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Measurement Equivalence of the Self-Care of Chronic Illness Inventory Across Time:
Longitudinal Structural Equation Models

Irene Dello Iacono[1], Maria Matarese[2], Mazzotta Rocco[1], Ercole Vellone[1], Davide Ausili[3], Maddalena De Maria[4]

[1] University of Rome Tor Vergata, Rome, Italy

[2] Campus Bio-Medico of Rome University, Rome, Italy.

[3] University of Milano-Bicocca, Monza, Italy.

[4] Link Campus University, Rome, Italy

Background (1)

According to the WHO, by 2050, **one in five people will be over 60**[1] .

In older people, multiple chronic conditions (MCCs) coexist frequently resulting in a negative impact on **quality of life**, on **healthcare costs** and on **mortality**.[2]

The WHO identifies **self-care** as a valid strategy to contrast the burden of chronic diseases[1].
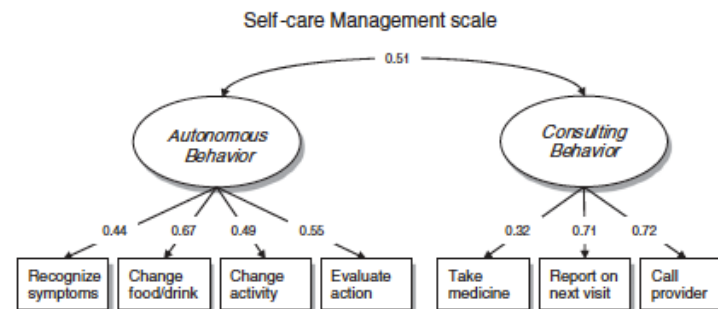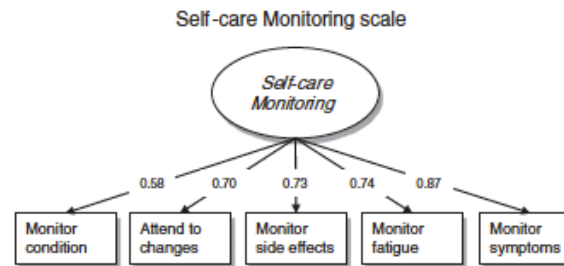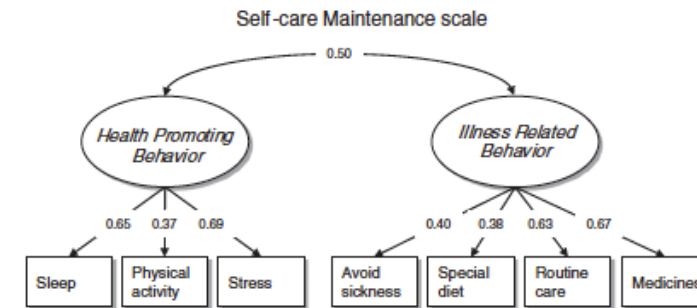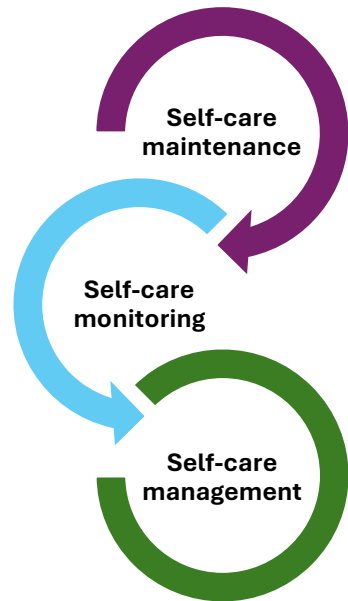
Self-care is defined by the **Middle-Range Theory of Self-Care of Chronic Diseases** as a process of maintaining health implemented through health promotion and disease management behaviors[3].

[1] *WHO, 2012*
[2] *Chan 2021; Cheng, Yang, Inder & Chan, 2020*
[3] *Riegel, Jaarsma, & Stromberg, 2012*

Self-Care of Chronic Illness Inventory

Based on the Middle Range Theory of Self-Care of Chronic Illness
(Riegel et al., 2012)

Generic measure of self care designed for use in individuals with any number and type of chronic conditions
(Riegel et al., 2018)

The 20-items of the SC-CII are divided among three separate scales

Traslated into Italian and Swedish

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Method (1)

Design

A multicenter longitudinal observational design

Instrument

Self Care of Chronic Illness Inventory

Sample

	Inclusion Criteria	Esclusion Criteria
Patient	≥ 65 years	Hospitalized
	Diagnosis of DM, COPD or HF and at least one additional chronic condition.	Diagnosis of cancer and/or dementia
	Available to provide written informed consent	Unavailable to provide written informed consent
Caregiver	≥ 18 years	< 18 years
	Identified as primary family caregivers by the patient	Caretaker
	Available to provide written informed consent	Unavailable to provide written informed consent

April 2018 - February 2022

Data Analysis

The method of Structural Equation Models over Multiple Groups (SEM-MG) was used.

This method allows factorial models to be examined simultaneously across multiple dependent samples, was applied to examine factorial invariance.

