IMPACT OF MULTIMORBIDITY INCLUDING MENTAL HEALTH CONDITIONS ON DISABILITY

KATHRYN FISHER I, PHD,
SCHOOL OF NURSING, MCMaster UNIVERSITY
McMaster University\textsuperscript{1}  
University of Alberta\textsuperscript{2}  

*Presenter: Kathryn Fisher  
(fisheka@mcmaster.ca)
Topics to be Covered

1. Purpose
2. Background
3. Objectives
4. Main Hypotheses
5. Results
6. Discussion
7. Conclusion
This study aims to improve our understanding of the **differential impact** on disability of **mental health conditions** that co-exist with other physical chronic conditions.
This is a multimorbidity study with a focus on mental health.

What is multimorbidity?
- Multimorbidity is defined as having 2 or more chronic conditions.
- Broadly consists of chronic conditions that are physical (e.g., COPD, cancer, CHF, arthritis, diabetes) or mental (e.g., depression, anxiety, bipolar disorder, schizophrenia).
Background – Multimorbidity

- **Multimorbidity** is a global health burden linked to greater disability, mortality, complex clinical management, self-management challenges, healthcare service use/cost.

- **Mental health** disorders are linked with higher disability compared to physical health conditions (Moen et al., 2018; Garin et al., 2014)

- **Physical** health multimorbidity is linked to higher rates of mental disorders (Stubbs et al., 2017; Bobo et al., 2016)
Mental health conditions within the context of multimorbidity may have a synergistic impact on disability:

- Disease clusters involving depression associated with higher disability compared to those involving only physical conditions (Quinones et al., 2018)
- Only one of the 14 most prevalent disease clusters included a mental health condition (depressive symptoms, ranked 11th), yet showed highest disability (Quinones et al., 2016)
- Co-occurrence of mental health conditions with specific physical conditions (arthritis, COPD, diabetes) linked to higher disability (Quinones et al., 2019; Rivera-Almaraz et al., 2018; Yokota et al. 2016)
Studies of multimorbidity, disability and mental health need to control for other influential socio-demographic factors, e.g.:

- multimorbidity and disability increase with age
- multimorbidity and disability higher in women, lower SES groups, minority populations
- mental health conditions higher in women
- Lists used to estimate multimorbidity vary widely and mental health conditions often not included (Diederichs et al., 2011)
- Disease clusters difficult to fully study in relation to other variables (e.g., limited to dyads, most prevalent clusters)
Study Objectives

1. Determine the rate of **physical disability** and **mental disorders**, and which physical conditions frequently cluster with mental health conditions.

2. Examine the association between **disability and multimorbidity**, with the analyses structured to **isolate the role that mental health** plays in shaping disability.

3. Investigate how **age, sex** and other socio-demographic factors modify the association between disability and multimorbidity (with and without mental health conditions).
Main Hypotheses

Multimorbidity combinations that include mental health conditions are associated with higher levels of disability compared to combinations that include only physical conditions, for a given level of multimorbidity.

Mental health conditions will cluster with highly symptomatic conditions (e.g., painful conditions such as arthritis, stressful conditions such as COPD, highly uncomfortable conditions such as stomach/bowel disorders), which may explain the link with disability.
Methods – Data Source

Baseline data collected from the Canadian Longitudinal Study on Aging

Community-dwelling, Canadians aged 45-85

In-person or computer-assisted telephone interviews

$N = 51,338$
Methods – Main Measures

1. **Outcome (Disability):** Dichotomous (any self-reported limitation versus no limitation). Participants were considered to have disability if they indicated difficulty with any of 14 Basic or Instrumental Activities of Daily Living (ADL/IADL) items from the Older Americans Resources and Services (OARS) Multidimensional functional assessment.

2. **Multimorbidity:** Number of chronic conditions (6+ months) were self-reported; participants were asked, “has a doctor ever told you that you have ____?”.

3. **Mental Health Conditions:** Mood or anxiety self-reported as described in 2 above. Due to potential under-reporting of mental health conditions, we also repeated our analyses including those reporting depressive symptoms (CESD score 10+).
## Methods – Chronic Conditions (Multimorbidity)

