

Multimorbidity from Population Health to Primary Care in Canada

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Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement

Outline

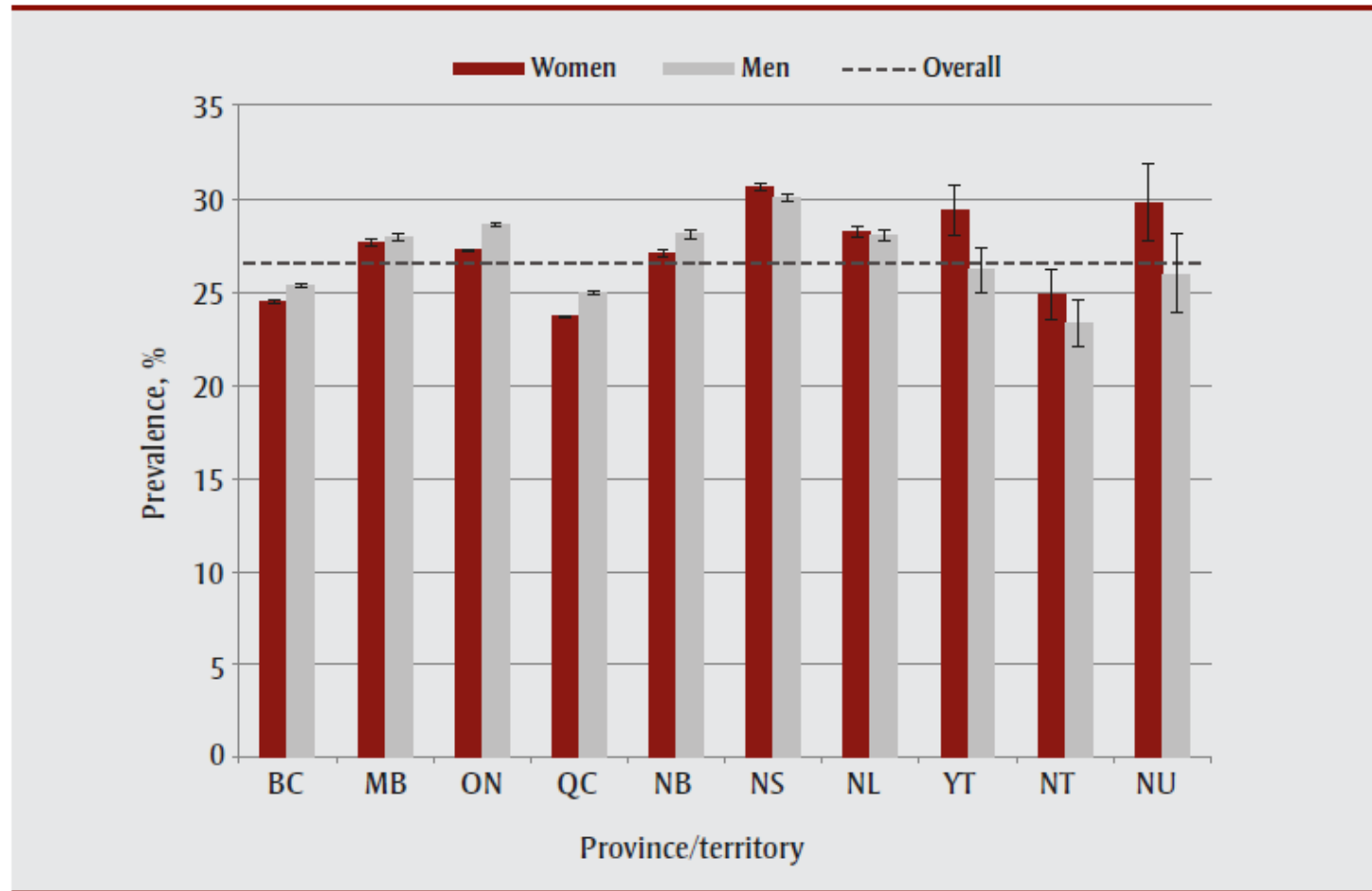
My Journey with Multimorbidity

- Population/Public Health Perspective
- Measurement Issues
- Data Sources
- Primary Care Research
- Challenges and (Possible) Next Steps



Multimorbidity Burden in Canada

Age-standardized prevalence^a (%) of the co-occurrence of two or more chronic conditions among people aged 40 years and over, by sex and province/territory, 2011/12

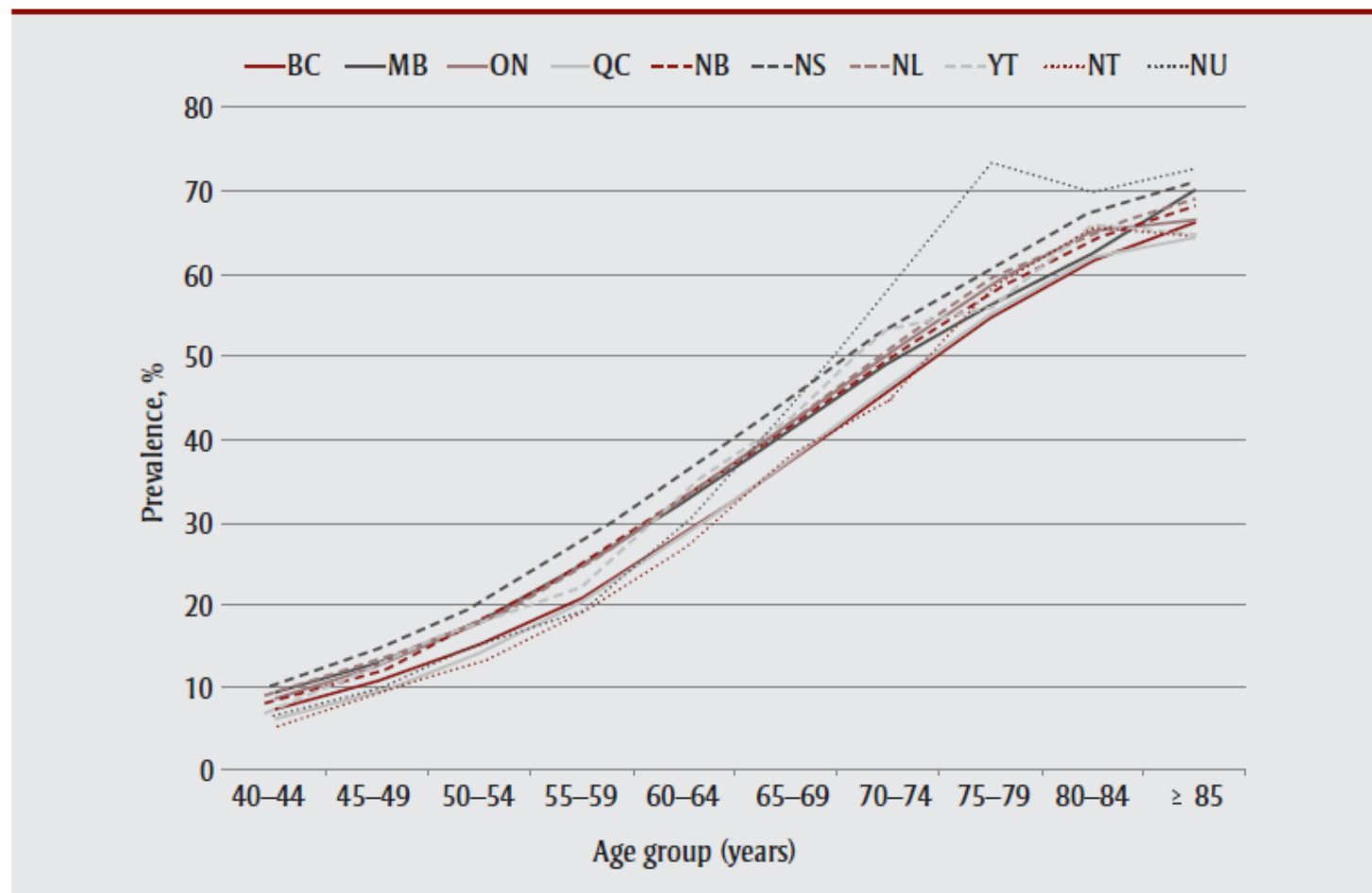


(Feely A et al. Health Promotion Chron Dis Prev Canada 2017)

Data source: Public Health Agency of Canada, using Canadian Chronic Disease Surveillance System data files contributed by the provinces and territories as of April 2015. Alberta, Saskatchewan and Prince Edward Island data were unavailable.

