓	✓	✓		
	COPD	✓			✓		
Cardiac	Heart disease (including CHF)	✓	✓	✓	✓		
	Angina		✓		✓		
	Myocardial infarction	✓	✓				
Vascular	Hypertension	✓	✓	✓		✓	
	Peripheral vascular disease						
Endocrine-Metabolic	Diabetes	✓	✓	✓	✓		
	Hypo-/Hyperthyroidism		✓	✓			
Neurological	Stroke or CVA	✓	✓		✓		
	Transient ischemic attack						
	Parkinsonism/disease						
	Multiple Sclerosis						
	Epilepsy						
	Migraine headaches			✓			✓
Gastrointestinal (Upper and Lower)	Intestinal or stomach ulcer		✓				
	Bowel disorder			✓			
	Bowel incontinence		✓				✓
Genitourinary	Urinary incontinence		✓				✓
Ophthalmologic	Cataracts, Glaucoma, Macular Degeneration			✓			✓
Psychiatric	Mood disorder (depression)	✓	✓	✓	✓		
	Anxiety						
	Alzheimer's disease/Dementia		✓				
Renal	Kidney disease		✓		✓		
Cancer*	Cancer	✓	✓	✓	✓		
Other Risk Factors/Symptoms	Obesity		✓			✓	
	Overweight					✓	
	Back problems		✓				✓

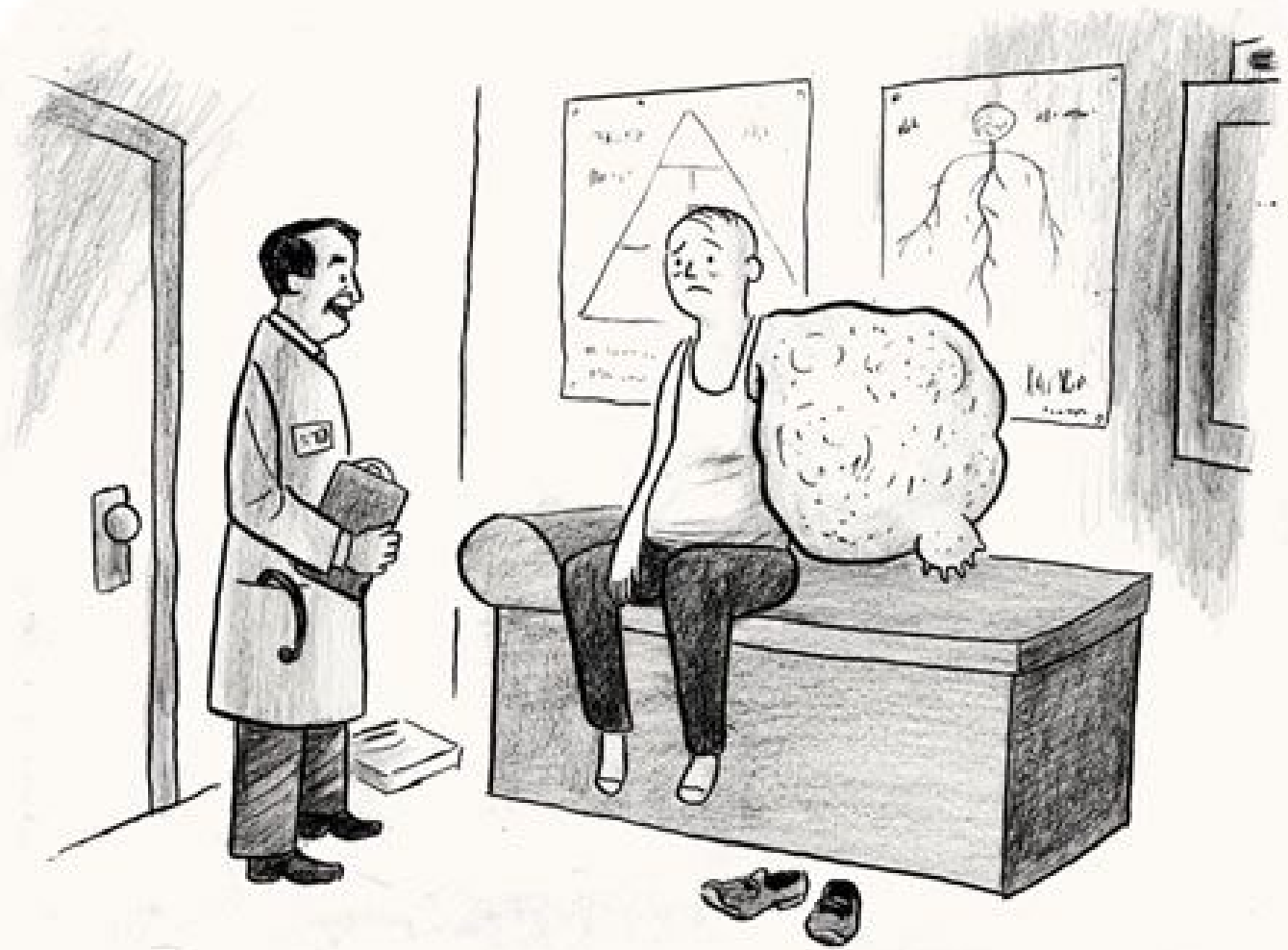
What Measures Should We Use In Surveys?

