LONG-TERM FUNCTIONAL LIMITATIONS RELATED TO LONG COVID IN ADULTS

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Conflicts of Interest

None to declare

Long COVID or Post-Acute Sequelae of COVID (PASC)

Umbrella terms that refer to a range of "new, returning, or ongoing health problems" experienced by people four or more weeks after initial coronavirus infection

No immunological confirmation required (PCR/antibody)

No well-established biomarker

| PICS (Post Intensive Care Syndrome) | Pulmonary fibrosis; pericarditis; myocarditis | Post-viral syndromes | Worsening of pre-existing comorbidities (asthma, arthritis…) |

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Patient-Reported Outcomes

Determine impairments and rehabilitation needs

Validated PROs:

- **Fatigue Severity Scale (FSS)**
- **MRC** Breathlessness Scale
- **EuroQol EQ-5D-5L**
- Depression: **PHQ-2**
- Anxiety: **GAD-7**
- **Neuro QOL Cognitive Function**
- WHO Disability Assessment **WHODAS**

OPEN

Post-acute COVID-19 Syndrome Negatively Impacts Physical Function, Cognitive Function, Health-Related Quality of Life, and Participation

Laura Tabacof, MD, Jenna Tosto-Mancuso, PT, DPT, Jamie Wood, PT, PhD, Mar Cortes, MD, Amy Kontorovich, MD, PhD, Dayna McCarthy, DO, Dahlia Rizk, MD, Gabriela Rozanski, PT, PhD, Erica Breyman, BS, Leila Nasr, BS, Christopher Kellner, MD, Joseph E. Herrera, DO, FAAPMR, and David Putrino, PT, PhD

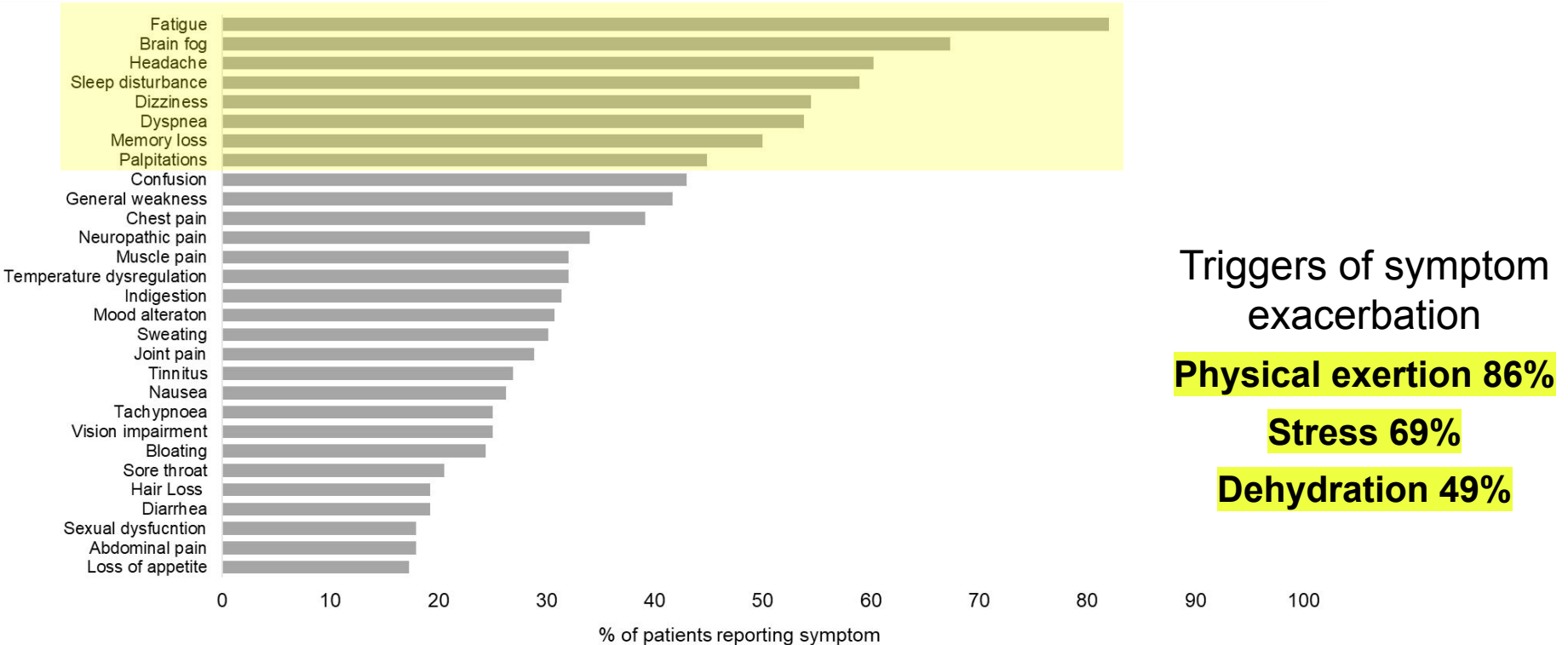**Table 1.** Patient (n=156) baseline demographic and COVID-19 related data