Multimorbidity Burden in Canada

Prevalence^a (%) of the co-occurrence of two or more chronic conditions,
by age group and province/territory, 2011/12



(Feely A et al. Health
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Change in Multimorbidity Burden in Ontario

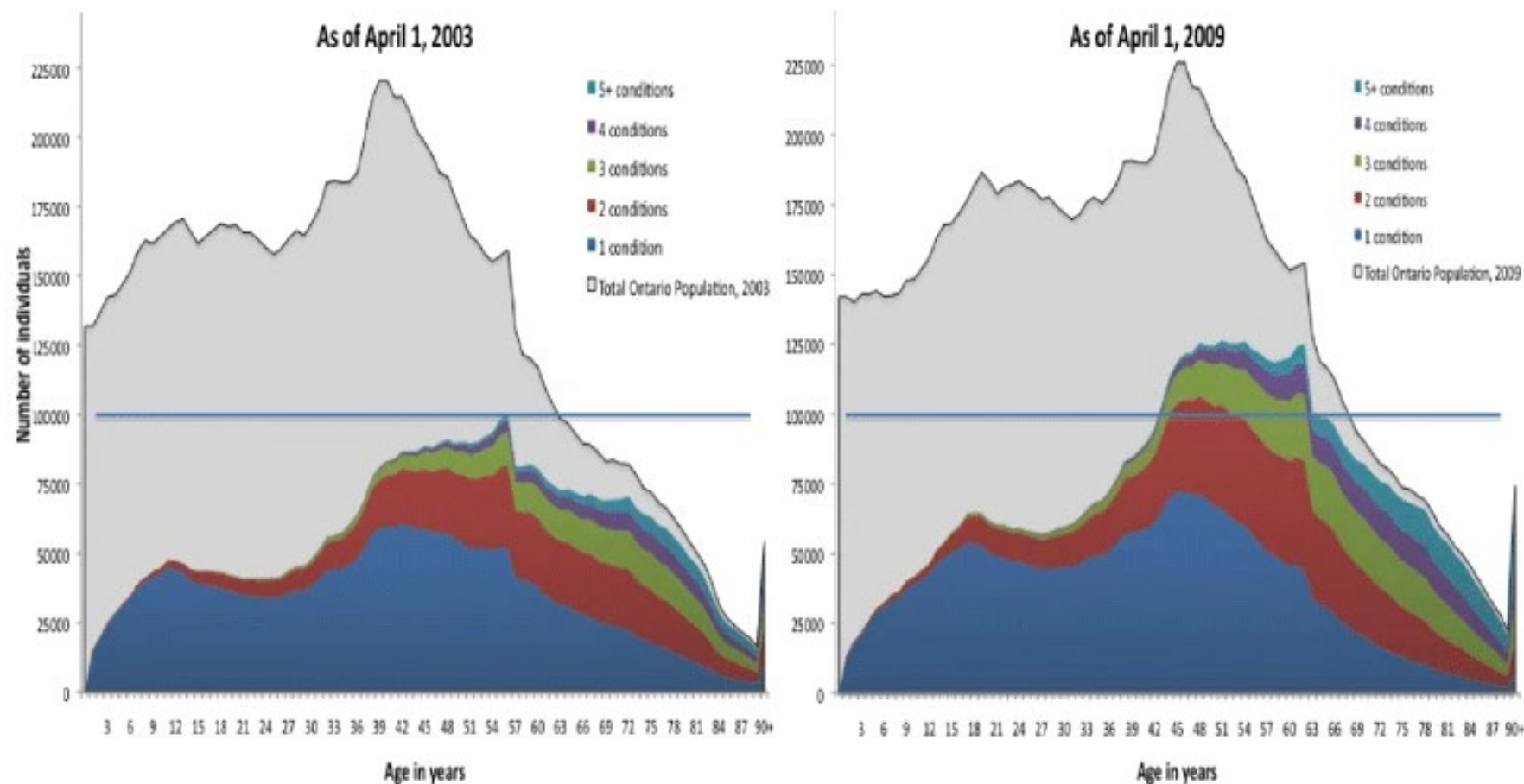


Figure 1. Distribution of the number of individuals with multimorbidity in Ontario across ages, by number of chronic conditions and year

(Koné Pefoyo et al. BMC Pub Health 2015)

Challenges in Multimorbidity Research

Feely et. al

Multimorbidity Framework (n=7):

- IHD
- Heart failure
- Asthma
- COPD
- “Mental Illness”
- Hypertension
- Diabetes

Koné Pefoyo et. al

Multimorbidity Framework (n=16):

- Arthritis
- Hypertension
- Asthma
- COPD
- Depression
- Diabetes
- Cancer
- Chronic coronary syndrome
- Cardiac arrhythmia
- Osteoporosis
- COPD
- CHF
- Renal failure
- Dementia
- Rheumatoid arthritis
- Stroke
- AMI



Challenges in Multimorbidity Research

Feely et. al

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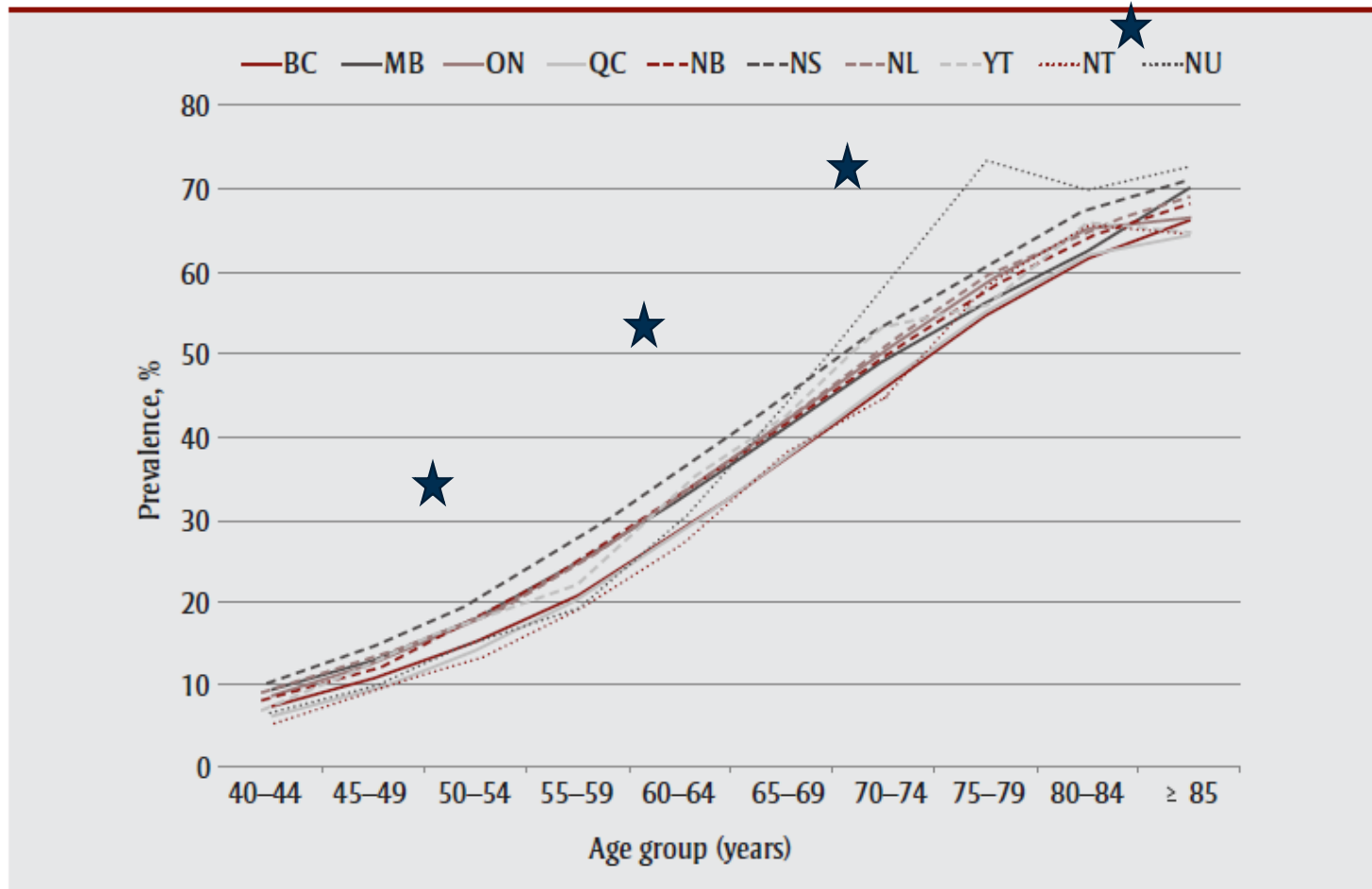
Multimorbidity Framework:

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Challenges in Multimorbidity Research

Prevalence^a (%) of the co-occurrence of two or more chronic conditions,
by age group and province/territory, 2011/12



★ Ontario estimates
from Koné Pefoyo
et al.

Population Health Perspective

Study 1: Population Attributable Risk (PAR) on **functional disability** and **social participation restriction** of physical and mental chronic conditions individually and in combination

Data Source: Canadian Community Health Survey – Healthy Aging (Cross-sectional)

Population: Community-living men and women aged 45+ in Canada

Population Attributable Risk

$$\text{PAR}\% = \left(\frac{\text{IP}_{\text{total}} - \text{IP}_{\text{nonexposed}}}{\text{IP}_{\text{total}}} \right) \times 100$$

where PAR = population attributable risk and IP = incidence proportion

- Assume that if the exposure could be eliminated, the incidence in the total population would be that of the nonexposed
- The proportion of the incidence of disability in the **population** that is due to exposure

Table 2 Population attributable risk for activities of daily living disability by gender and age category