- Estimating multiple morbidity disease burden among older persons: A convergent construct validity study to discriminate among six chronic illness measures, CCHS 2008/09 (Wister et al., 2015).
- Utilized the Canadian Community Health Survey – Healthy Aging dataset (16,369 participants 65+).

Wister, A.V., Levasseur, M., Griffith, L., & Fyffe, I. (2015). Estimating multiple morbidity disease burden among older persons: a convergent construct validity study to discriminate among six chronic illness measures, CCHS 2008/09. *BMC Geriatrics*, *15*(1).

Bivariate Correlation Coefficients Canadians aged 65+ (n= 16,369)

Health Outcome Measures	Multimorbidity Dichotomized (0/1, 2+)	Multimorbidity Additive Scale	Multimorbidity Weighted by ADL Scale
Life Satisfaction	-.14	-.23	-.25
Perceived Health	-.24	-.39	-.40
Health Professional Visits	.20	.22	.24
Medications Used Daily	.40	.55	.50
*All correlations are statistically significant at the p < .001 level			



"So, what seems to be the trouble today?"

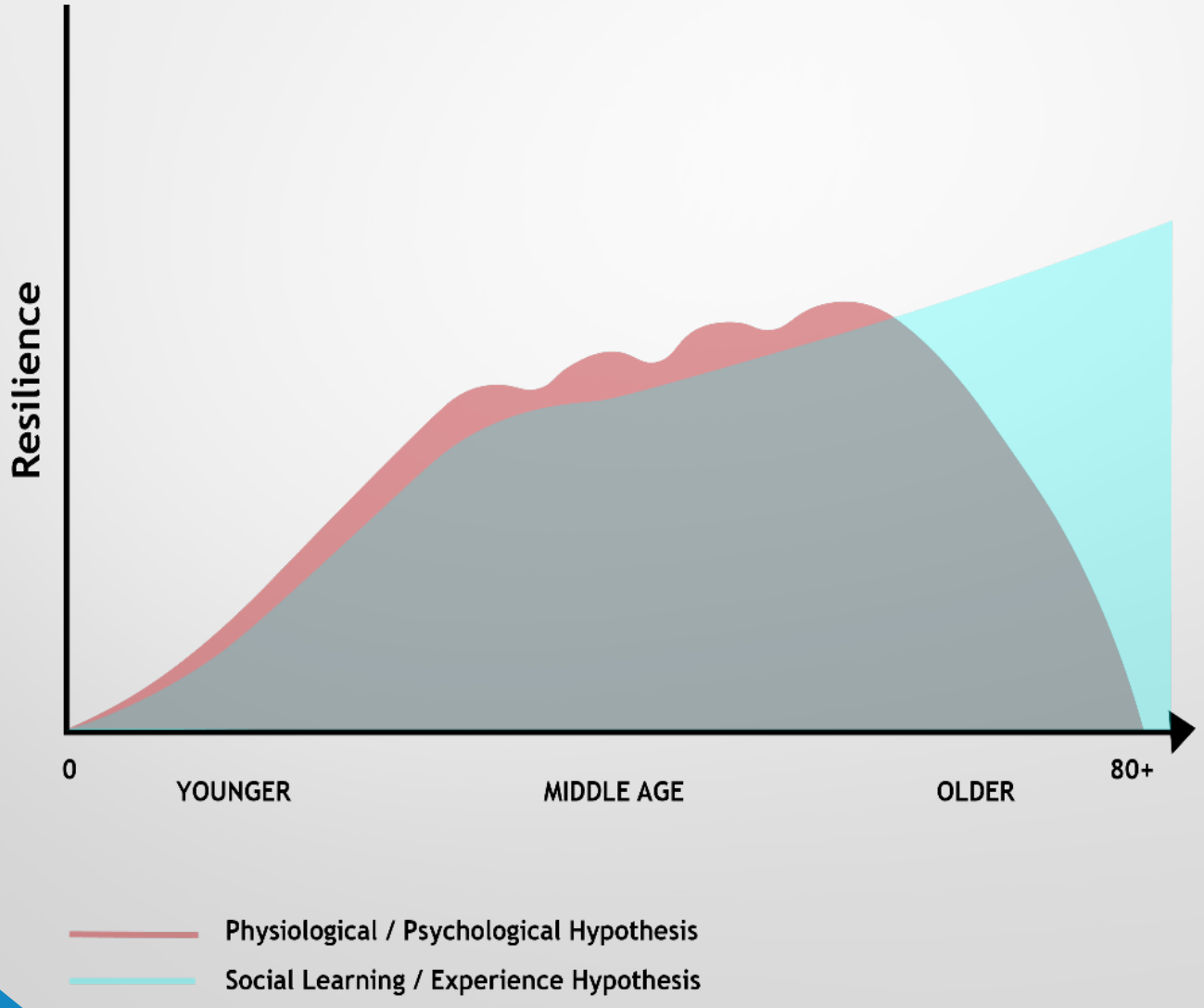
Why Do Some People Live Well In the Face of Multimorbidity?

