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Myriam Blanchin, Odile Stahl, Anne-Déborah Bouhnik, Marc Karim Bendiane, Marion Istvan, et al.. A simultaneous assessment of multiple sources of Differential Item Functioning and Response Shift in health-related quality of life of cancer survivors. 31st Annual Conference of the International Society for Quality of Life Research, Oct 2024, Cologne, Germany. Quality of life Research, 33 (S1), pp.133, 2024, 10.1007/s11136-024-03786-x. hal-04777209

### HAL Id: hal-04777209 https://hal.science/hal-04777209v1

Submitted on 12 Nov 2024

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# A simultaneous assessment of multiple sources of Differential Item Functioning and Response Shift in health-related quality of life of cancer survivors

Myriam Blanchin<sup>1</sup>, Odile Stahl<sup>1</sup>, Anne-Déborah Bouhnik<sup>2</sup>, Marc-Karim Bendiane<sup>2,3</sup>, Marion Istvan<sup>1</sup>, Véronique Sébille<sup>1</sup>

- <sup>1</sup> Nantes Université, Université de Tours, INSERM, SPHERE, Nantes, France.
- <sup>2</sup> Aix Marseille Univ, Inserm, IRD, SESSTIM,, ISSPAM, Marseille, France.
- <sup>3</sup> Internal Medicine, Geriatrics and Therapeutic Unit, AP-HM, Marseille, France.



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Cancer survivors face much challenges, including physical and mental comorbidities, that affect their health-related quality of life (HRQoL). Cancer experience and the need to adapt may induce Differential Item Functioning (DIF) and Response Shift (RS). The way patients accommodate to their cancer experience may differ according to prognosis group and disease progression, two covariates that may be correlated.

### **OBJECTIVES**

- To study the influence of prognosis group and disease progression on HRQoL, item functioning and RS in VICAN patients
- To compare three analysis strategies at the item level

