

LOCOMOTION Webinar

Psychometric analysis of the modified Covid-19 Yorkshire Rehabilitation Scale (C19-YRSm) in a prospective multicentre study

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Long COVID multidisciplinary consortium
Optimising treatments and services across the NHS

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Introduction



Long COVID multidisciplinary consortium
Optimising treatments and services across the NHS

- 2 million living with LC in the UK
- >750,00 have persistent LC for > 2 years

- NHS England funds 90 specialist LC services (£90M/ year)
- UoLeeds-ELAROS developed DPROM
 - Platform used by >40 services in England
 - Platform used in NIHR study LOCOMOTION
 - C19-YRSm
- Psychometric evaluation C19-YRSm

> [JMIR Hum Factors](#). 2023 Sep 2. doi: 10.2196/48632. Online ahead of print.

A Digital Patient Reported Outcome Measures (DPROM) platform for Long Covid and other long-term conditions: user-centred development and technical description

Manoj Sivan ¹, Roman Lawrence ¹, Paul O'Brien ²

> [BMJ Open](#). 2022 May 17;12(5):e063505. doi: 10.1136/bmjopen-2022-063505.

Long COvid Multidisciplinary consortium Optimising Treatments and services across the NHS (LOCOMOTION): protocol for a mixed-methods study in the UK

Manoj Sivan ¹, Trisha Greenhalgh ², Julie Lorraine Darbyshire ², Ghazala Mir ³, Rory J O'Connor ⁴, Helen Dawes ⁵, Darren Greenwood ⁶, Daryl O'Connor ⁷, Mike Horton ⁴, Stavros Petrou ², Simon de Lusignan ^{2, 8}, Vasa Curcin ⁹, Erik Mayer ¹⁰, Alexander Casson ¹¹, Ruairidh Milne ¹², Clare Rayner ¹³, Nikki Smith ¹⁴, Amy Parkin ¹⁵, Nick Preston ⁴, Brendan Delaney ¹⁶; LOCOMOTION consortium

Methods - DPRROM platform - patient app

C19-YRS

COVID-19 Yorkshire Rehabilitation Scale
A digital assessment and monitoring tool to help manage individuals with Long COVID



Symptoms severity score



Functional disability score



Overall health score



BLOGGS, Born 20-Apr- Gender Male NHS 777 888

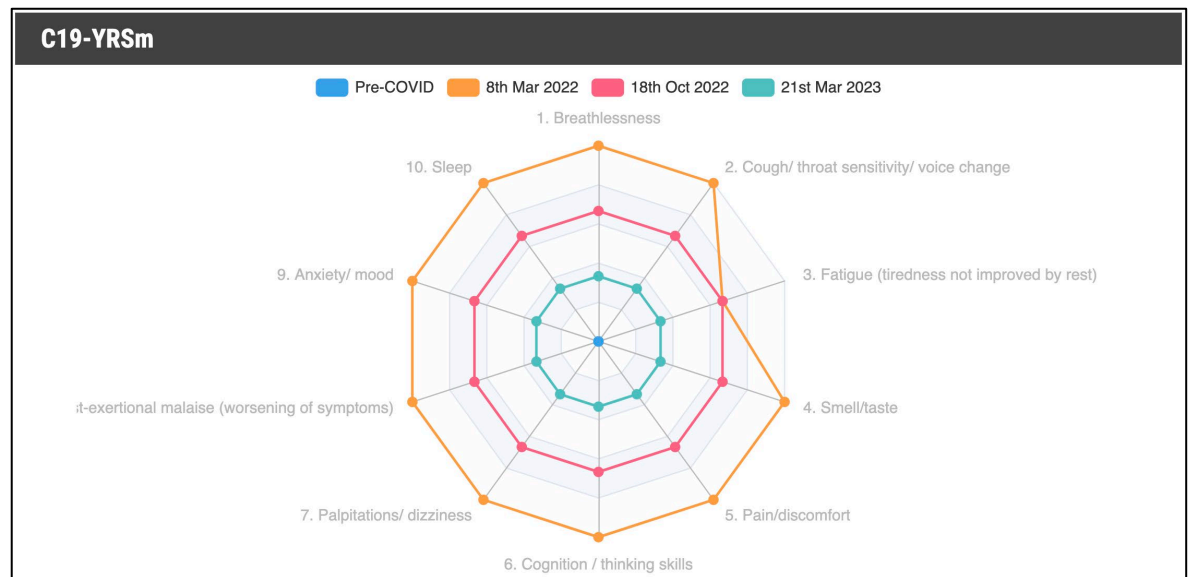
Select Assessment

- C19-YRS ⓘ
- EQ-5D-5L ⓘ
- FACIT Fatigue Scale ⓘ
- GAD-7 ⓘ
- Long Covid Friends and Family Test Survey ⓘ
- Modified Fatigue Impact Scale ⓘ
- Modified YRS ⓘ
- MRC dyspnoea scale ⓘ
- PDQ-D-5 ⓘ
- PHQ-9 ⓘ
- WSAS ⓘ

Cancel

Digital PROMs platform - clinician web portal

C19-YRSm									
Export CSV Add Historic Assessment Hide									
Assessment	Type	Completed (Date completed)	Weeks since first Symptoms	Score: Symptoms (30)	Score: Functional (15)	Score: Other (25)	Score: Overall (10)	Exported	
Before COVID	-	-	-	0	0	-	10	-	
Assessment #14969-1	App	8th March 2022, 11:14am		29	15	7	1	N/A	
Assessment #14969-2	Mobile App	18th October 2022, 12:39pm		20	10	8	4	N/A	
Assessment #14969-3	Mobile App	21st March 2023, 15:41pm		10	5	6	6	✘	



What is and what makes a “good” PROM?