- Past experience?
- Innate ability (trait)?
- Attitude/Belief?
- Cultural capital?
- Physical strength?
- Personal resources?

Why Multimorbidity?

- Offers a perfect opportunity to examine individuals facing adversity

Competing Resilience and Aging Hypotheses



A Lifecourse Model of Multimorbidity Resilience

- 120 publications between 1995 and 2016 were reviewed.
- Synthesized with the aging and chronic illness literature.

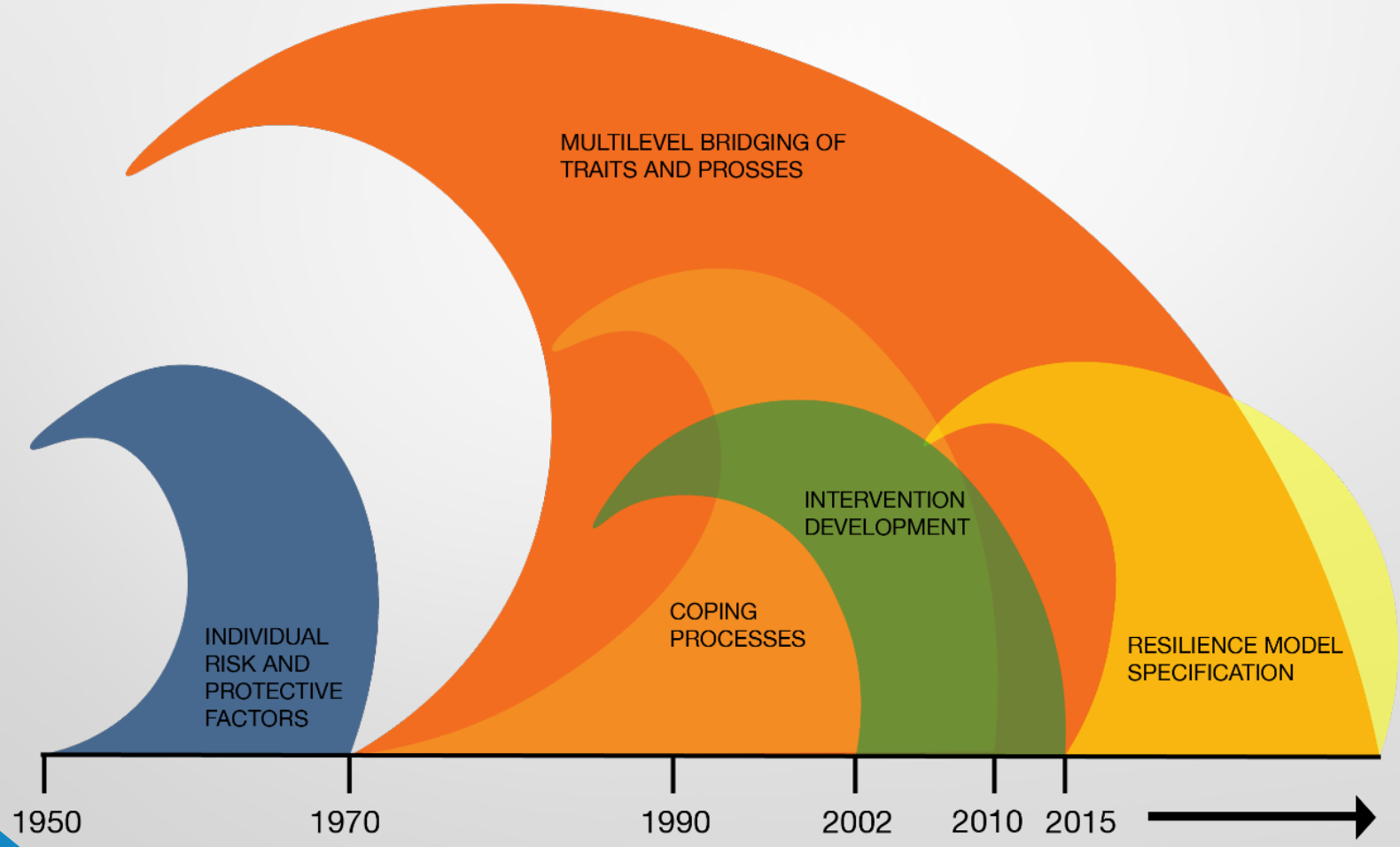
Wister, A., Coatta, K., Schurman, N., Lear, S., Rosin, M., & MacKey, D. (2016a). A lifecourse model of resilience applied to aging with multimorbidity. *International Journal of Aging and Human Development*, *82*(4): 290-313.