Age group (years)	Males			Females		
	1 Condition	2 Conditions	3 Conditions	1 Condition	2 Conditions	3 Conditions
45–54	IHD	IHD+RES	IHD+RES+DIA	DEP	DEP+IHD	DEP+IHD+HER
	18.7 (5.4 to 32.4)	25.3 (9.9 to 41.1)	29.6 (11.9 to 45.0)	8.8 (1.8 to 15.7)	13.4 (5.5 to 21.9)	14.4 (6.3 to 23.2)
	RES	IHD+DIA	IHD+RES+HER	IHD	DEP+HER	DEP+HER+ART
	6.8 (–5.1 to 19.0)	24.0 (7.8 to 39.7)	27.9 (12.6 to 43.3)	4.6 (0.01 to 9.7)	10.0 (2.7 to 17.5)	13.4 (2.5 to 23.3)
	DIA			HER		
	5.7 (–6.9 to 17.9)			1.2 (–2.5 to 5.0)		
55–64	HER			ART		
	2.6 (–0.3 to 8.6)			0.01 (–8.9 to 9.9)		
	ART	ART+IHD	ART+IHD+DIA	ART	ART+DEP	ART+DEP+EYE
	16.9 (4.7 to 28.1)	28.2 (15.9 to 40.7)	34.6 (21.6 to 47.0)	12.2 (1.3 to 23.0)	19.9 (8.6 to 29.7)	24.9 (13.8 to 35.1)
	IHD	ART+DIA	ART+IHD+RES	DEP	ART+EYE	ART+DEP+HER
	14.5 (5.5 to 23.7)	25.2 (12.4 to 37.8)	32.0 (19.4 to 44.1)	8.7 (3.8 to 13.4)	17.5 (7.0 to 28.4)	21.3 (10.4 to 31.7)
65–74	DIA			EYE		
	10.0 (0.9 to 18.8)			6.1 (1.3 to 11.0)		
	RES			HER		
	7.4 (–0.5 to 15.1)			2.0 (–0.3 to 4.6)		
	DIA	DIA+COG	DIA+COG+EYE	ART	ART+DIA	ART+DIA+EYE
	18.2 (10.1 to 26.5)	22.4 (12.4 to 31.4)	23.9 (13.0 to 34.0)	36.9 (25.5 to 47.7)	48.6 (38.8 to 57.3)	55.3 (46.5 to 63.0)
75–85	COG	DIA+EYE	DIA+COG+ART	DIA	ART+EYE	ART+DIA+IHD
	4.9 (–1.4 to 11.7)	19.8 (9.3 to 29.2)	23.5 (9.7 to 36.3)	19.9 (13.3 to 26.5)	45.6 (35.2 to 54.9)	53.0 (43.8 to 61.0)
	EYE			EYE		
	1.8 (–5.6 to 9.4)			13.0 (5.0 to 21.5)		
	ART			IHD		
	1.3 (–11.2 to 13.0)			10.4 (4.1 to 16.7)		
	DIA	DIA+ART	DIA+ART+EYE	ART	ART+RES	ART+RES+EYE
	13.6 (4.0 to 23.3)	24.1 (8.6 to 39.0)	30.9 (15.4 to 45.7)	35.0 (23.8 to 45.9)	47.1 (37.1 to 56.9)	54.3 (44.2 to 63.9)
	ART	DIA+EYE	DIA+ART+IHD	RES	ART+EYE	ART+RES+DIA
	12.4 (–3.9 to 28.5)	21.0 (6.2 to 35.3)	30.4 (14.0 to 46.0)	17.8 (11.2 to 24.0)	44.1 (32.4 to 55.1)	51.4 (41.6 to 61.2)
	EYE			EYE		
	8.6 (–3.8 to 21.3)			14.0 (3.7 to 23.3)		
	IHD			IHD		
	8.5 (–4.2 to 20.6)			8.1 (0.5 to 14.8)		
				DIA		
				7.6 (1.9 to 13.1)		

- Impact of combinations of CCs on disability differ substantially by age and gender
- Recognizing these differences will increase the efficiency of clinical and public health interventions

Population Health + Primary Care Perspective

Study 2: Examining population-level co-morbidity burden, patterns, and associated health service utilization and costs to inform intervention studies as part of the Aging Community and Health Research Unit (ACHRU)

Data Source: ICES Administrative Data

Population: Community-living men and women aged 66+ in Ontario with:

- Diabetes
- Dementia
- Stroke



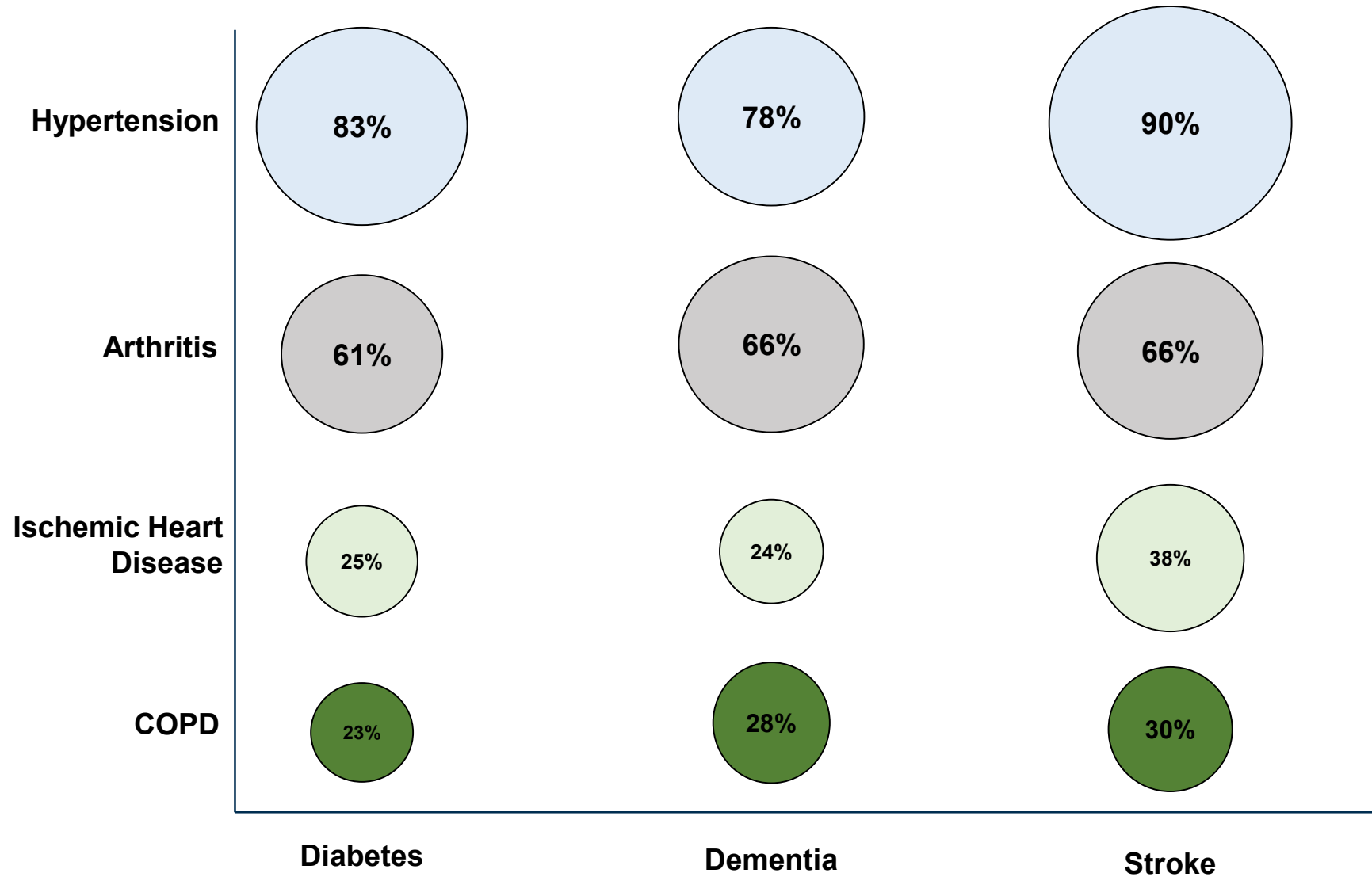
Insights on Multimorbidity from 3 Comorbidity Studies

Studies used a common methodology, time period and geographical area/health care system

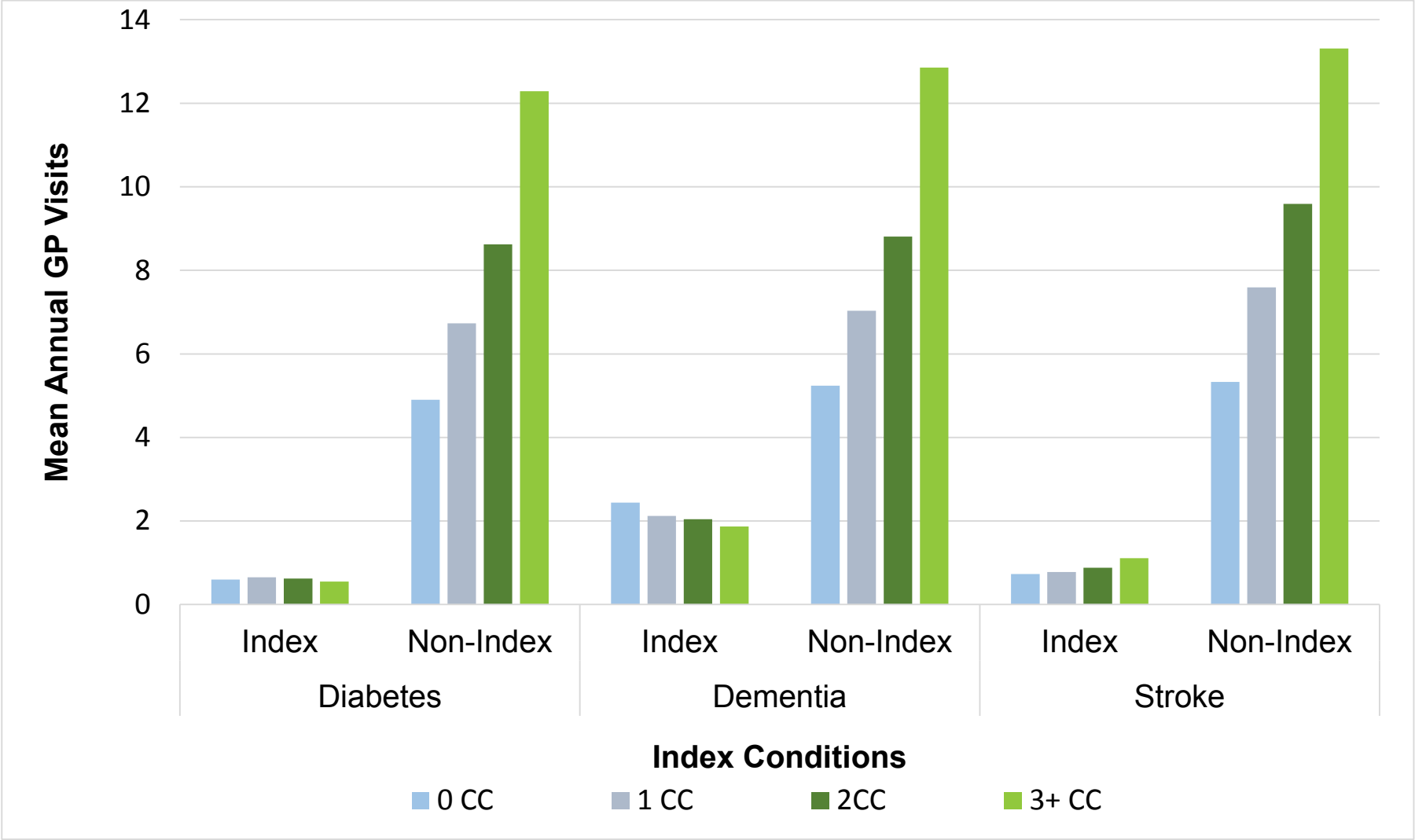
Index conditions (Diabetes, Dementia, Stroke) differed in terms of:

- Prevalence
- Presentation
- Disease Course
- Population Demographics

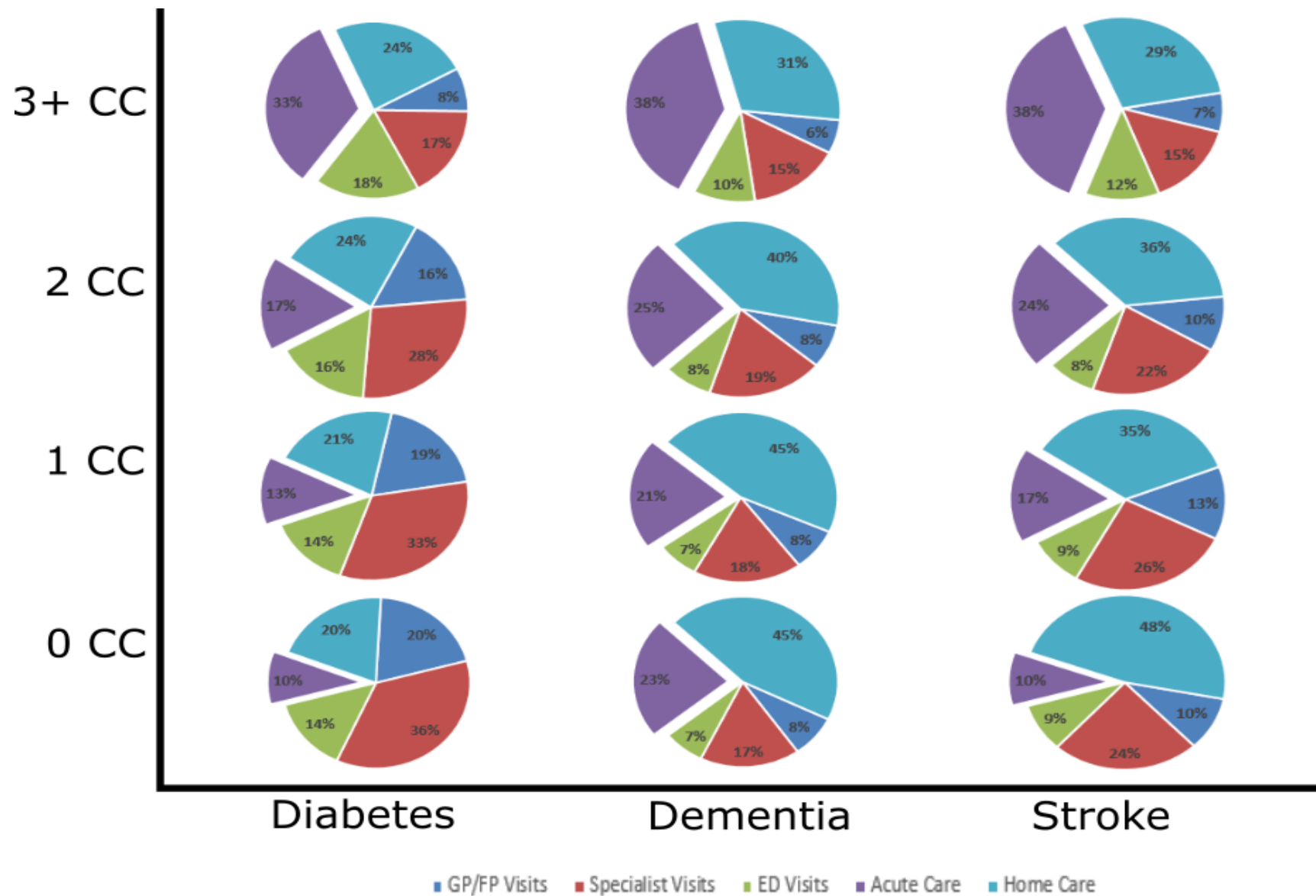
Insight 1: Patterns of Comorbidity



Insight 2: Increase in HCU with Increasing Comorbidity Attributed to Non-Index Conditions



Insight 3: Drivers of Costs



Underscores the importance using a MM lens

- Co-morbidity a key driver of use
- Majority of health service utilization not attributed to care related to index condition
- Common patterns illustrate the underlying needs of people with multimorbidity that are often obscured in literature that has a single disease focus

Measurement Challenges

Study 3: Explore how different frameworks and categories of chronic conditions impact multimorbidity prevalence estimates and associations with patient-important functional outcomes

Data Source: Canadian Longitudinal Study on Aging
(Baseline data)

Population: Community-living men and women aged 45-85
across Canada

Multimorbidity Frameworks

Used 3 MM Frameworks developed base on systematic reviews of the MM literature

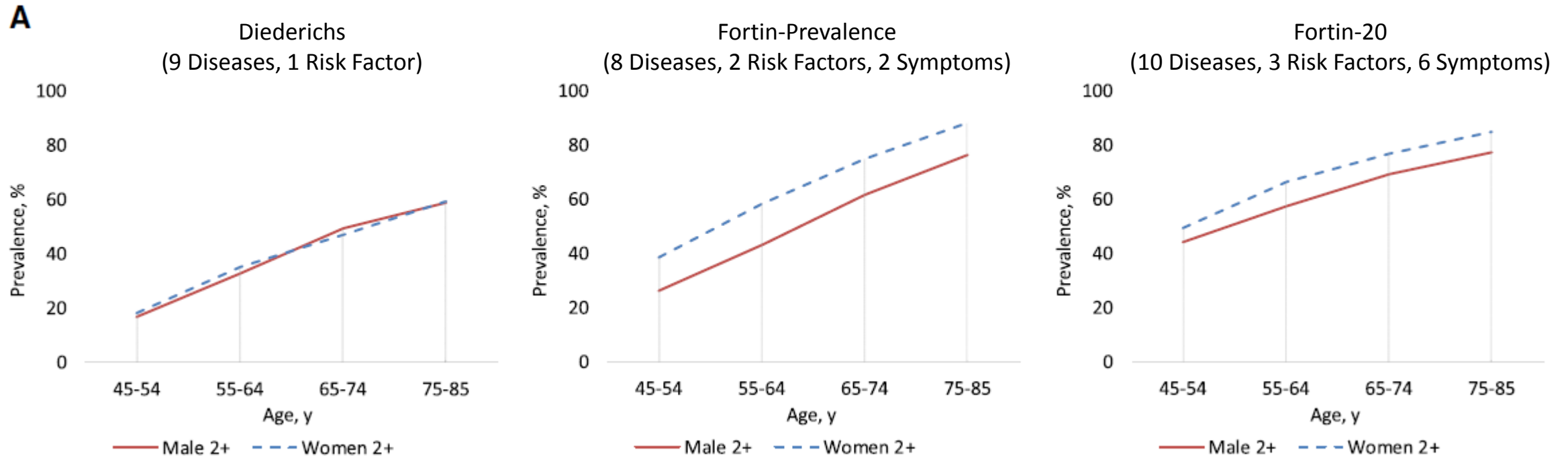
- Diederichs (at least 11 most common CCs diagnosed in people 65+)
- Fortin-prevalence (at least 12 most prevalent and/or impactful CCs)
- Fortin-20 (20 CCs based on relevance to primary care services, impact on patients, and how often included in other frameworks)

Multimorbidity Frameworks

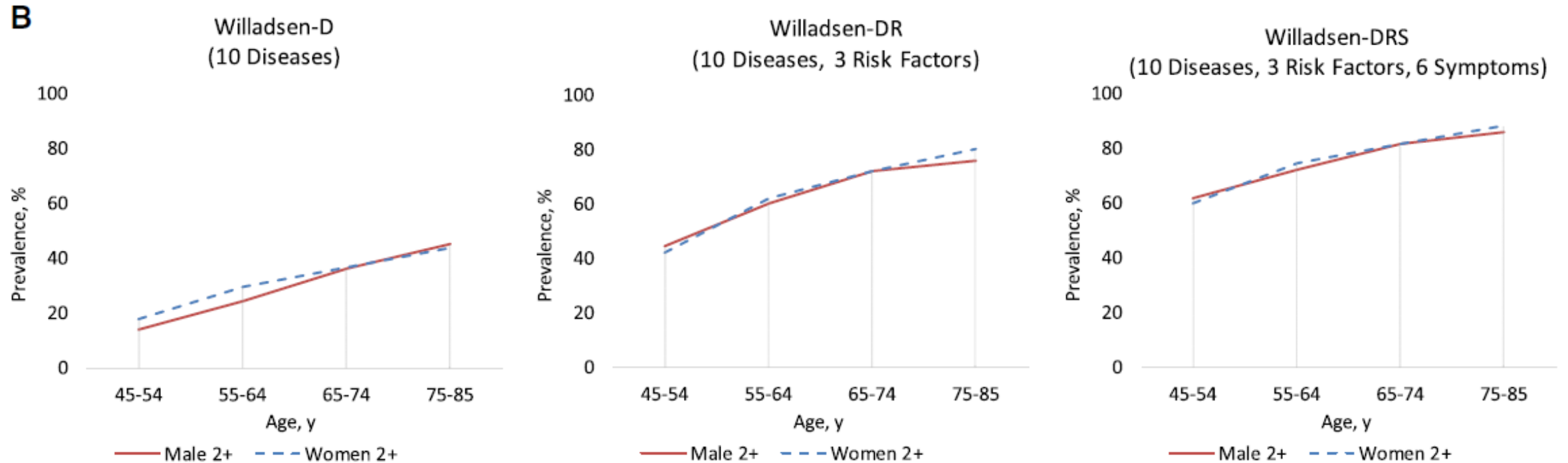
Willadsen (identified most common diseases (10), risk factors (6), and symptoms (10) that were commonly included in frameworks