- Any report coming **directly** from patients / people living...about their health, symptoms, quality of life...
- PROMs: Three key pillars of evidence
- Validity
 - Content
 - Known-groups
 - Convergent / Divergent
- Reliability
 - Test/retest
 - Internal reliability
- Responsiveness to change

What makes a “good” PROM?



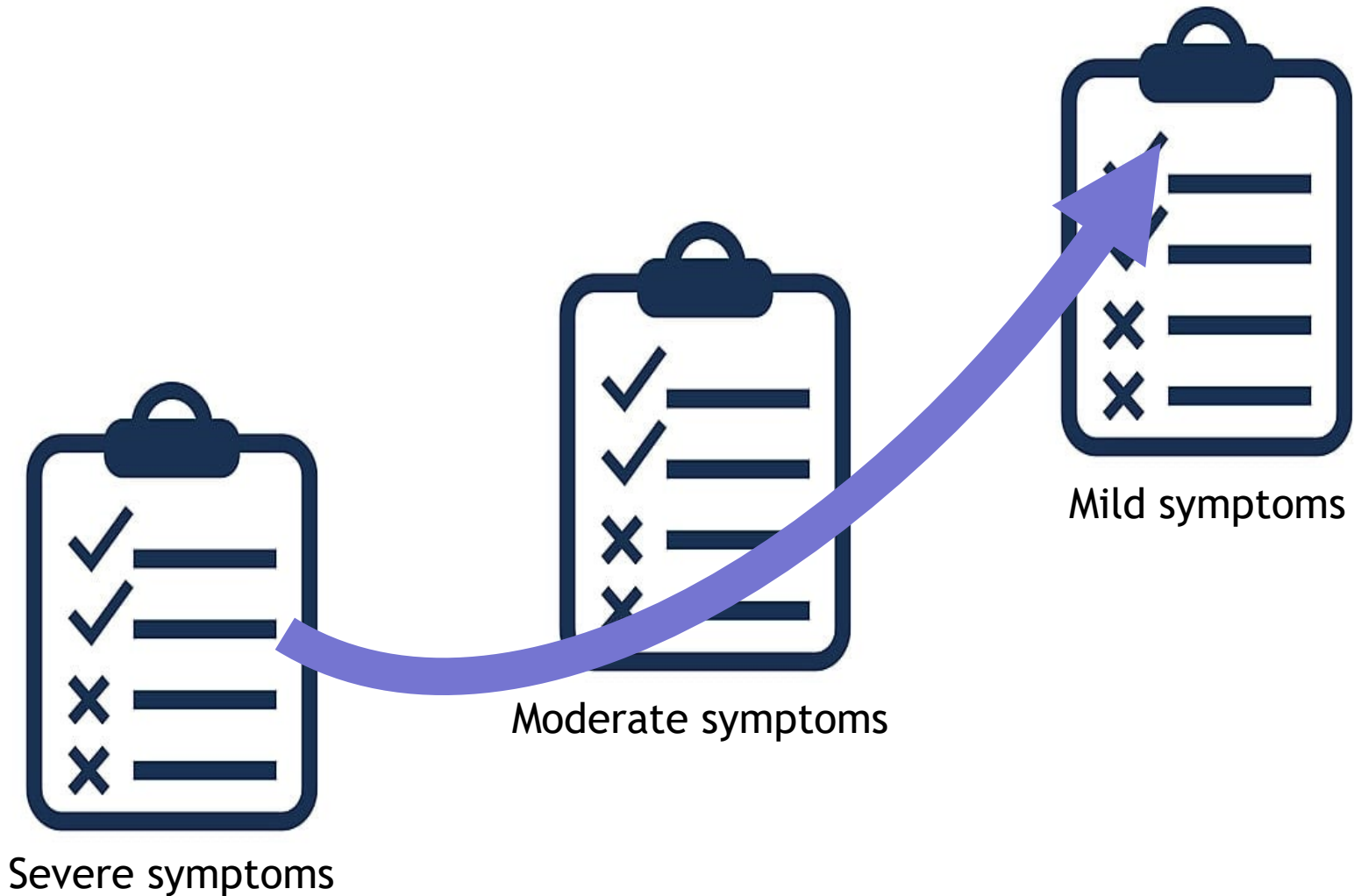
1. Question 1
2. Question 2
3. Question 3
4. Question 4

1. Question 1
2. Question 2
3. Question 3
4. Question 4

1. Question 5
2. Question 6
3. Question 7
4. Question 8



What makes a “good” PROM?