Multifaceted Nature of Resilience

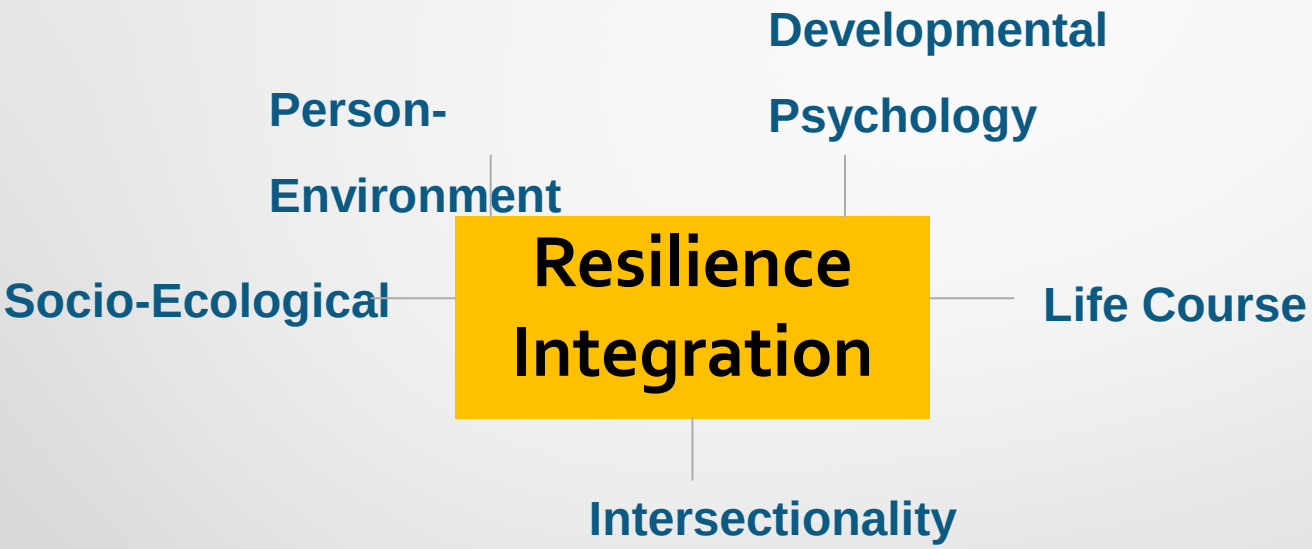
- physical/functional,
- psychological,
- emotional,
- spiritual,
- economic,
- cultural, and
- social or ecological resilience.

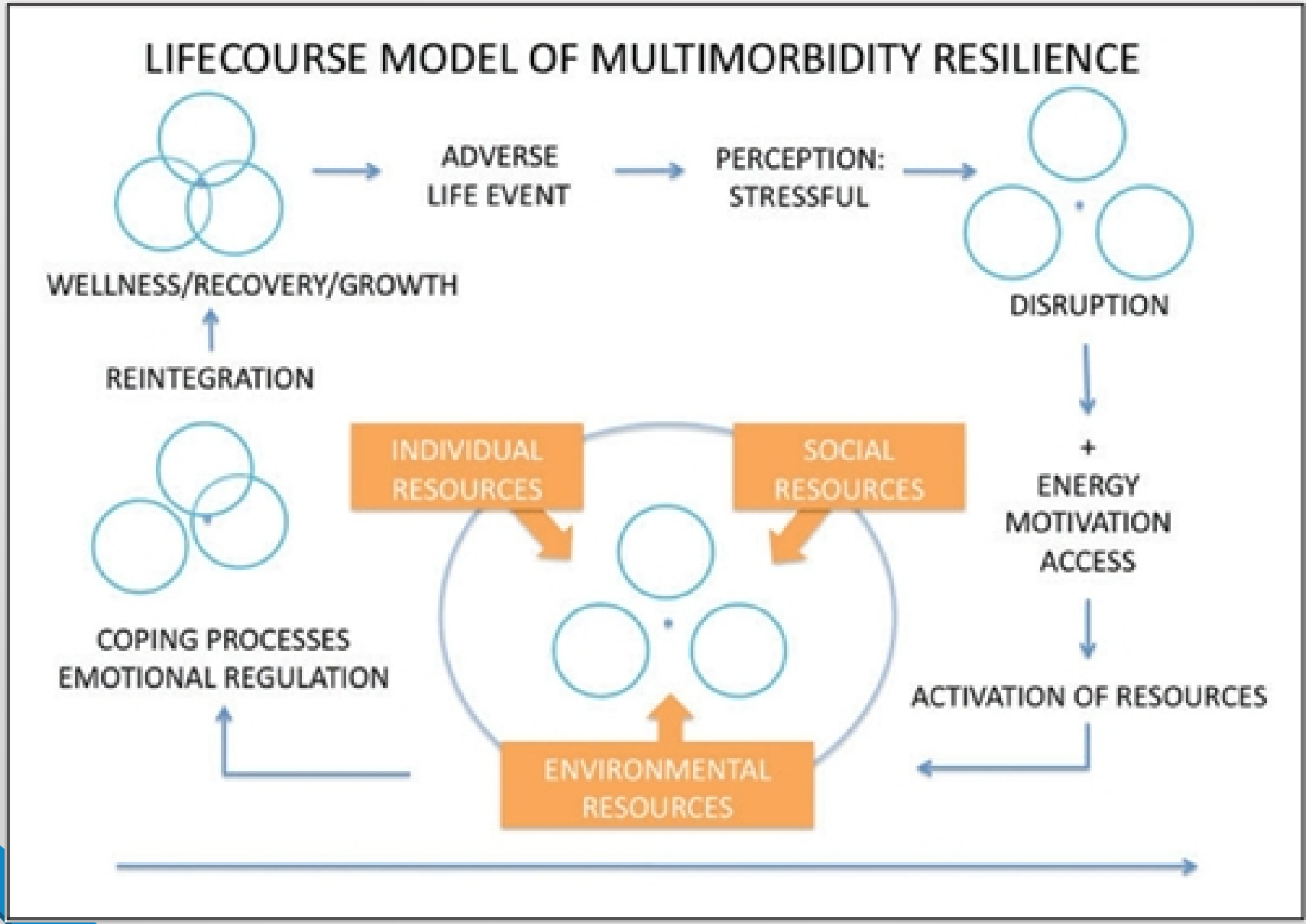
(Nygren et al., 2005; Resnick et al., 2015; Silverman et al., 2015; Wiles et al., 2012; Windle, 2011)