	All patients (n = 156)
Female	107 (69)
Age y, median (range)	44 (13 to 79)
BMI kg/m^2, median (range)	24 (16 to 52)
Duration of symptoms in days, median (range)	351 (82 to 457)
PCR completed	98 (63)
PCR positive	34 (22)
Antibody test completed	149 (96)
Antibody positive	80 (51)
PCR and/or antibody positive	87 (56)
Hospitalized for COVID-19	17 (11)
Received COVID-19 vaccination*	87 (56)
Most prevalent comorbidities	
Cancer (any type)	30 (20)
Asthma	30 (20)
Anxiety	18 (12)
Depression	13 (8)
Hypertension	11 (7)

Data are presented as n (%) unless otherwise indicated. BMI = body mass inde
reaction. *All COVID-19 vaccination occurred after COVID-19 infection.

Mount Sinai Center for Post COVID Care rehabilitation clinic

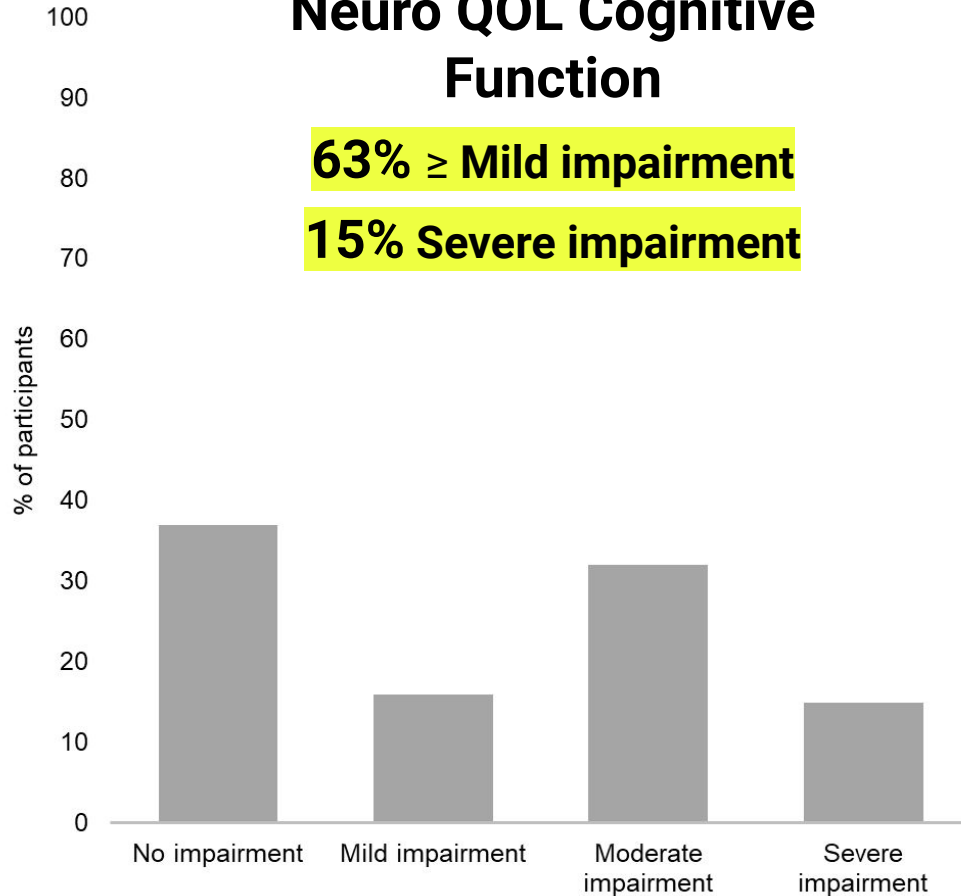**Probable or confirmed** SARS-Cov-2 infection (WHO)