- Did not suggest a specific framework but highlighted the importance of considering what category of chronic conditions included in multimorbidity frameworks
- Used findings to categorize CCs from other frameworks into Diseases, Risk Factors or Symptoms
- Created Willadsen-D, Willadsen-DR, Willadsen-DRS

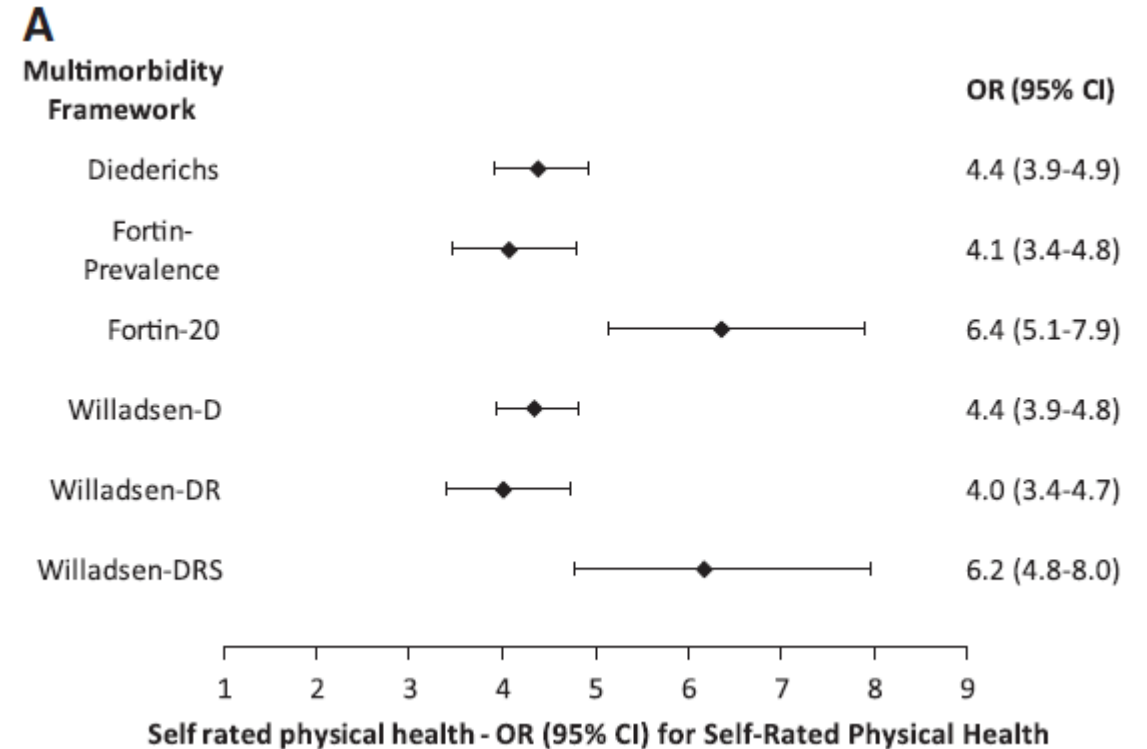
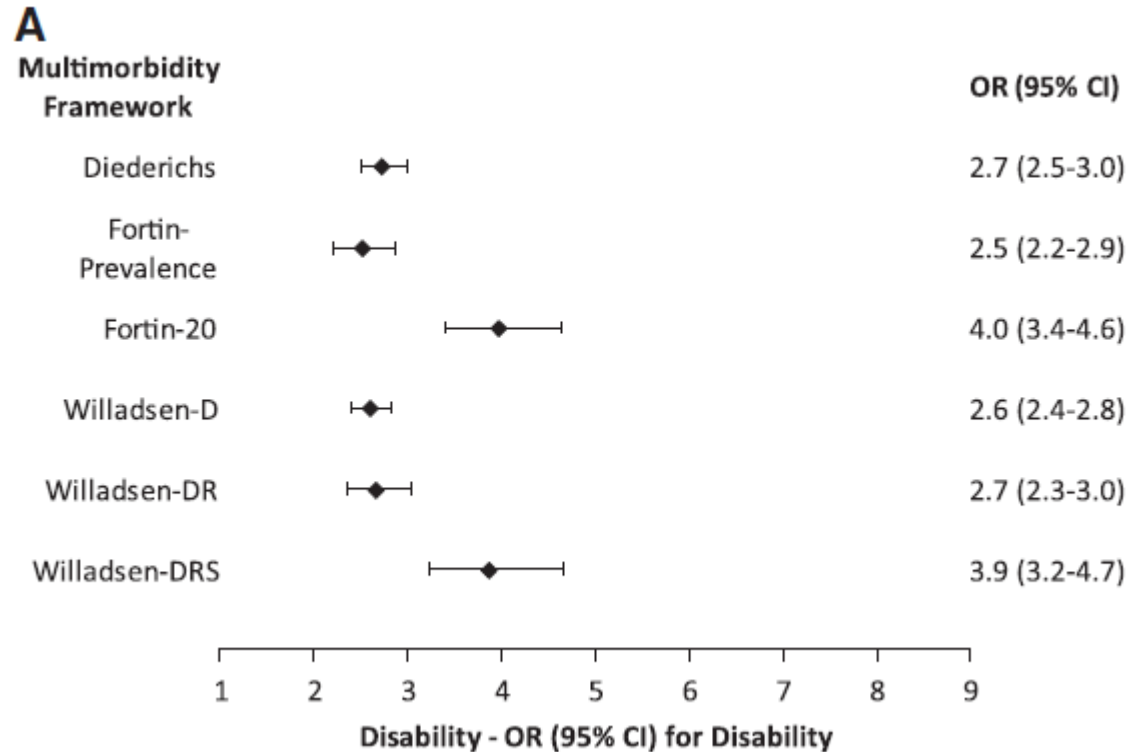
Multimorbidity Frameworks – Prevalence



Multimorbidity Frameworks – Prevalence



Multimorbidity Frameworks – Associations with Patient Important Outcomes

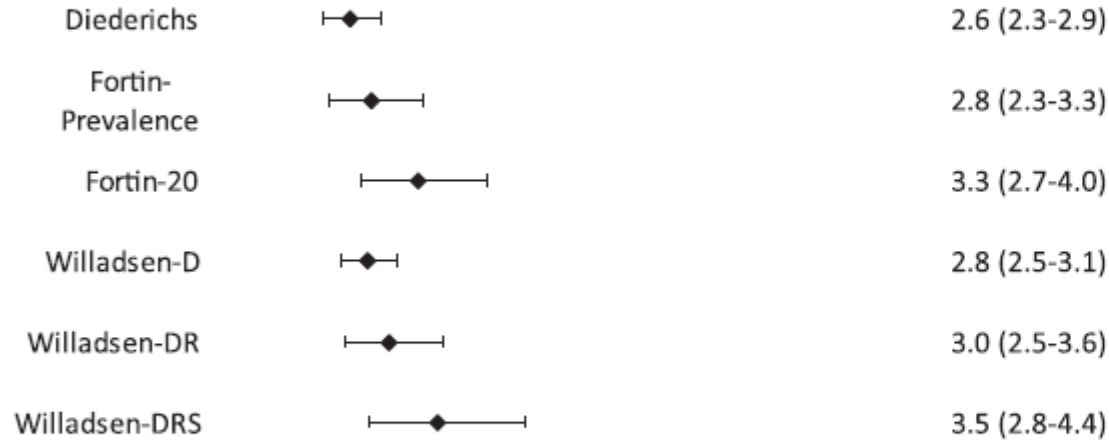


Multimorbidity Frameworks – Associations with Patient Important Outcomes

B

Multimorbidity Framework

OR (95% CI)

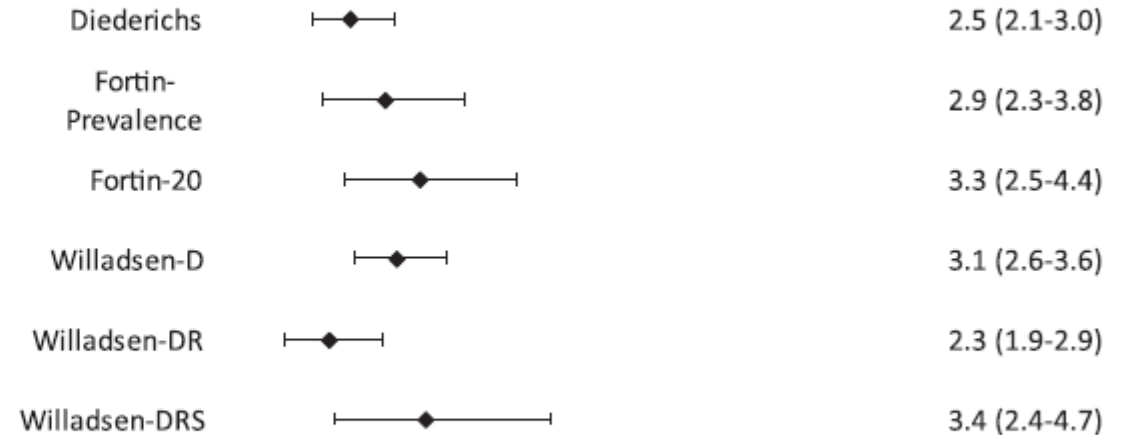


1 2 3 4 5 6 7 8 9
Social Participation Restriction - OR (95% CI) for Social n Restriction