Five Waves of History in Resilience Thinking



Contributing Perspectives and Epistemological Lenses



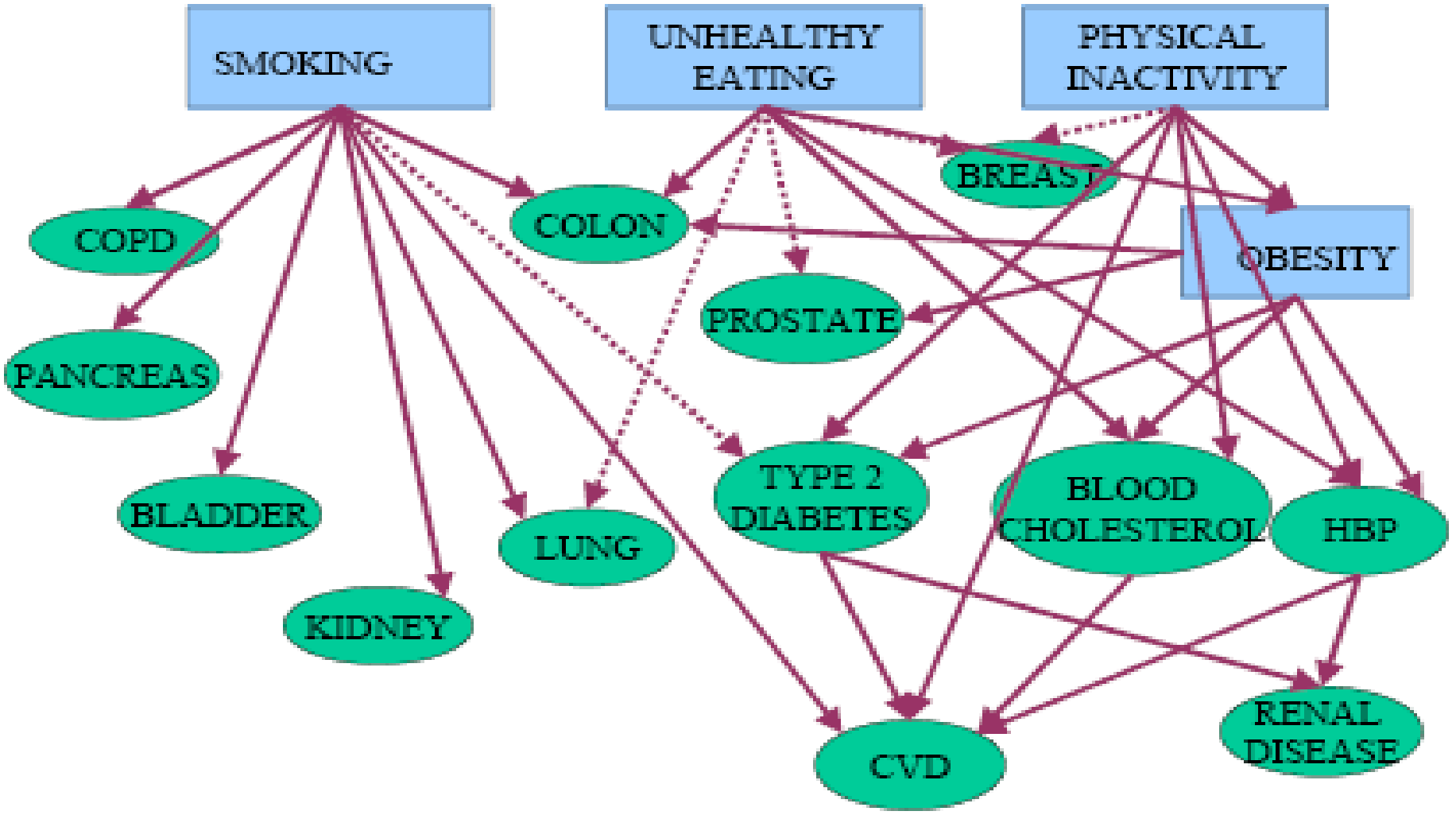

LIFECOURSE MODEL OF MULTIMORBIDITY RESILIENCE
ADVERSE LIFE EVENT
PERCEPTION: STRESSFUL
DISRUPTION
+ ENERGY MOTIVATION ACCESS
ACTIVATION OF RESOURCES
INDIVIDUAL RESOURCES
SOCIAL RESOURCES
ENVIRONMENTAL RESOURCES
COPING PROCESSES EMOTIONAL REGULATION
REINTEGRATION
WELLNESS/RECOVERY/GROWTH

Research Gap

- There remains a significant gap in theory and research that explicates the complexity of resilience types, processes, and determinants specific to the occurrence of chronic illness and disability in old age (Rybarczyk et al., 2012).

Multimorbidity Resilience and Aging: Examining Lifestyle Behaviours

Chronic Diseases and their Common Risk Factors



Harvey, Hook, Koziniak and Selvanathian March, 2002

"My doctor told me to start my exercise program very gradually. Today I drove past a store that sells sweat pants."


© 1999 Randy Glasbergen. www.glasbergen.com
"Eat less, exercise more, and alter your genetic code with the DNA of thin parents."

CLSA Design Overview

51,000 women and men aged 45 – 85 community dwelling at baseline

Tracking (20,000)
Randomly selected
10 provinces

Comprehensive (31,000)
Randomly selected
25-50 km of 11 sites in 7 provinces

Questionnaire
• By telephone (CATI)

Questionnaire
• In person, in home (CAPI)

Physical Assessments
Blood, Urine
• At Data Collection Site

20 year study: Full follow up every 3 years, maintaining contact in between

Data Linkage

clsa élcv
Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement

CLSA Baseline Data

- Studied 6,771 Canadian adults aged 65 or older from the Comprehensive Cohort only (mean age 73.0, 57% women) who reported two or more of 27 possible chronic conditions.

- OLS analyses of functional, social, psychological as well as total resilience and sociodemographic, social, environmental, lifestyle, and health variables.

Three Types of Multimorbidity Resilience

- Three separate but interrelated domains:
  - Functional multimorbidity resilience
  - Social multimorbidity resilience