Tabacof *et al*, 2021

Symptoms and Triggers of Exacerbation

Triggers of symptom exacerbation

Physical exertion 86%

Stress 69%

Dehydration 49%

Tabacof *et al*, 2021 (AJPMR)

Neuro QOL Cognitive Function

63% ≥ Mild impairment

15% Severe impairment

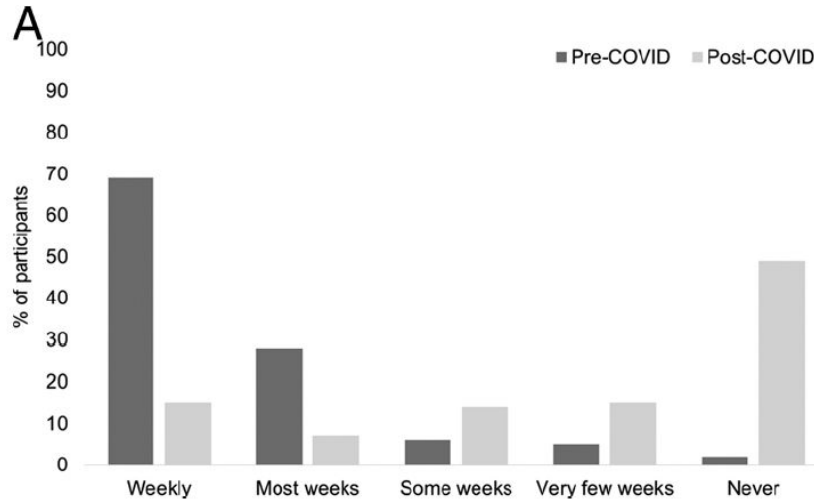# Fatigue Severity Scale

78% Debilitating Fatigue
score ≥4

MRC Dyspnea

40% Debilitating Dyspnea

score ≥3

% of participants

No impairment | Mild impairment | Moderate impairment | Severe impairment

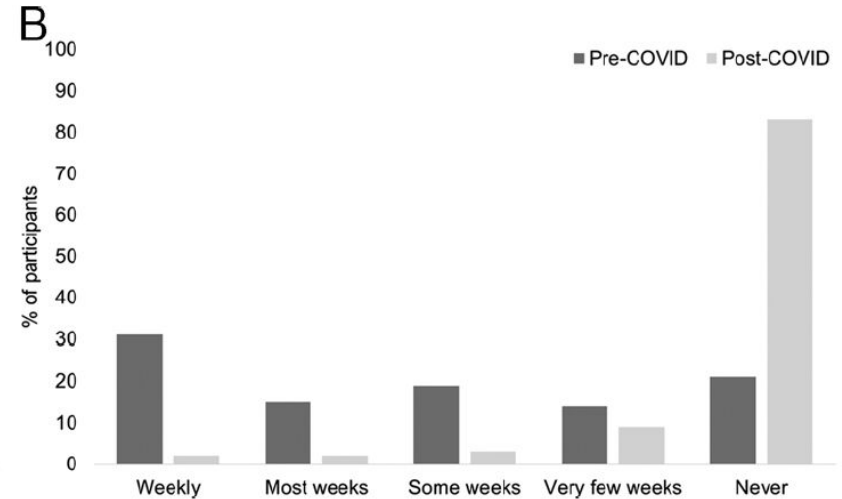Tabacof *et al*, 2021 (AJPMR)