B

Multimorbidity Framework

OR (95% CI)



1 2 3 4 5 6 7 8 9
Self rated mental health - OR (95% CI) for Self-Rated Mental Health

Underscores the importance of what is included in a multimorbidity framework

- Risk factors generally increase prevalence but not associations with patient important outcomes
- Many MM frameworks do not include disease severity or symptoms → This may be important to include for patient important outcomes
- Inclusion of risk factors may be very important from a public health perspective (to prevent upstream causes of disease)

Key factors to consider when measuring multimorbidity

Study 4: Expert group of clinicians, researcher, and a policy-maker with expertise in the MM asked to consider the following questions focused on broader issues relating to measuring multimorbidity:

- 1) What important concepts should be included in measures of multimorbidity;
- 2) What key factors should be considered when creating measures of multimorbidity; and
- 3) What underlying concepts are currently missing in measures of multimorbidity

Factors associated with the choice of current MM measures

Deficiencies in current MM measures

1) Fit with the Study Purpose

Multimorbidity measures are typically designed to serve specific purposes (e.g., epidemiological, clinical, policy, research), making it challenging to select a single "best" measure.

3) Episodic Conditions

It is difficult to know whether to include, and how to include, episodic conditions in a multimorbidity measure, since these conditions go through long periods of remission and/or fluctuate significantly in terms of morbidity/severity.

2) Conditions Included in Multimorbidity Measures

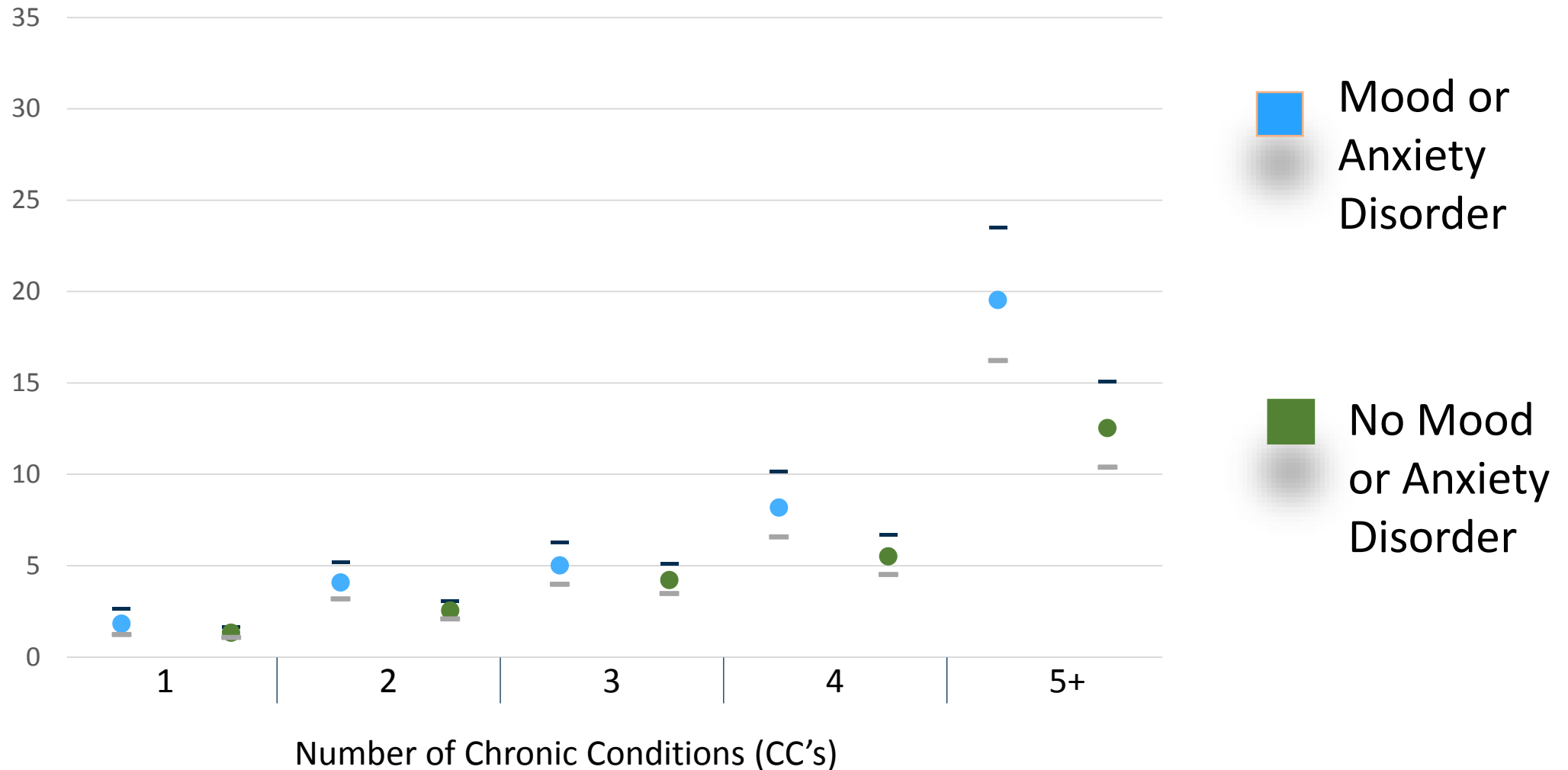
Inclusion of vague conditions and/or risk factors and symptoms in lists of conditions included in measuring multimorbidity run the risk of overestimating the prevalence of multimorbidity.

4) Social Factors, Mental Health and Other Gaps

Current measures of multimorbidity do not incorporate social determinants of health, which are important drivers of multimorbidity and/or its consequences. There are other important gaps in current measures, such as the exclusion of mental health conditions.

Disability with and without Mental Health (Fisher et al.)

Odds of Disability (ADL, IADL) stratified by CC and Mood/Anxiety Adjusted for Age



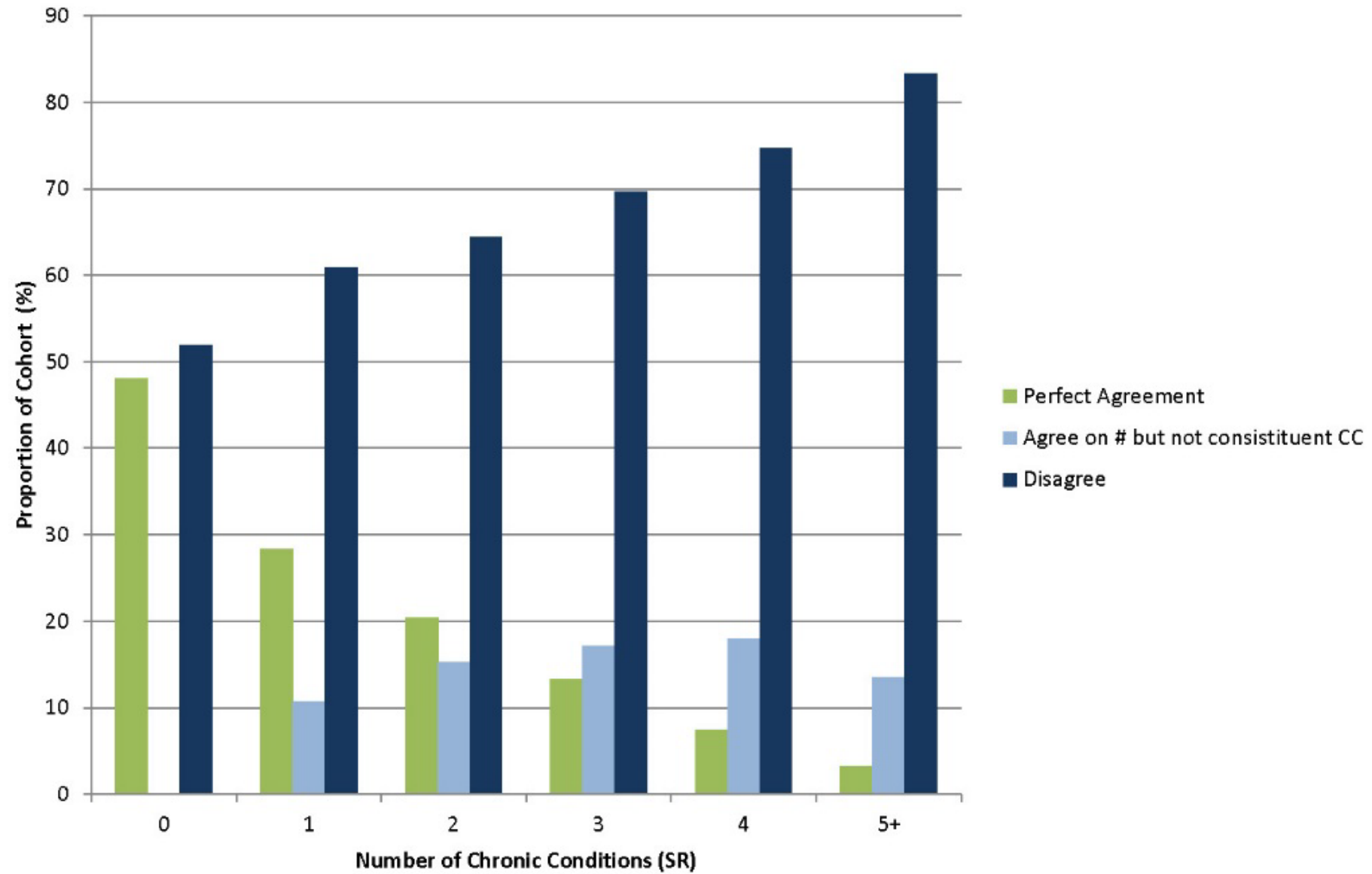
Data Sources

Study 5: Explore agreement in multimorbidity measures between administrative (ICES) and self-report and understand factors associated with disagreement between the two data sources