  - Psychological multimorbidity resilience

Functional Resilience

- *Functional resilience* is fundamental to aging well as it relates to the ability of a multimorbid individual to complete tasks of daily living, social roles, and remain physically active (Canizares et al., 2017; Kendig et al., 2000; Silverman et al., 2015; Windle, 2012).

- Functional disability is a key aspect of the disablement process that can increase vulnerability, and limit daily activities, healthy living, and social engagement.

Social Resilience

- *Social resilience* supports maintenance of positive social interaction, including community participation, as well as protecting against loneliness and social isolation.

- The successful activation of social resilience entails harnessing available resources, especially social support networks (De Jong et al., 2015; Hutchinson & Nimrod, 2012; Rowe & Kahn, 1997; Sells et al., 2009; Stewart & Yuen, 2011; Ungar, 2011; Wiles et al. 2012; Wister et al., 2016a/2016b).

Psychological Resilience

- *Psychological resilience* pertains to the ability to mentally cope with stressors associated with multimorbidity. The degree to which individuals perceive stress, experience degrees of depression, and maintain psychological well-being represent aspects of this domain (Nygren et al., 2005; Stewart & Yuen, 2011).

- Draws from stress theory and the cognitive appraisal process, wherein stressfulness and challenges in old age due to episodic pain and disability can lead to the disruption of self-concept, and even health care decisions (de Groot, 2003; Fortin et al., 2012; Pearlin et al., 2005).

Resilience Indices

- Functional Resilience – OARS IADLs, ADLs, and Guralnik's Summary Performance Score (range 0-3)
- Social Resilience – MOS Social Support scale, social participation frequency scale, and a single item loneliness scale (range 0-3)
- Psychological Resilience – Kessler's Psychological Distress Scale, Deiner Satisfaction with Life Scale, and the CES-D depression scale (range 0-3)
- Total Resilience – 9 is comprised of 3 sub-indices each with 3 variables dichotomized at mean (interval variables), and median (ordinal).