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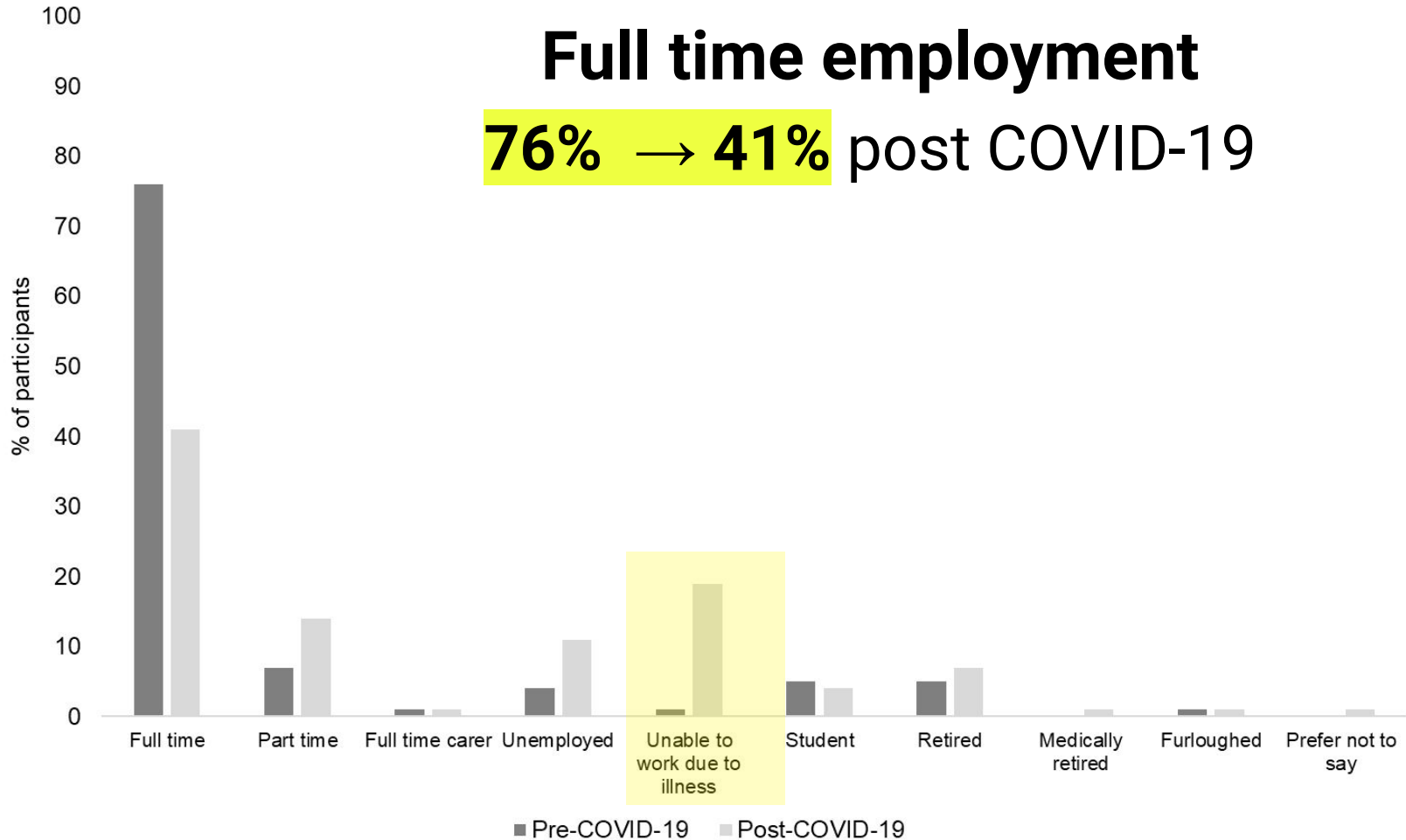# Changes in Exercise Habits

MODERATE

VIGOROUS

Levels of physical activity regularly completed pre- and post-COVID-19

Full time employment

76% → 41% post COVID-19

n=533; 71% ♀, age 46 (±13); 90% non-hospitalized

Fatigue Severity Scale (n=498)