Data Source: 4 Cycles of Canadian Community Health Survey (Cross-sectional Data) linked to ICES Administrative data

Population: Community-living men and women aged 45-85 across Canada

Agreement



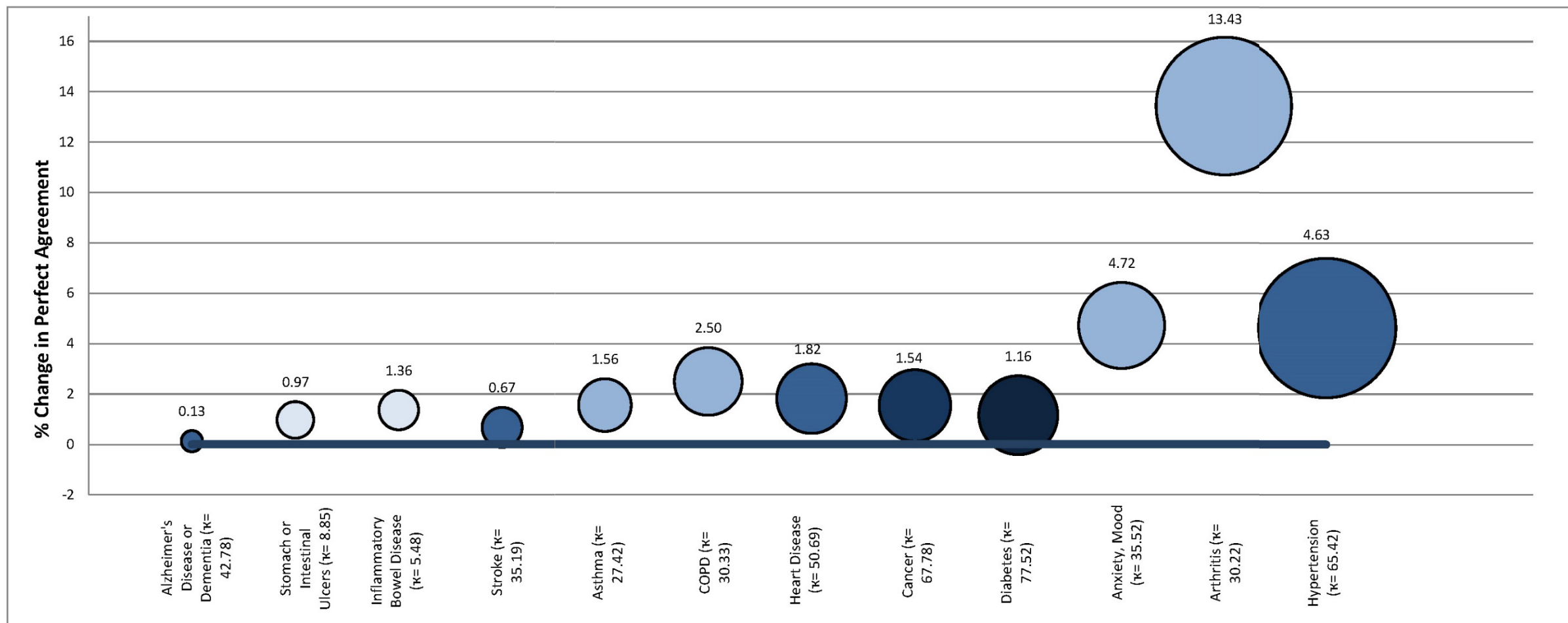
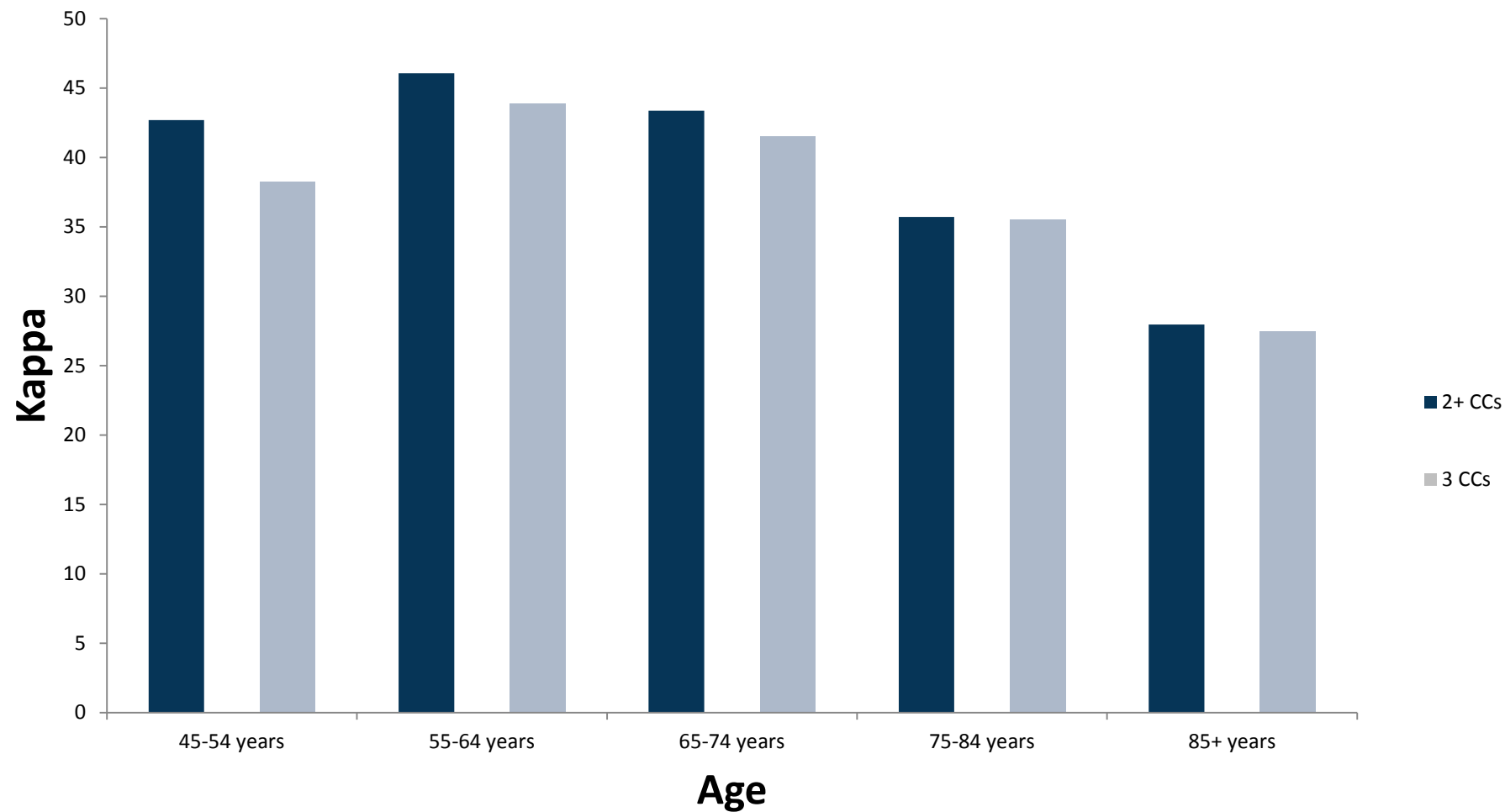
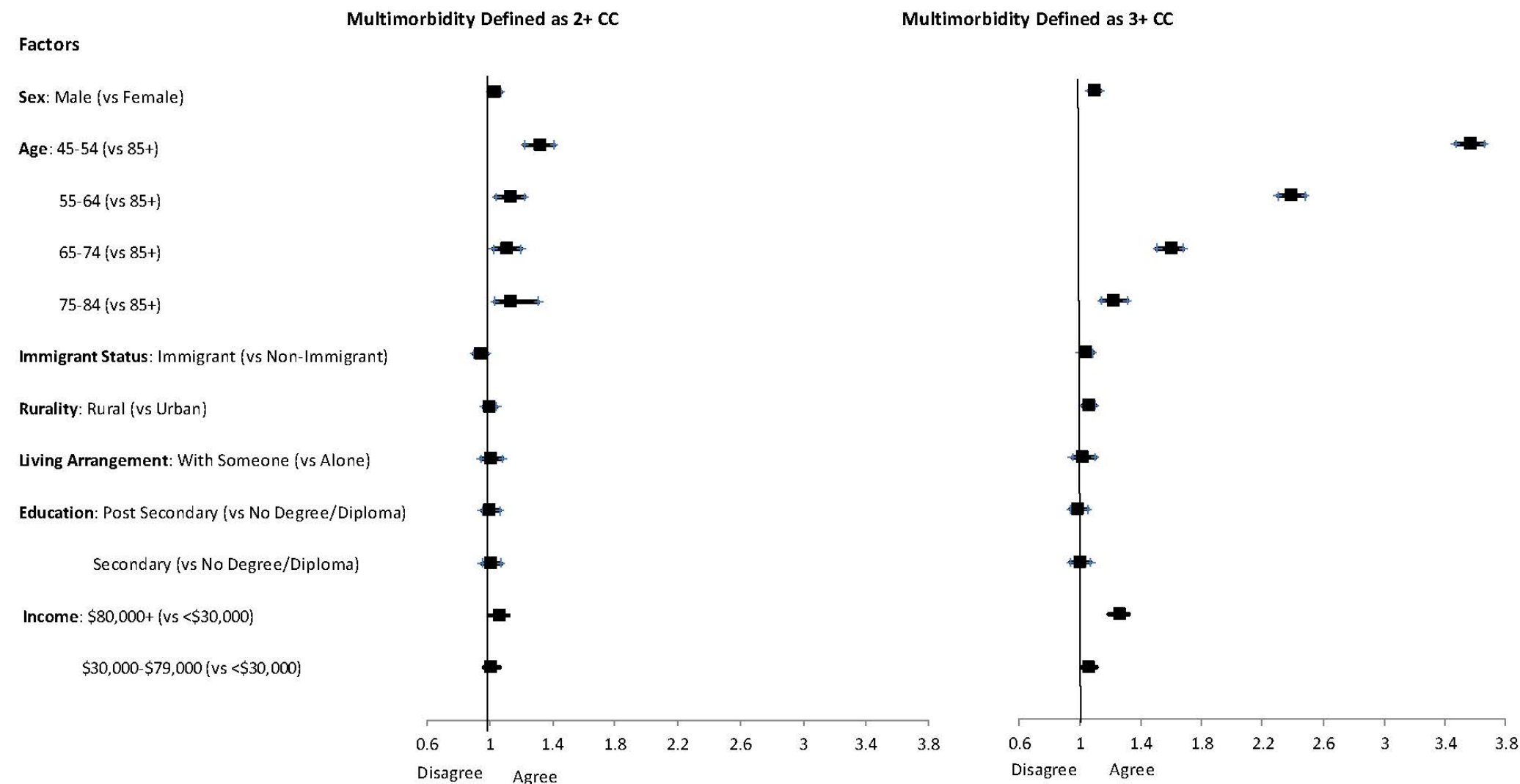