<table>
<thead>
<tr>
<th>Chronic Condition</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Blood Pressure</td>
<td>19203</td>
<td>37.56%</td>
</tr>
<tr>
<td>Eye Condition</td>
<td>15608</td>
<td>30.87%</td>
</tr>
<tr>
<td>Arthritis</td>
<td>14825</td>
<td>29.25%</td>
</tr>
<tr>
<td>Mood or Anxiety Disorder</td>
<td>10070</td>
<td>19.67%</td>
</tr>
<tr>
<td>Diabetes, borderline diabetes</td>
<td>8863</td>
<td>17.31%</td>
</tr>
<tr>
<td>Respiratory Condition</td>
<td>8379</td>
<td>16.40%</td>
</tr>
<tr>
<td>Cancer</td>
<td>7902</td>
<td>15.42%</td>
</tr>
<tr>
<td>Thyroid Condition</td>
<td>7185</td>
<td>14.16%</td>
</tr>
<tr>
<td>Heart Condition</td>
<td>7009</td>
<td>13.73%</td>
</tr>
<tr>
<td>Migraine headaches</td>
<td>6773</td>
<td>13.23%</td>
</tr>
<tr>
<td>Bowel Disorder</td>
<td>5412</td>
<td>10.58%</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>4698</td>
<td>9.21%</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>4388</td>
<td>8.57%</td>
</tr>
<tr>
<td>Intestinal or stomach ulcers</td>
<td>3912</td>
<td>7.65%</td>
</tr>
<tr>
<td>Peripheral vascular disease, poor circulation</td>
<td>3165</td>
<td>6.19%</td>
</tr>
<tr>
<td>Stroke or TIA</td>
<td>2367</td>
<td>4.64%</td>
</tr>
<tr>
<td>Kidney disease, kidney failure</td>
<td>1460</td>
<td>2.85%</td>
</tr>
<tr>
<td>Neurological Condition</td>
<td>1121</td>
<td>2.19%</td>
</tr>
</tbody>
</table>
Methods - Analyses

• Phase 1:
  • Compared disability prevalence for people with and without mental health conditions:
    • Compared people at same multimorbidity level (number of chronic conditions): those who have at least one mental health condition versus those who do not have a mental health condition
    • Stratified analysis by age, sex
  • Logistic Regression to obtain odds of disability for people with and without mental health conditions:
    • Unadjusted and adjusted analyses

• Phase 2:
  • Mental Health: Depressive Symptoms (CESD) + depression
  • Disability: IADL & ADL examined separately

• Phase 3:
  • Exploratory factor analysis to determine multimorbidity clusters and which physical conditions clustered with mental health conditions
  • Explored links between social participation and mental health conditions
Phase 1 Results
Results - Demographic Characteristics

51% Female

20% Mood or Anxiety Disorder

Multimorbidity: Mean Number of Chronic Conditions
- 2.23 overall
- 2.09 in those without Mood/Anxiety
- 2.82 in those with Mood/Anxiety disorder
# Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>All Participants</th>
<th>Participants with a Mood or Anxiety Disorder</th>
<th>Participants without a Mood or Anxiety Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=51,338</td>
<td>N=10,070</td>
<td>N=41,113</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>25183</td>
<td>49.1</td>
<td>3731</td>
</tr>
<tr>
<td>Women</td>
<td>26155</td>
<td>51.0</td>
<td>6339</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>13427</td>
<td>26.2</td>
<td>2961</td>
</tr>
<tr>
<td>55-64</td>
<td>16420</td>
<td>32.0</td>
<td>3749</td>
</tr>
<tr>
<td>65-74</td>
<td>11996</td>
<td>23.4</td>
<td>2213</td>
</tr>
<tr>
<td>75-85</td>
<td>9495</td>
<td>18.5</td>
<td>1147</td>
</tr>
<tr>
<td><strong>5 Most Common Physical Chronic Conditions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis</td>
<td>14825</td>
<td>29.3</td>
<td>3514</td>
</tr>
<tr>
<td>Eye condition</td>
<td>15608</td>
<td>30.9</td>
<td>3026</td>
</tr>
<tr>
<td>High blood pressure</td>
<td>19203</td>
<td>37.6</td>
<td>4033</td>
</tr>
<tr>
<td>Diabetes</td>
<td>8863</td>
<td>17.3</td>
<td>2137</td>
</tr>
<tr>
<td>Respiratory condition,</td>
<td>8379</td>
<td>16.4</td>
<td>2376</td>
</tr>
<tr>
<td><strong>Number of Chronic Conditions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>7564</td>
<td>14.8</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>10532</td>
<td>20.6</td>
<td>1103</td>
</tr>
<tr>
<td>2</td>
<td>10339</td>
<td>20.2</td>
<td>1826</td>
</tr>
<tr>
<td>3</td>
<td>8248</td>
<td>16.1</td>
<td>1922</td>
</tr>
<tr>
<td>4</td>
<td>5875</td>
<td>11.5</td>
<td>1660</td>
</tr>
<tr>
<td>5+</td>
<td>8625</td>
<td>16.9</td>
<td>3559</td>
</tr>
<tr>
<td><strong>Social Participation Prevented by Health Status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3877</td>
<td>7.6</td>
<td>1424</td>
</tr>
<tr>
<td><strong>Limitation in Basic or Instrumental Activities of Daily Living (ADL/IADL)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5186</td>
<td>10.1</td>
<td>1732</td>
</tr>
</tbody>
</table>
Disability Prevalence