81% Severe Fatigue ≥4/7

	Mean FSS Score (SD) Score range: 1-7
Long COVID	**5.4 (1.6)**
Healthy population	2.3 (0.7)
Post-poliomyelitis Sd.	5.3 (1.3)
Multiple Sclerosis	4.8 ± 1.4
Parkinson's Disease	3.9 (1.6)
Epilepsy	4.2 ± 1.5

Hernández-Ronquillo et al 2011; Learmonth et al 2013; Lerdal et al 2011
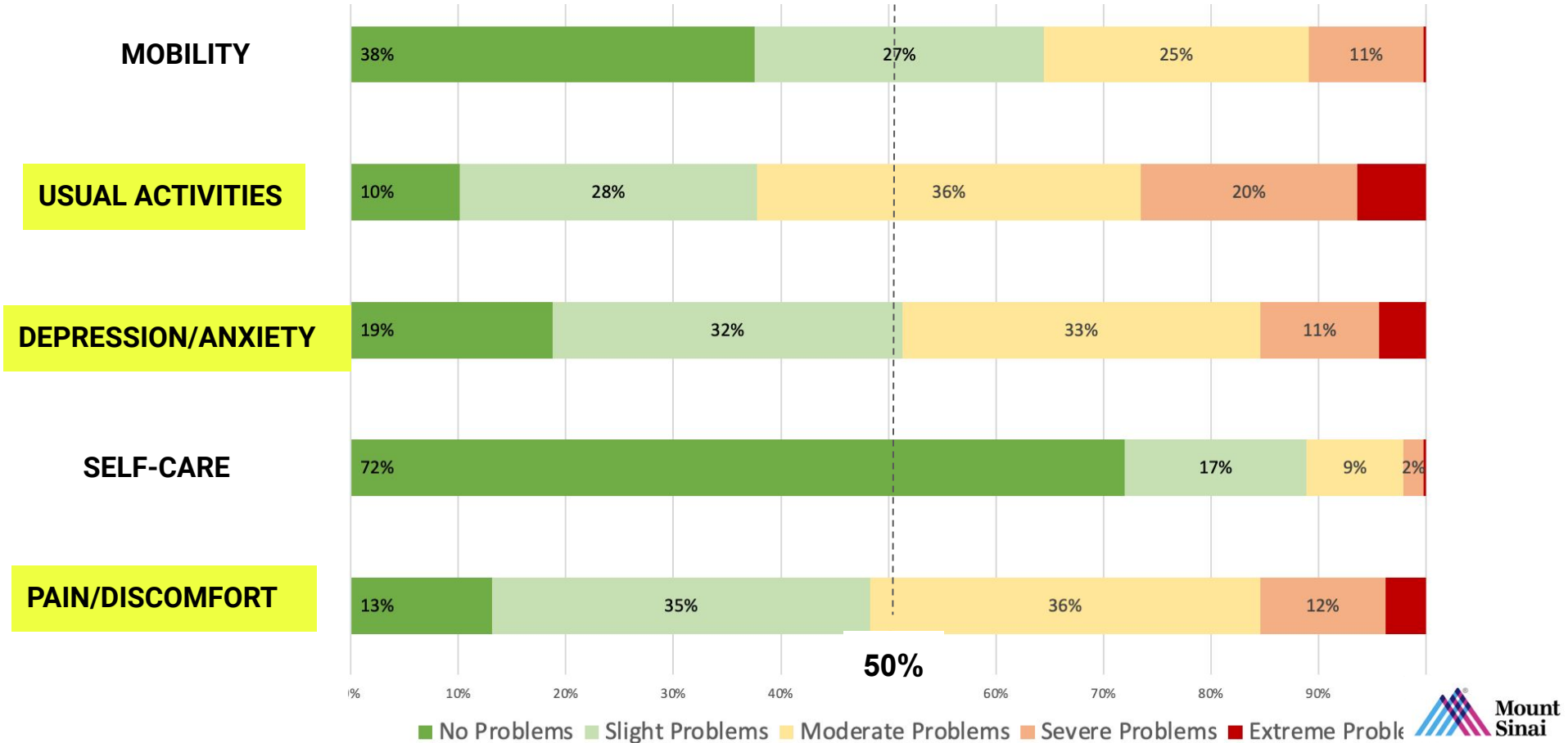
Neuro QOL Cognitive Function