Domain Index Intercorrelations

	Social Resilience	Psychological Resilience	Total Resilience
Functional Resilience Index	.14	.20	.57
Social Resilience Index		.39	.74
Psychological Resilience Index			.80

Descriptive Statistics

Dependent Variables	Range	Mean	Standard Deviation
Functional Resilience Index	0 to 3	2.25	.78
Social Resilience Index	0 to 3	1.83	.94
Psychological Resilience Index	0 to 3	1.91	1.04
Total Resilience Index	0 to 9	6.00	2.00

Continuous Independent Variables	Range	Mean	Standard Deviation
Age	65 to 86	73.02	5.63
Number of Friends	0 to 90	5.47	6.77
Number of Relatives	0 to 100	29.64	25.48
Number of Medications	0 to 8	1.84	1.75

Descriptive Statistics

Ordinal/Categorical Independent Variables		Frequency (%)
Gender	Female Male	3,860 (57.0) 2,911 (43.0)
Education	No post-sec. degree, cert. or diploma Trade certificate or diploma Bachelor's degree University degree above bachelor's	2,038 (30.1) 2,157 (31.9) 1,252 (18.5) 1,324 (19.5)
Household Income	Less than $20,000 per year $20,000 to $49,999 $50,000 to $99,999 $100,000 to $149,999 $150,000 and over	806 (11.9) 417 (6.2) 2,132 (31.5) 3,039 (44.9) 377 (5.6)
Marital Status	Single / Widowed / Divorced / Separated Married / Common-law	2,256 (33.3) 4,516 (66.7)
Immigration Status	Not born in Canada Born in Canada	1,438 (21.2) 5,333 (78.8)

Independent Variables		Frequency (%)
Housing Problems	Yes No	1,177 (17.4) 5,594 (82.6)
Urban/Rural Status	Rural Urban	685 (10.1) 6,086 (89.9)
Body Mass Index	Normal Underweight Overweight Obese	1,773 (26.2) 55 (0.8) 2,858 (42.2) 2,085 (30.8)
Inactivity	Sitting less than 30 minutes 30 minutes but less than an hour 1 hour but less than 2 hours 2 hours but less than 4 hours 4 hours or more	11 (0.1) 98 (1.5) 669 (9.9) 3,050 (45.0) 2,943 (43.5)
Alcohol consumption	14 or less drinks per week 15 or more drinks per week	6,270 (92.6) 501 (7.4)
Smoking	Smoked in last 30 days Has not smoked in last 30 days	285 (4.2) 6,486 (95.8)

Independent Variables		Frequency (%)
Sleep	Very dissatisfied Dissatisfied Neutral Satisfied Very satisfied	291 (4.3) 1,389 (20.5) 960 (14.2) 2,743 (40.5) 1,388 (20.5)
Appetite	Poor Fair Good Very good	121 (1.8) 400 (5.9) 2,562 (37.8) 3,688 (54.5)
Skipped meals	Rarely or never Sometimes to always	5,503 (81.3) 1,268 (18.7)
Health Status	Poor Fair Good Very good Excellent	1,080 (17.5) 632 (9.3) 2,257 (33.3) 2,702 (39.9) 1,063 (15.7)
Pain	None Mild Moderate Severe	3,935 (58,1) 1,033 (15.3) 1,485 (21.9) 318 (4.7)

OLS Regression of Functional Resilience Index

Independent Variables	Final Model
Age	-.24***
Gender	.17***
BMI – Normal (ref) Underweight Overweight Obese	- -.01 -.06*** -.15***
Health – Poor (ref) Fair Good Very good Excellent Pain, Smoking & Sleep	- .03 .23*** .32*** .27***

*Note. * p < .05, ** p < .01, *** p < .001.*

OLS Regression of Social Resilience Index

Independent Variables	Final Model
Marital status	.21***
Number of friends	.11***
Appetite – Poor (ref) Fair Good Very good	- .02 .08 .12**
Health – Poor (ref) Fair Good Very good Excellent	- 0 .04 .10* .12***
Age, Gender, Smoking	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

OLS Regression of Psychological Resilience Index

Independent Variables	Final Model
Sleep – Very dissatisfied (ref)	-
Dissatisfied	.02
Neutral	.07***
Satisfied	.22***
Very satisfied	.25***
Appetite – Poor (ref)	-
Fair	.04
Good	.17***
Very good	.23***
Health – Poor (ref)	-
Fair	.04
Good	.23***
Very good	.38***
Excellent	.35***

*Note. * $p < .05$, ** $p < .01$, *** $p < .001$.*

Independent Variables	Final Model
Age	-.12***
Marital status	.12***
Sleep – Very dissatisfied (ref) Dissatisfied Neutral Satisfied Very satisfied	- .04 .06** .17*** .21***
Appetite – Poor (ref) Fair Good Very good	- .03 .14*** .21***
Health – Poor (ref) Fair Good Very good Excellent Gender, Number of friends, Obese, Smoking	- .03 .23*** .37*** .35***

Key Resilience Associations

- Lifestyle: Normal or Underweight BMI; Better Sleep; Better Appetite, Fewer Skipped Meals, Not Smoking, Less Inactivity
- Being Female, Younger Senior; Married & More Friends, Housing Problems
- Higher Perceived Health, Pain

Are There Multimorbidity Disease Clusters?

