Predictors of Unrelieved Symptoms in Individuals with Chronic Conditions: The Relevance of the *All of Us* Research Program Survey Data to Interdisciplinary Care

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Background

- Over half of all adults living in the United States are diagnosed with a chronic condition
- These individuals are at higher risk of having unrelieved symptoms that may negatively impact daily life
- *All of Us* Research Program offers a unique opportunity to study symptoms and predictors of symptoms in adults diagnosed with one or more chronic conditions

Objectives

- To identify symptom phenotypes of patients diagnosed with one or more common chronic conditions, specifically cancer, chronic obstructive pulmonary disease (COPD), heart failure, and/or type 2 diabetes mellitus
- To understand the demographic, healthcare access and utilization, and health-related factors that predict membership in symptomatic phenotypes
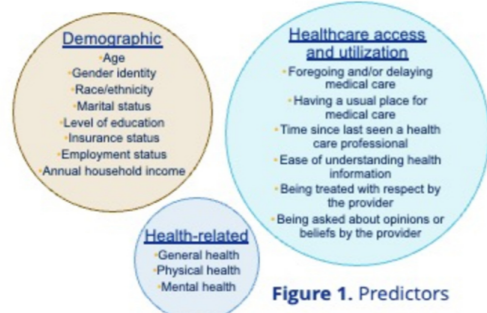

Figure 1. Predictors

Methods

- Conducted a retrospective, cross-sectional analysis using participant responses to *All of Us* Research Program survey questions
- Performed analyses on *All of Us* data release version 4.0 within the secure Researcher Workbench using R
- Identified adult (≥18 years of age) participants diagnosed with cancer, COPD, heart failure, and/or diabetes based on ICD and SNOMED condition codes and complete responses to symptom-related survey questions
- Performed hierarchical clustering to generate symptom phenotypes of *fatigue*, *emotional distress*, and *pain*
- Used multinomial regression to determine if demographic, healthcare access and utilization, and health-related variables (**Figure 1**) predict symptom phenotype
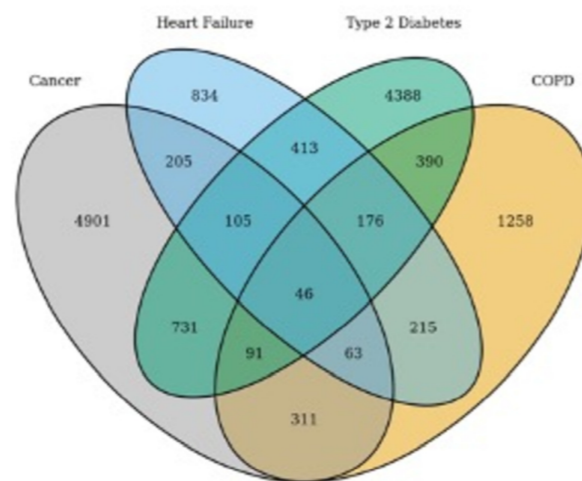

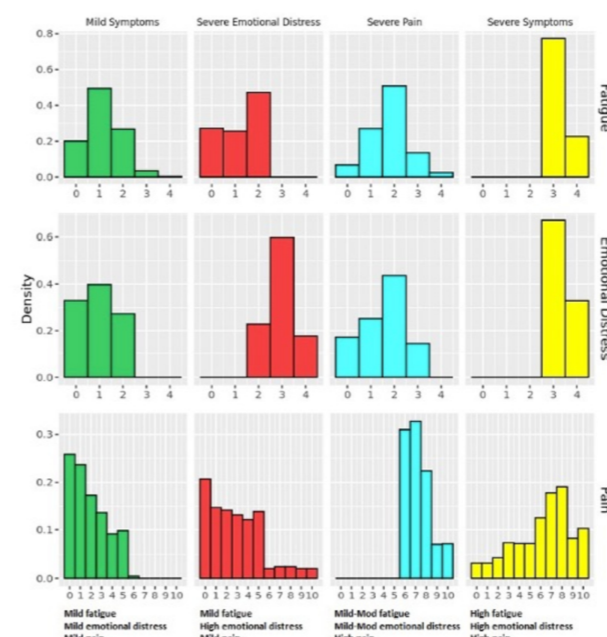**Figure 2.** Chronic condition diagnoses

Results

Figure 3. Symptom phenotypes

- Participants (*N*=14,127; **Figure 2**) were approximately 63 years of age and primarily women, White/non-Hispanic, married, highly educated, not employed, and insured
- Time between earliest condition start date and response to symptom surveys: *median*=3.66 years (*min*=0; *Q1*=1.82, *Q3*=7.48, *max*=36.98)
- Four phenotypes, one *asymptomatic or mildly symptomatic* (n=9,961) and three highly symptomatic, characterized by *all severe symptoms* (n=618), *severe pain* (n=2,576), and *severe emotional distress* (n=972), were identified (**Figure 3**)
- The percentage of participants that belong to the *all severe symptoms* phenotype increased with the number of chronic conditions
- Most notably, foregoing or delaying medical care (*OR*=1.30-1.68, *95CI*=1.10-2.16, *p*<0.001-0.002) and rating mental health as *poor* (*OR*=3.64-39.79, *95CI*=2.10-69.24, all *p*<0.001) or *fair* (*OR*=1.89-6.44, *95CI*=1.60-8.33, all *p*<0.001) increased the odds of belonging to a highly symptomatic phenotype

Conclusions

- Consistent with previous research, foregoing or delaying medical care was a key factor in unmet health care needs, increasing the likelihood of belonging to a phenotype characterized by severe, unrelieved symptoms
- Found that participants who rated their mental health as *poor* or *fair* had higher odds of belonging to a symptomatic phenotype compared to those who rated their mental health as *good*
  - While poor mental health may be related to emotional distress, relationships were not limited to the severe emotional distress phenotype
- These findings support a growing body of literature that suggests a complex, bidirectional relationship between psychological and physical symptoms in chronic conditions
- Mental health interventions, such as telehealth to expand access, should be explored as methods of symptom management

***All of Us* Research Program** data offer a unique opportunity to study <u>symptoms</u> in individuals diagnosed with <u>one or more chronic conditions</u> and inform targeted interventions to mitigate symptom burden