Some level of dysfunction: 70%
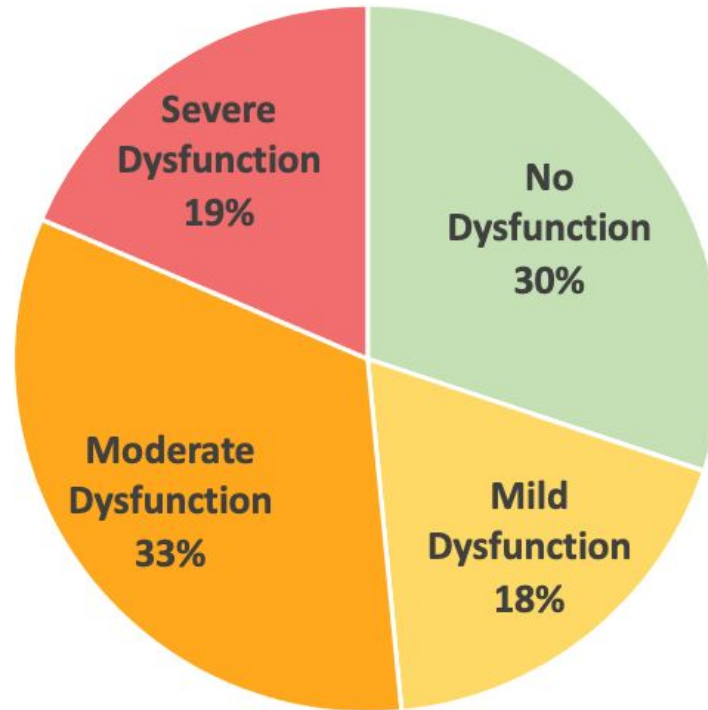
Neuro QOL Cognitive Function

	Moderate/Severe Cognitive Dysfunction	Mean (SD) *Lower scores=worse cog. function*
Long COVID	51%	24.81 (8.40)
General population *all age groups*	20% p<0.001*	32.60 (6.89) p<0.001*

Iverson et al 2021; Neuro QOL Score Cut Points https://www.healthmeasures.net/

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EQ-5D-5L Health Related QoL

	No Problems	Slight Problems	Moderate Problems	Severe Problems	Extreme Problems
MOBILITY	38%	27%	25%	11%	
USUAL ACTIVITIES	10%	28%	36%	20%	
DEPRESSION/ANXIETY	19%	32%	33%	11%	
SELF-CARE	72%	17%	9%	2%	
PAIN/DISCOMFORT	13%	35%	36%	12%	

50%

No Problems Slight Problems Moderate Problems Severe Problems Extreme Proble

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GAD-7 (n=529)
Minimal or Mild Anxiety: 74%
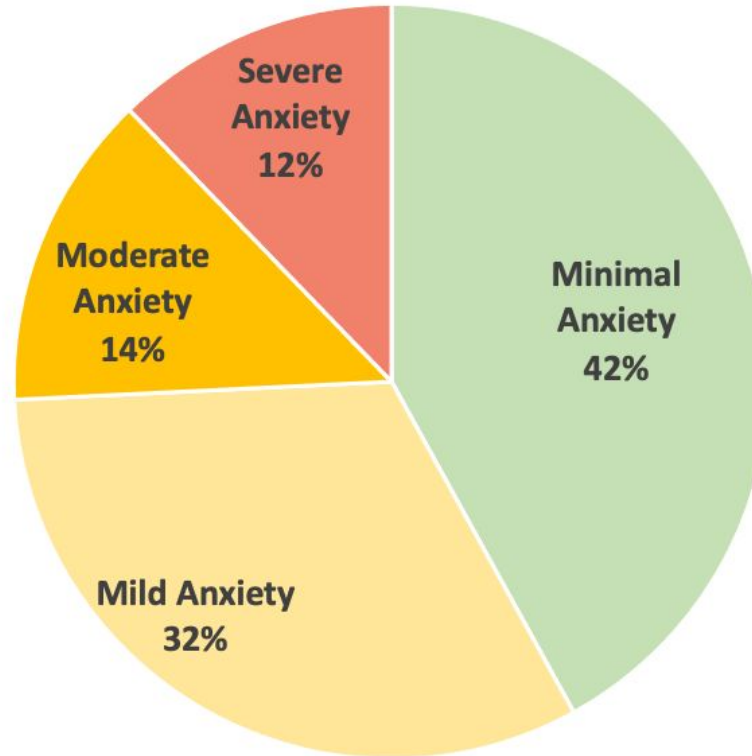
	Generalized Anxiety Disorder	**Major Depressive Disorder**
Screened +	25%	31%
Normative Population	23% p=0.103	21% p*<0.001
Baseline	11%	20%