Disability Prevalence by Mood or Anxiety Disorder and Number of Chronic Conditions

**Figure 1: All Participants**

- **Number of Chronic Conditions**
  - 1
  - 2
  - 3
  - 4
  - 5+

- **Percentage**
  - 0
  - 10
  - 20
  - 30
  - 40

- **Mood or Anxiety Disorder**
- **No Mood or Anxiety Disorder**

**Figure 2: Women**

- **Number of Chronic Conditions**
  - 1
  - 2
  - 3
  - 4
  - 5+

- **Percentage**
  - 0
  - 10
  - 20
  - 30
  - 40

**Figure 3: Men**

- **Number of Chronic Conditions**
  - 1
  - 2
  - 3
  - 4
  - 5+

- **Percentage**
  - 0
  - 10
  - 20
  - 30
  - 40
Results – Disability Prevalence

There is well-established evidence that disability and multimorbidity increase with age. Our results are consistent with this finding.
Disability Prevalence by Age and Sex

Figure 4: Disability Prevalence by Mood or Anxiety Disorder, Sex, and Age
Multimorbidity and Age

Figure 6: Number of Chronic Conditions by Mood or Anxiety Disorder and Age
Results so far suggest that **age and multimorbidity** are especially important to control for to better understand how each relates to disability.
Disability Prevalence

Figure 5: Disability Prevalence by Number of Chronic Conditions and Age
Disability with and without Mental Health

Figure 6: Odds Ratio Disability (ADL, IADL) stratified by CC and Mood/Anxiety Unadjusted
Disability with and without Mental Health

Figure 7: Odds of Disability (ADL, IADL) stratified by CC and Mood/Anxiety Adjusted for Age

Any ADL/IADL OR Estimate, 95% CI

Mood or Anxiety Disorder

No Mood or Anxiety Disorder
Results – Disability Prevalence

We looked at many stratified analyses for evidence of differences in disability prevalence, stratifiers included:

- Sex
- Age
- Income
- Education
- Living alone
- Social support

Age, sex and education showed the strongest relationships with disability, so all logistic regressions were adjusted for these.
Comparison of Disability with and without Mental Health

Figure 8: Odds of Disability (ADL, IADL) stratified by CC and Mood/Anxiety Adjusted for Age, Sex and Education

Any ADL/IADL OR Estimate, 95% CI

0 5 10 15 20 25 30 35

Number of Chronic Conditions (CC’s)

Mood or Anxiety Disorder

No Mood or Anxiety Disorder
Phase 2 Results
Composite Outcome: CESD + Self-Reported Mood/Anxiety
Comparison of Disability with and without Mental Health

Figure 9: Odds of Disability (ADL, IADL) stratified by CC and Mood/Anxiety/CESD Adjusted for Age, Sex and Education

- Any ADL/IADL OR Estimate, 95% CI
- Comparison of Disability with and without Mental Health

Mood or Anxiety Disorder
- Mood or Anxiety Disorder
- No Mood or Anxiety Disorder
Disability: ADL and IADL
Examined Separately
Comparison of Disability with and without Mental Health

Figure 10: Odds of ADL (Only) stratified by CC and Mood/Anxiety Adjusted for Age, Sex and Education
Comparison of Disability with and without Mental Health

Figure 11: Odds of IADL (Only) stratified by CC and Mood/Anxiety Adjusted for Age, Sex and Education

Any ADL/IADL OR Estimate, 95% CI

Mood or Anxiety Disorder

No Mood or Anxiety Disorder
Phase 3 Results
What multimorbidity clusters exist, and what physical conditions (if any) do mental health conditions cluster with?
## Chronic Conditions Clusters