Literature on Multimorbid Disease Clusters

- Three studies were utilized to determine three main multimorbid disease clusters.
- These included studies from Australia, US, and Germany.
- These studies were chosen based on the statistical methodologies used as well as the number of chronic illnesses included.

Multimorbid Disease Cluster Studies

Study	Country	Population	Number of Illnesses	Method
Holden et al., 2011	Australia	18 to 70; males and females	23	Tetrachoric Factor Analysis
Schafer et al., 2010	Germany	65 or older; males and females	46	Tetrachoric Factor Analysis
Whitson et al., 2016	United States	65 or older; males and females	13	Latent Class Analysis

Three Multimorbid Disease Clusters

- **Osteo Cluster – Consists of the presence of two or more of:**
  - **osteoarthritis,**
  - **osteoporosis,**
  - **lung disease (emphysema, COPD, asthma, chronic bronchitis and smoking-related lung changes) and/or**
  - **chronic back problems.**
- **Metabolic and Vascular Cluster – Consists of the presence of two or more of:**
  - **diabetes,**
  - **hypertension, and/or**
  - **heart disease.**
- **Mental Health Cluster – Consists of two or more of:**
  - **anxiety disorder,**
  - **mood disorder,**
  - **thyroid disorder, and/or**
  - **migraine headaches.**

Osteo-Cluster – Total Resilience
OLS Regression Modeling (n= 2,395)

Independent Variable	Final Model
Age	-.11***
Marital status	.11***
Number of friends	.11***
Sleep – Very dissatisfied (ref) Dissatisfied Neutral Satisfied Very satisfied	- .05 .06 .17*** .18***
Appetite – Poor (ref) Fair Good Very Good	- .01 .10 .18***
Skipped meals	-.10***
Health – Poor (ref) Fair Good Very good Excellent	- 0 .19*** .35*** .30***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Vascular Cluster – Total Resilience OLS Regression (n = 1,983)

Independent Variable	Final Model
Age	-.12***
Household Income – Below $20,000 (ref)	-
$20,000 to $49,999	.10***
$50,000 to $99,999	.16***
$100,000 to $149,999	.09**
$150,000 and over	.10**
Marital status	.12***
Sleep – Very dissatisfied (ref)	-
Dissatisfied	.01
Neutral	.04
Satisfied	.13**
Very satisfied	.18***
Appetite – Poor (ref)	-
Fair	.03
Good	.13*
Very Good	.19***
Health – Poor (ref)	-
Fair	.08*
Good	.31***
Very good	.40***
Excellent	.26***
Pain – None (ref)	-
Mild	-.03
Moderate	-.09***
Severe	-.13***

Mental Health Cluster – Total Resilience OLS Regression (n = 867)

Independent Variable	Final Model
Age	-.12***
Education level – No post-sec. (ref)	-
Trade certificate or diploma	.10**
Bachelor's degree	.06
University or degree above bachelor's degree	.04
Household Income – Below $20,000 (ref)	-
$20,000 to $49,999	.10**
$50,000 to $99,999	.09*
$100,000 to $149,999	.09*
$150,000 and over	.11**
Housing problems	-.12***
Inactivity – Sitting less than 1 hour (ref)	-
1 hour but less than 2 hours	-.19*
2 hours but less than 4 hours	-.32*
4 hours or more	-.32*
Sleep – Very dissatisfied (ref)	-
Dissatisfied	0
Neutral	-.01
Satisfied	.09
Very satisfied	.18***
Skipped meals	-.10**
Health – Poor (ref)	-
Fair	.01
Good	.23***
Very good	.37***
Excellent	.30***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Key Resilience Associations

- Lifestyle: Normal or Underweight BMI; Better Sleep; Better Appetite, Fewer Skipped Meals, Not Smoking, Less Inactivity
- Being Female, Younger Senior; Married & More Friends, Fewer Housing Problems, Higher Income & Education
- Higher Perceived Health, Pain

"It's good that you're eating more fresh fruit and vegetables, but be careful to chew more thoroughly."

Final Thoughts

- There is a need for multimethod studies to understand experiences of multimorbidity resilience in personal contexts
- Better measures than only asking "how well someone has bounced back from adversity?"
- Longitudinal data from CLSA, disentangle bidirectional associations, moderating, mediating and interaction effects
- Connect resilience at individual, family, and community level
- Currently working on GIS mapping of multimorbidity resilience, with income by postal code data, link to other data

What We Need To Know?

- There remains a knowledge gap as to why some individuals, families and communities adapt to the adversity associated with the presence of multimorbidity better than others
- This leaves a considerable void in illness prevention, care/management, and self-care/coping, during a period of population aging and escalating health care costs
- Most research has focused primarily on the pathogenic correlates, treatments and disablement outcomes of multimorbidity
- However, some individuals may possess salutogenic factors, such as social, economic and social-psychological resources

THANK YOU!....QUESTIONS?

- Organizers
- Co-authors
- Audience!

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