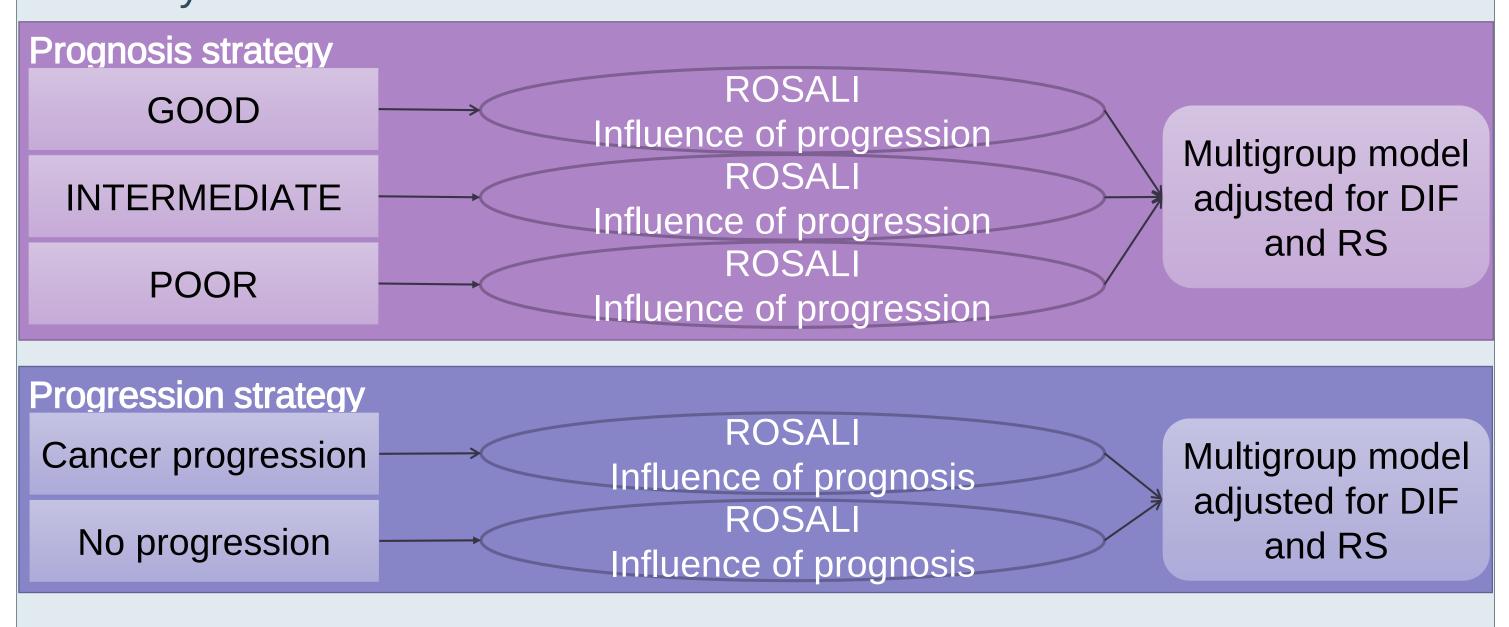
### METHODS: STRATEGIES TO COMPARE

"RespOnse Shift ALgorithm at the Item level" - ROSALI (Hammas et al., 2020)

- DIF and RS detection, quantification and adjustment at the item level
- Based on Rasch models
- Suitable for only one source of DIF and RS
- Stata module -rosali- on ssc
- Freely accessible on https://pro-online.net

TWO OPTIONS to account for two sources of DIF and RS:

- OPTION 1: Perform ROSALI with one covariate and repeat the analysis on each strata of the second covariate



- OPTION 2: Perform ROSALI with a new variable combining the two covariates



# **RESULTS AND DISCUSSION**

# DIF at year 2

- 2/6 items flagged by progression and simultaneous strategies
- DIF was not assessed with prognosis strategy as progression is reported between year 2 and year 5
- More groups flagged with DIF with the simultaneous strategy

# RS between year 2 and year 5

- 4/6 items affected 3 items flagged by all strategies
- More groups affected with the simultaneous strategy: mix of different types and size of RS effects

# DISCUSSION

- Affected groups associated with the stratification variable
- Imbalance into strata may have favored identification of same RS effects into strata: patients without cancer progression (84%) and good prognosis group (57%)
- Simultaneous strategy: the only strategy that accounts for correlated covariates

# DATA FROM THE VICAN STUDY

STUDY: VICAN (VIe après le CANcer), French nationwide longitudinal survey on HRQoL, health status and psychosocial conditions