Kroenke et al 2003; Spitzer et al 2006

My employer has reduced my hours due to my health 3%

My employer has ended my employment due to my health 2%

I am unable to work at all due to my health 26%

It has not impacted my employment status 36%

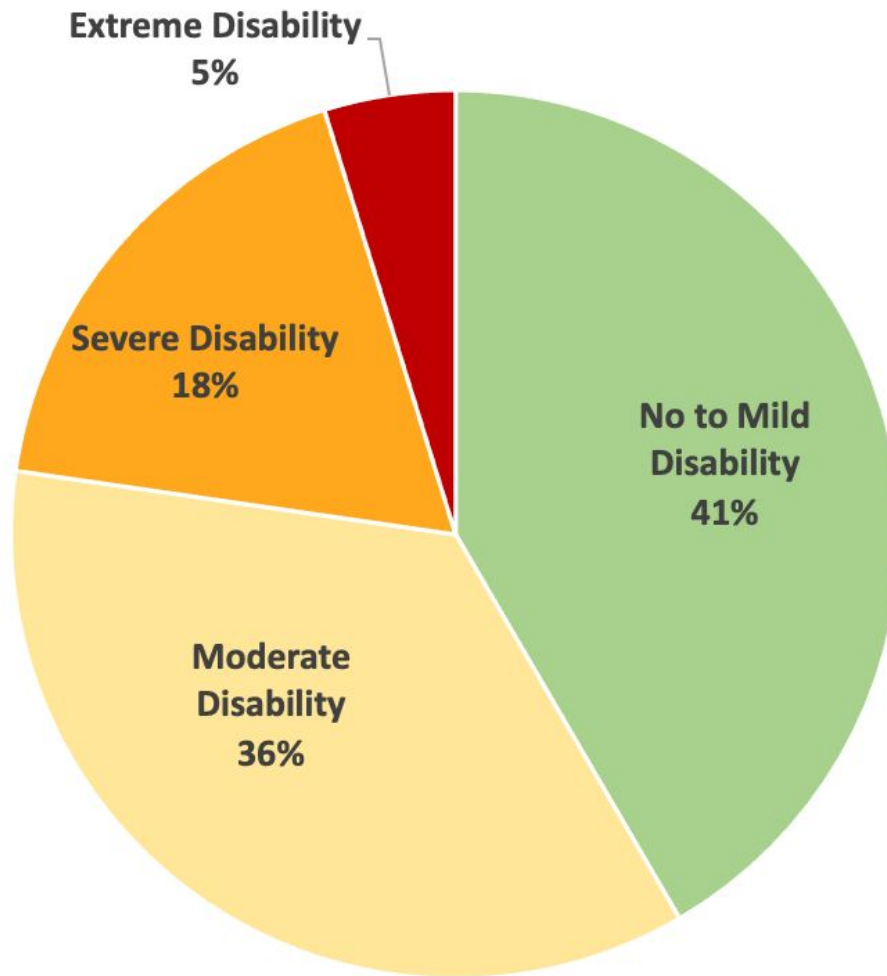I am unable to work the same number of hours due to my health 33%
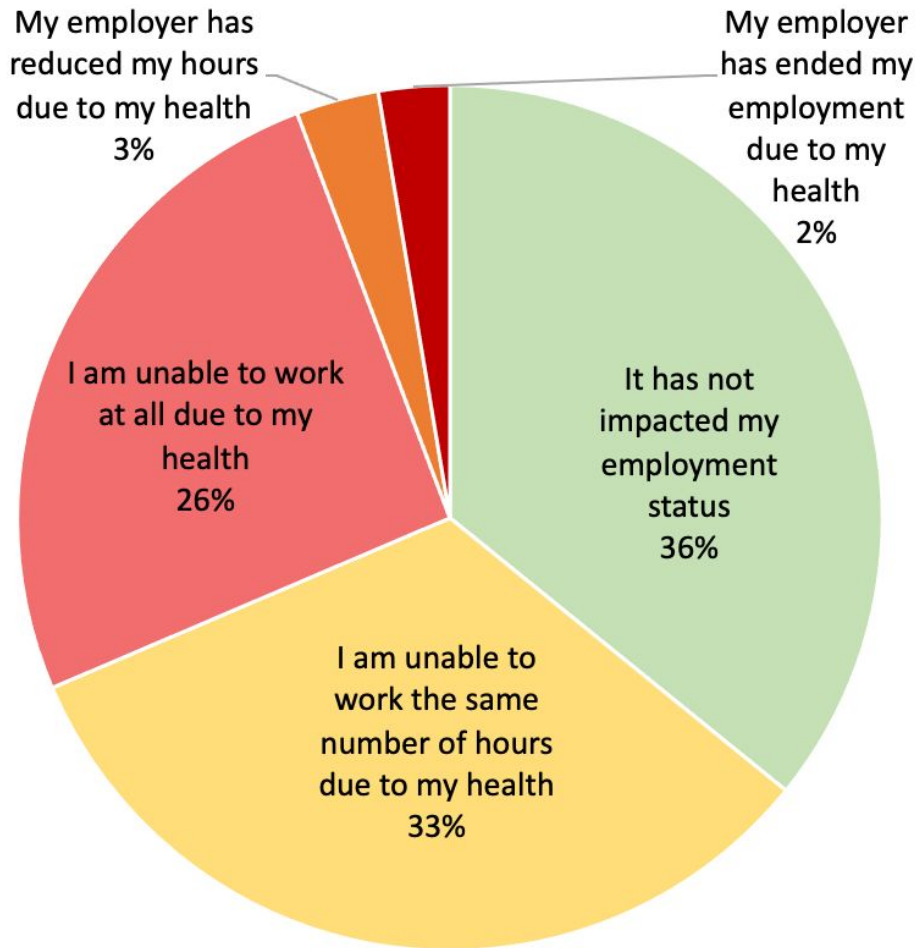
Employment Status (n=522)

Disability Insurance (n=217)

n=17 applied

50% were approved

WHO Disability Assessment (n=524)

Key messages

1. PASC/ LC can reduce function and participation for longer than **12 months** despite severity of acute illness

2. Impairments are **comparable or more severe** than what is seen in other work-debilitating conditions

3. With no universal biomarker for LC or LC-related disability, diagnosis should be based on **patient reported symptoms/outcomes and clinical evaluation**

4. **Clinicians should be trained to diagnose LC** so we can determine its prevalence and ensure proper care is delivered

5. Investment in local support systems of LC is crucial: **rehabilitation, care delivery workforce and infrastructure**

Thank you
Questions: laura.tabacof@mountsinai.org

Dr. David Putrino
Dr. Jenna Tosto-Mancuso
Dr. Jamie Wood
Dr. Amy Kontorovich
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Dr, Clare Rayner
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RTW Charitable Foundation
AAPMR
World Physiotherapy
Frontline workers
AJPMR

References

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8. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. Archives of Internal Medicine. 2006 May 22;166(10):1092–7.
9. Kroenke K, Spitzer RL, Williams JBW. The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener. Medical Care. 2003 Nov;41(11):1284–92.
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