C19-YRS

- Short PROM
- Specific to Long COVID

- Severity of 10 main **symptoms** (each scored 0-3)
- Severity of 5 **functional disabilities** (scored 0-3)
- Presence of 25 **other symptoms** (yes/no)

- **Overall health** (0-10)



C19-YRSm: Psychometric evaluation

- Validity
 - Content ✓
 - Known-groups: Other Symptom (severity, tertiles); Hospitalisation (ICU)
 - Convergent / Divergent: C19-YRSm subscales + FACIT-Fatigue
- Reliability
 - Test/retest: 30 days (\pm 10 days) no changes in Overall Health (>0.7)
 - Internal reliability: Cronbach's alpha >0.8
- Responsiveness to change
 - Follow-up responses at 30 days (\pm 10 days)
- Minimal clinically important difference

C19-YRSm: Results

- Respondents: 1314, 882 (67%) female, aged ~48 years
- Validity
 - Content
 - Known-groups: Other Symptom (severity, tertiles); Hospitalisation (ICU)
 - Convergent / Discriminant: C19-YRSm subscales + FACIT-Fatigue
- Reliability
 - Test/retest: 70 patients, Symptom Severity 0.8, FD 0.78
 - Internal reliability: Cronbach's alpha >0.8
- Responsiveness to change
 - Follow-up responses at 30 days (\pm 10 days)
- Minimal clinically important difference



C19-YRSm: Known groups validity

Domain	Low, N = 507 ¹	Medium, N = 441 ¹	High, N = 396 ¹	p-value ²
Symptom Severity (0-30)	14.6 (4.8)	18.8 (4.5)	22.8 (4.2)	<0.001
Functional Disability (0-15)	5.1 (3.1)	7.0 (3.3)	9.9 (3.3)	<0.001
Overall Health (0-10)	5.1 (1.8)	4.4 (1.7)	3.8 (1.8)	<0.001

Hospital Admission	No, N = 1179 ¹	Yes, N = 134 ¹	p-value ²
Symptom Severity (0-30)	18.3 (5.6)	19.3 (6.0)	0.07
Functional Disability (0-15)	7.0 (3.7)	8.0 (4.2)	0.03
Overall Health (0-10)	5.0 (1.9)	4.5 (1.9)	0.8

Characteristic	No, N = 1,283 ¹	Yes, N = 31 ¹	p-value ²
Symptom Severity (0-30)	18.3 (5.6)	20.2 (6.0)	0.07
Functional Disability (0-15)	7.1 (3.8)	8.8 (4.5)	0.03
Overall Health (0-10)	4.5 (1.9)	4.3 (2.2)	0.9

C19-YRSm: Results

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 - Content
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 - Convergent / Discriminant: C19-YRSm subscales + FACIT-Fatigue
- Reliability
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 - Internal reliability:
- Responsiveness to change
 - Follow-up responses at 30 days (\pm 10 days): 70 patients
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What makes a “good” PROM?

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Subscale (scale range) / Change from 1st assessment	Mean (SD)	Median	Min, Max	ICC	TRR	ES	MID	MCID (SEM)	MCID (RIC)
Symptom Severity (0-30)	2.0 (4.0)	2 (0 to 3)	(-19.0, 23.0)	0.68	0.86	0.50	2	4	6
Functional Disability (0-15)	0.8 (2.4)	1 (-1 to 2)	(-5.0, 10.0)	0.76	0.78	0.33	2	4	5
Overall Health (0-10)	0.3 (1.67)	0.4 (-1 to 1)	(-7.0, 7.0)	0.58	-	0.22	1	-	-

*SD, standard deviation; min, minimum; max, maximum; ICC, intraclass correlation; TRR, test-retest reliability; ES, effect size; MID, minimally important difference; MCID, minimal clinically important difference; SEM, standard error of measurement; RIC, reliable change index

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Conclusion

- The C19-YRSm is a condition-specific patient-reported outcome measure developed for people living with LC
- Psychometric evaluation
 - Reliable,
 - Valid, and
 - Responsive patient-reported outcome measure for Long COVID.

Thoughts on future research

Thank you !

- Study participants
- Co-authors:
 - Dr. Darren C. Greenwood, LIDA, School of Medicine, University of Leeds
 - Dr. Mike Horton, Academic Department of Rehabilitation Medicine, University of Leeds
 - Thomas Osborne , Academic Department of Rehabilitation Medicine, University of Leeds
 - Madeline Goodwin , Academic Department of Rehabilitation Medicine, University of Leeds
 - Román Rocha Lawrence, Elaros 24/7
 - Dr. Paul Williams, Hertfordshire Community NHS Trust, UK
 - Prof. Ruairidh Milne, School of Healthcare Enterprise and Innovation, University of Southampton, Southampton
 - Prof. Manoj Sivan, Academic Department of Rehabilitation Medicine, University of Leeds; Covid Rehabilitation Service, Leeds Community Healthcare NHS Trust; National Demonstration Centre of Rehabilitation Medicine, Leeds Teaching Hospitals NHS Trust
- medRxiv: <https://www.medrxiv.org/content/10.1101/2023.12.22.23300424v2>