**PARTICIPANTS**: 2009 adult cancer patients diagnosed between January and June 2010

**OUTCOME**: SF-12 Physical health

**MEASURES**: Self-reported questionnaires at 2 and 5 years after cancer diagnosis (Y2 and Y5)

# SOURCES OF DIF AND RS:

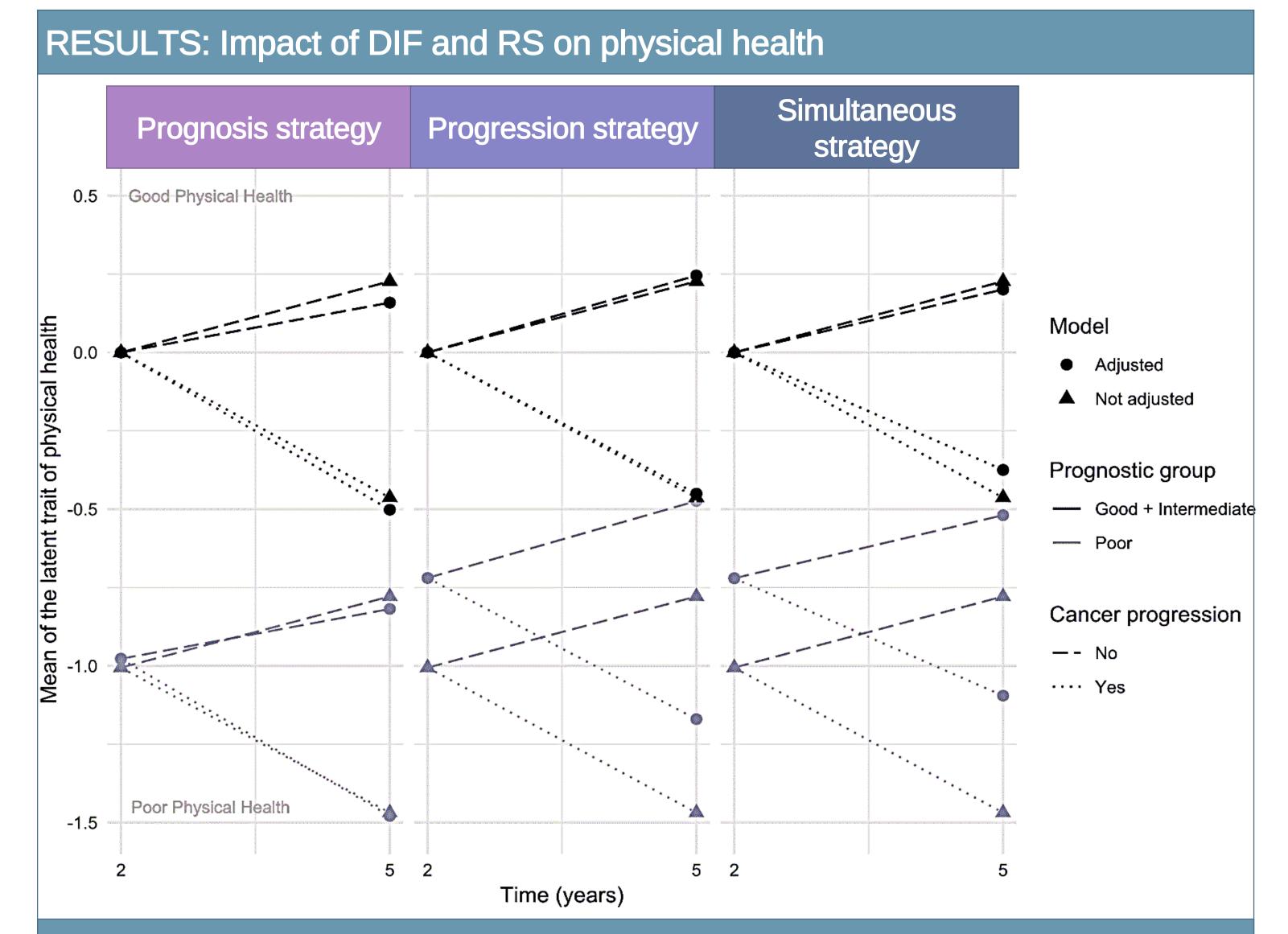
- Cancer progression between Y2 and Y5: Yes (N=314), No (N=1695)
- Prognosis group:

GOOD (N=1150): breast, prostate, thyroid, melanoma

INTERMEDIATE (N=734): colorectal, bladder, kidney, cervical, endometrial, upper aerodigestive tract, non-Hodgkin lymphoma

POOR (N=125): lung

### RESULTS: Items affected by DIF and RS (X) DIF RC No cancer No cancer Cancer Cancer progression progression progression progression Prognosis Good Good Inter Good Good Inter Good Inter Poor Good Inter Poor groups VS Inter Poor Poor Inter Poor Poor Strategies Prognosis Item 1 (General Health) Progression Simultaneous Χ Item 2b Prognosis Climbing several flights of stairs Progression (Physical Simultaneous Functioning) Item 3a Prognosis X Reduced work or Progression other activities Simultaneous (Role Physical) Item 5 Prognosis X Limitations in work Progression or other activities Simultaneous (Bodily Pain)



- Improvement of physical health when no progression was reported, deterioration in case of cancer progression
- Lower physical health in the poor prognosis group (lung cancer)
- Physical health underestimated if DIF and RS are not accounted for (progression and simultaneous strategies)