Measurement equivalence (ME) is used to determine whether the interpretation of a measured construct is conceptually similar overtime (one year)

We used the framework developed by Meredith to test ME because it is grounded in Multiple Group Confirmatory Factor Analysis (MG-CFA)

Meredith's framework specifies four different levels of ME: configural, metric, scalar and strict

Results (1)

Sociodemographic characteristics of multiple chronic conditions patients (N=630)

	M (±SD)
Age	77 (7.7)
	N (%)
Sex	
Male	290 (46)
Female	340 (54)
Level of education (years)	
0-8	502 (79.7)
9-13	115 (18.3)
≥ 14	13 (2.1)
Employment status	
Employed	39 (6.2)
Unemployed/retired	591 (93.8)
Perceived income adequacy	
Less than needed	25 (4)
Enough for living	477 (75.7)
More than needed	128 (20.3)
Number of chronic conditions	*M (median) ±SD (range)*
	3 (3) ±1.3 (2-9)
	N (%)
Primary chronic conditions	
Hypertension	482 (76.5)
DM	406 (64.4)
HF	269 (42.7)
COPD	111 (17.6)
Atrial fibrillation	85 (13.5)
Osteoporosis	81 (12.9)

Results (2)

Item description of SC-CII during time.

	T0			T1			T2		
	M (±SD)	Ske	Ku	M (±SD)	Ske	Ku	M (±SD)	Ske	Ku
Self-care maintenance scale									
- Make sure to get enough sleep?	3.73 (1.07)	-0.49	-0.30	3.72 (1.01)	-0.34	-0.43	3.85 (1.00)	-0.64	0.05
- Try to avoid getting sick (e.g., flu shot, wash your hands)?	4.28 (0.95)	-1.27	1.09	4.30 (0.89)	-1.11	0.50	4.41 (0.85)	-1.57	2.71
- Do physical activity (e.g., take a brisk walk, use the stairs)?	2.71 (1.31)	0.23	-0.98	2.82 (1.29)	0.15	-0.97	2.92 (1.35)	0.08	-1.10
- Eat a special diet?	3.17 (1.24)	-0.18	-0.86	3.37 (1.21)	-0.37	-0.70	3.42 (1.17)	-0.34	-0.64
- See your healthcare provider for routine health care?	4.03 (1.02)	-0.77	-0.31	4.21 (0.97)	-1.16	0.82	4.27 (0.88)	-0.98	0.21
- Take prescribed medicines without missing a dose?	4.68 (0.63)	-2.10	4.59	4.71 (0.62)	-2.53	7.52	4.69 (0.65)	-2.51	7.08
- Do something to relieve stress (e.g., medication, yoga, music)?	2.82 (1.38)	0.15	-1.13	2.86 (1.34)	0.11	-1.08	2.93 (1.37)	0.06	-1.14
Self-care monitoring scale									
- Monitor your condition?	4.03 (0.95)	-0.75	0.10	4.11 (0.89)	-0.66	-0.25	4.10 (0.87)	-0.68	-0.05
- Monitor for medication side-effects?	4.05 (0.94)	-0.72	0.04	4.06 (0.91)	-0.69	-0.03	4.15 (0.86)	-0.87	0.54
- Pay attention to changes in how you feel?	3.60 (1.20)	-0.46	-0.68	3.66 (1.05)	-0.41	-0.43	3.74 (1.03)	-0.49	-0.34
- Monitor whether you tire more than usual doing normal activities?	3.84 (1.05)	-0.58	-0.29	3.93 (0.96)	-0.59	-0.15	4.01 (0.93)	-0.74	0.19
- Monitor for symptoms?	3.90 (1.02)	-0.65	-0.10	3.94 (0.91)	-0.46	-0.36	4.00 (0.90)	-0.54	-0.33
Self-care management									
- Change what you eat or drink to make the symptom decrease or go away?	3.19 (1.23)	-0.06	-0.82	3.26 (1.15)	-0.09	-0.63	3.34 (1.12)	-0.11	-0.58
- Change your activity level (e.g. slow down, rest)?	3.19 (1.24)	-0.19	-0.84	3.30 (1.15)	-0.14	-0.68	3.38 (1.16)	-0.29	-0.58
- Take a medicine to make the symptom decrease or go away?	3.27 (1.28)	-0.21	-0.94	3.29 (1.24)	-0.16	-0.86	3.41 (1.20)	-0.33	-0.68
- Tell your healthcare provider about the symptom at the next office visit?	4.10 (1.05)	-0.96	0.11	4.17 (1.00)	-0.97	0.13	4.13 (1.02)	-0.92	0.05
- Call your healthcare provider for guidance?	3.70 (1.28)	-0.65	-0.67	3.87 (1.22)	-0.81	-0.34	3.89 (1.18)	-0.80	-0.25

Results (3)

Measurement invariance analysis showed that for all three scales of the SC-CII, the highest levels

of measurement equivalence were partially or fully achieved.

The partial scalar invariance level was reached for

self-care maintenance, self-care monitoring, and self-care management scales

Discussion

When chronic patients responding to SC-CII items overtime

Use the same cognitive framework	Use the 1–5 Likert response scale in a very similar or almost identical way	Respond with limited bias

Conclusion

The concept of self-care could be stable over time, with behaviors focused on maintaining chronic disease stability, monitoring signs and symptoms, and intervening if the disease worsens.

Despite clinical differences over the years, patients with MMC share the same fundamental view of self-care, as assessed by the SC-CII.

Take Home Message

We can conclude that the results of the SC-CII are comparable over time.

What are the distinct self-care maintenance, self-care monitoring and self-care management trajectories among MCCs patients, and what the associations with clinical outcomes ?