Figure 1. Change in overall perfect agreement between self-reported chronic conditions and administrative records with removal of each chronic condition. Size of each circle represents the overall prevalence of each chronic condition with a larger size representing a greater prevalence. The shading of each circle represents the kappa matching statistic of each chronic condition with a darker shade representing a higher Kappa statistic.

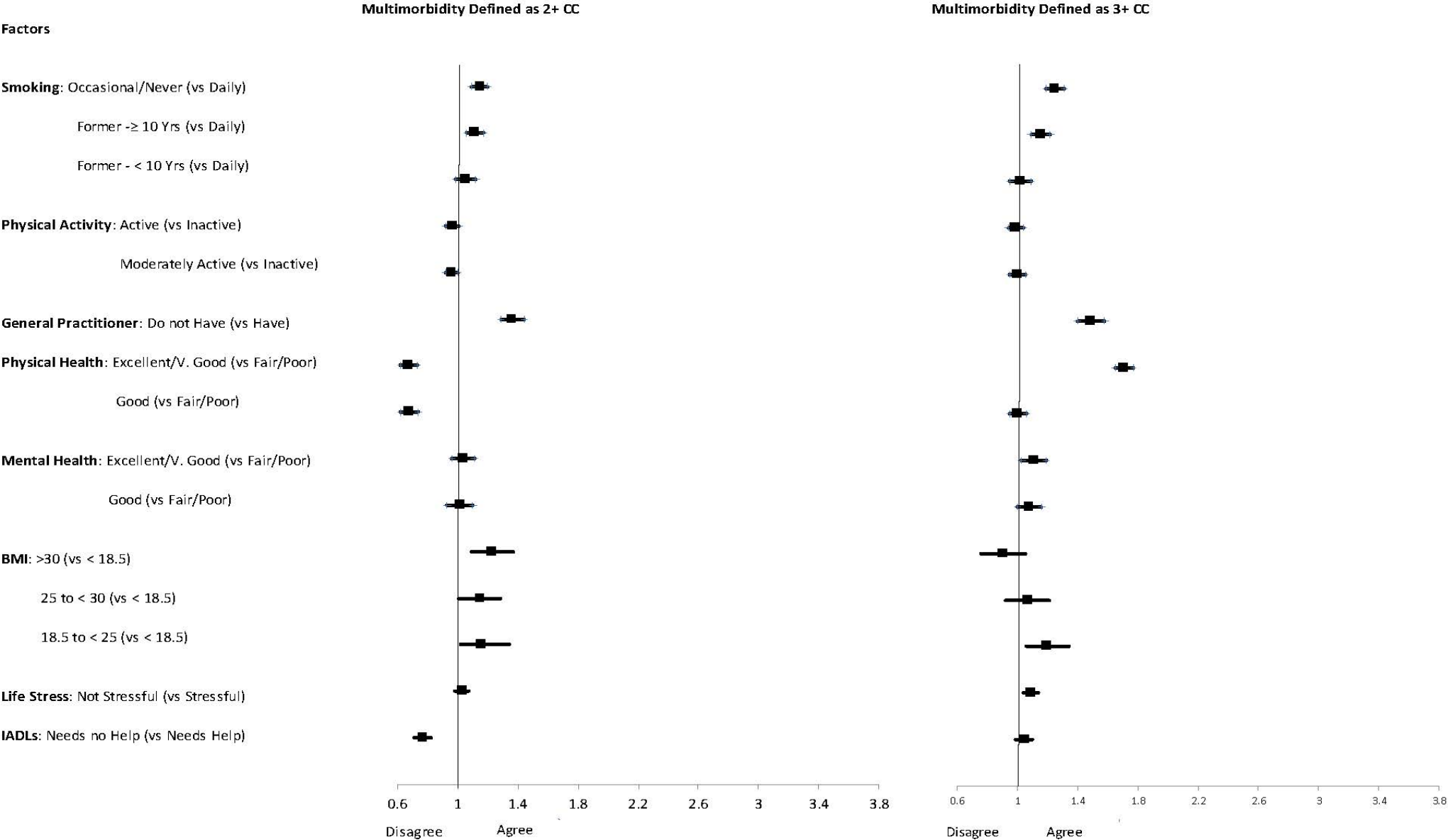
Agreement on MM Status



Factors Associated with Agreement on MM Status



Factors Associated with Agreement on MM Status



Data Sources

- Examining agreement for multimorbidity measures is complex
 - Consider agreement on both the number of CCs and the constituent conditions
- The agreement between data sources decreased when the number of CCs increased
- The impact of individual CCs on multimorbidity agreement is influenced by both the agreement on individual CCs and its prevalence in the population
- Although many factors were associated with agreement, the associations appear to depend on the definition used to characterize multimorbidity

Combining volunteers and primary care teamwork to support health goals and needs of older adults: a pragmatic randomized controlled trial

Lisa Dolovich PharmD MSc, Doug Oliver MD, Larkin Lamarche PhD, Lehana Thabane PhD, Ruta Valaitis PhD, Gina Agarwal MBBS PhD, Tracey Carr MBA RN, Gary Foster PhD, Lauren Griffith PhD, Dena Javadi MSPH, Monika Kastner PhD, Dee Mangin MBChB, Alexandra Papaioannou MD, Jenny Ploeg PhD, Parminder Raina PhD, Julie Richardson PhD, Cathy Risdon MD, Pasqualina Santaguida PhD, Sharon Straus MD MSc, David Price MD

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See related article at www.cmaj.ca/lookup/doi/10.1503/cmaj.190406

ABSTRACT

BACKGROUND: The Health TAPESTRY (Health Teams Advancing Patient Experience: STREngthening Quality) intervention was designed to improve primary care teamwork and promote optimal

gathered information on people's goals, needs and risks in their homes, using electronic forms. Interprofessional primary care teams reviewed summaries and addressed issues. Participants

intervention versus control group over 6 months (mean \pm standard deviation [SD] 4.93 \pm 3.86 v. 3.50 \pm 3.53; difference of 1.52 [95% confidence interval (CI) 0.84 to 2.19]). The odds of having 1 or more hos-

CLINICAL INVESTIGATION

Community Program Improves Quality of Life and Self-Management in Older Adults with Diabetes Mellitus and Comorbidity

Maureen Markle-Reid, RN, PhD,^{†} Jenny Ploeg, RN, PhD,^{*‡} Kimberly D. Fraser, RN, PhD,[§] Kathryn A. Fisher, PhD,^{*} Amy Bartholomew, RN, BScN,^{*} Lauren E. Griffith, PhD,[†] John Miklavcic, PhD,[§] Amiram Gafni, PhD,^{†¶} Lehana Thabane, PhD,[†] and Ross Upshur, MD, MSc^{**}*

OBJECTIVES: To compare the effect of a 6-month community-based intervention with that of usual care on quality of life, depressive symptoms, anxiety, self-efficacy, self-management, and healthcare costs in older adults with type 2 diabetes mellitus (T2DM) and 2 or more comorbidities.

DESIGN: Multisite, single-blind, parallel, pragmatic, randomized controlled trial.

SETTING: Four communities in Ontario, Canada.

(SDSCA), Self-Efficacy for Managing Chronic Disease, and healthcare costs.

RESULTS: Morbidity burden was high (average of eight comorbidities). Intention-to-treat analyses using analysis of covariance showed a group difference favoring the intervention for the MCS (mean difference = 2.68, 95% confidence interval (CI) = 0.28–5.09, $P = .03$), SDSCA (mean difference = 3.79, 95% CI = 1.02–6.56, $P = .01$), and CES-D-10 (mean difference = –1.45, 95% CI = –0.13 to –2.76, $P = .03$). No group differences were seen in PCS

Challenges and Possible Next Steps

- How do we move multimorbidity beyond # of chronic conditions?
 - Unified vs. Bespoke frameworks (Actionable)
 - Chronic condition clusters
 - “Big” data sources – EMR/administrative
 - Statistical methods to reducing dimensionality
 - Longitudinal data (like CLSA)
- How do we incorporate other important factors?
 - Examining other population stratifiers, such as SES, to better understand the heterogeneity in multimorbidity at the population-level

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Questions?