### Table 2: Rotated Factor Analysis

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cardio-metabolic</th>
<th>Highly-Symptomatic (incl. Mood)</th>
<th>Miscellaneous</th>
<th>Neurologic</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Blood Pressure</td>
<td>0.74</td>
<td>0.04</td>
<td>0.08</td>
<td>-0.08</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.70</td>
<td>0.16</td>
<td>-0.11</td>
<td>-0.15</td>
</tr>
<tr>
<td>Heart disease, CHF, angina, or MI</td>
<td>0.67</td>
<td>-0.02</td>
<td>0.07</td>
<td>0.25</td>
</tr>
<tr>
<td>Stroke, CVA, mini-stroke, or TIA</td>
<td>0.53</td>
<td>0.01</td>
<td>0.10</td>
<td>0.50</td>
</tr>
<tr>
<td>Kidney disease or kidney failure</td>
<td>0.49</td>
<td>0.19</td>
<td>0.19</td>
<td>0.05</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>0.46</td>
<td>0.13</td>
<td>0.24</td>
<td>0.28</td>
</tr>
<tr>
<td>Mood or anxiety disorder</td>
<td>0.02</td>
<td>0.68</td>
<td>-0.06</td>
<td>0.13</td>
</tr>
<tr>
<td>Bowel disorder</td>
<td>0.05</td>
<td>0.60</td>
<td>0.24</td>
<td>0.15</td>
</tr>
<tr>
<td>Migraine headaches</td>
<td>-0.09</td>
<td>0.59</td>
<td>0.09</td>
<td>0.15</td>
</tr>
<tr>
<td>Intestinal or stomach ulcers</td>
<td>0.22</td>
<td>0.55</td>
<td>0.08</td>
<td>-0.06</td>
</tr>
<tr>
<td>Respiratory condition</td>
<td>0.15</td>
<td>0.48</td>
<td>0.12</td>
<td>-0.05</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>-0.07</td>
<td>0.05</td>
<td>0.76</td>
<td>0.23</td>
</tr>
<tr>
<td>Arthritis</td>
<td>0.21</td>
<td>0.24</td>
<td>0.58</td>
<td>-0.06</td>
</tr>
<tr>
<td>Eye condition</td>
<td>0.44</td>
<td>-0.11</td>
<td>0.57</td>
<td>0.11</td>
</tr>
<tr>
<td>Hypothyroidism or hyperthyroidism</td>
<td>0.04</td>
<td>0.18</td>
<td>0.52</td>
<td>-0.08</td>
</tr>
<tr>
<td>Neurological condition</td>
<td>-0.01</td>
<td>0.12</td>
<td>-0.06</td>
<td>0.81</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>0.15</td>
<td>0.34</td>
<td>0.29</td>
<td>0.43</td>
</tr>
</tbody>
</table>
Social participation is often associated with health and disability. Do mental health conditions impact social participation?
Social Participation

Figure 5: Social Participation Restriction by Mood or Anxiety Disorder, Sex, and Age
Discussion

- **Mood or anxiety disorders** are more prevalent in the younger age groups and in women.

- **Mood or anxiety disorders** cluster with other highly-symptomatic physical conditions (e.g., respiratory conditions, migraine headaches, bowel and intestinal conditions).

- **Disability** is higher in women than men, at all levels of multimorbidity.
Discussion

- The **prevalence of disability** increases with the level of multimorbidity.

- At a given level of multimorbidity, the **prevalence of disability** is higher for those with **mental health disorders** compared to those without, in adjusted models.

- For men and women in all age groups, those with **mental health disorders** were more likely to report **social participation restrictions** due to health compared to those without.
Discussion

- Some multimorbidity studies have reported a more significant impact of mental health disorders on disability compared to our results.
  - This can reflect the populations studied and chronic conditions captured.
  - There are also methodological differences, some of which exaggerate the impact of mental health – e.g.,
    - Adding a mental health disorder to an existing set of physical conditions & comparing to the set of physical conditions alone...this involves different levels of multimorbidity (number of conditions) which will contribute to differences in the outcome.
Discussion – Our Original Analysis

Number of Chronic Conditions

- % with any ADL/IADL
- Mood or Anxiety Disorder
- No Mood or Anxiety Disorder
Limitations

- relatively few CLSA participants reporting an ADL/IADL limitation (age 45+, relatively “healthy” population of community-dwelling adults)

- cross-sectional study using baseline CLSA (not longitudinal)

- small cell sizes thereby limiting stratified analyses and regressions
Limitations

- Multimorbidity measured using a count of chronic conditions obscures the importance of individual chronic conditions and interactions of particular combinations of physical and mental health conditions, e.g.,
  - The impact on disability is likely to be greater for a person with anxiety and COPD compared to a person with anxiety and hypertension, even though both people have 2 chronic conditions.
Conclusions

Results suggest that the presence of mental health disorders increases the level of disability and decreases social activity at all levels of multimorbidity, with potentially stronger effects seen in women compared to men.
References


References


