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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

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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

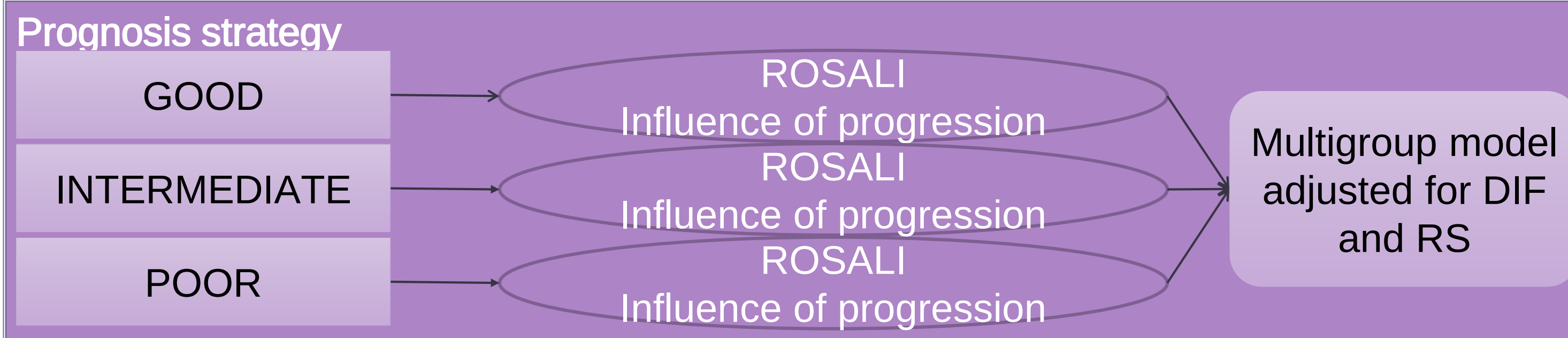
METHODS: STRATEGIES TO COMPARE

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

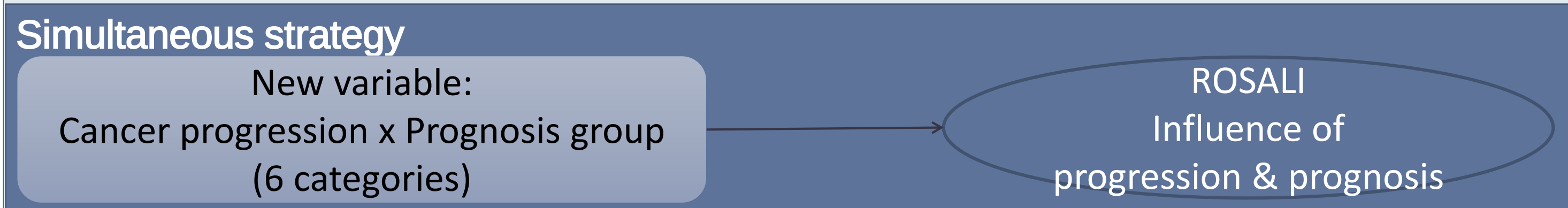
- DIF and RS detection, quantification and adjustment at the item level
- Based on Rasch models
- Suitable for only one source of DIF and RS
- Stata module -rosali- on ssc
- Freely accessible on <https://pro-online.net>

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 some 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

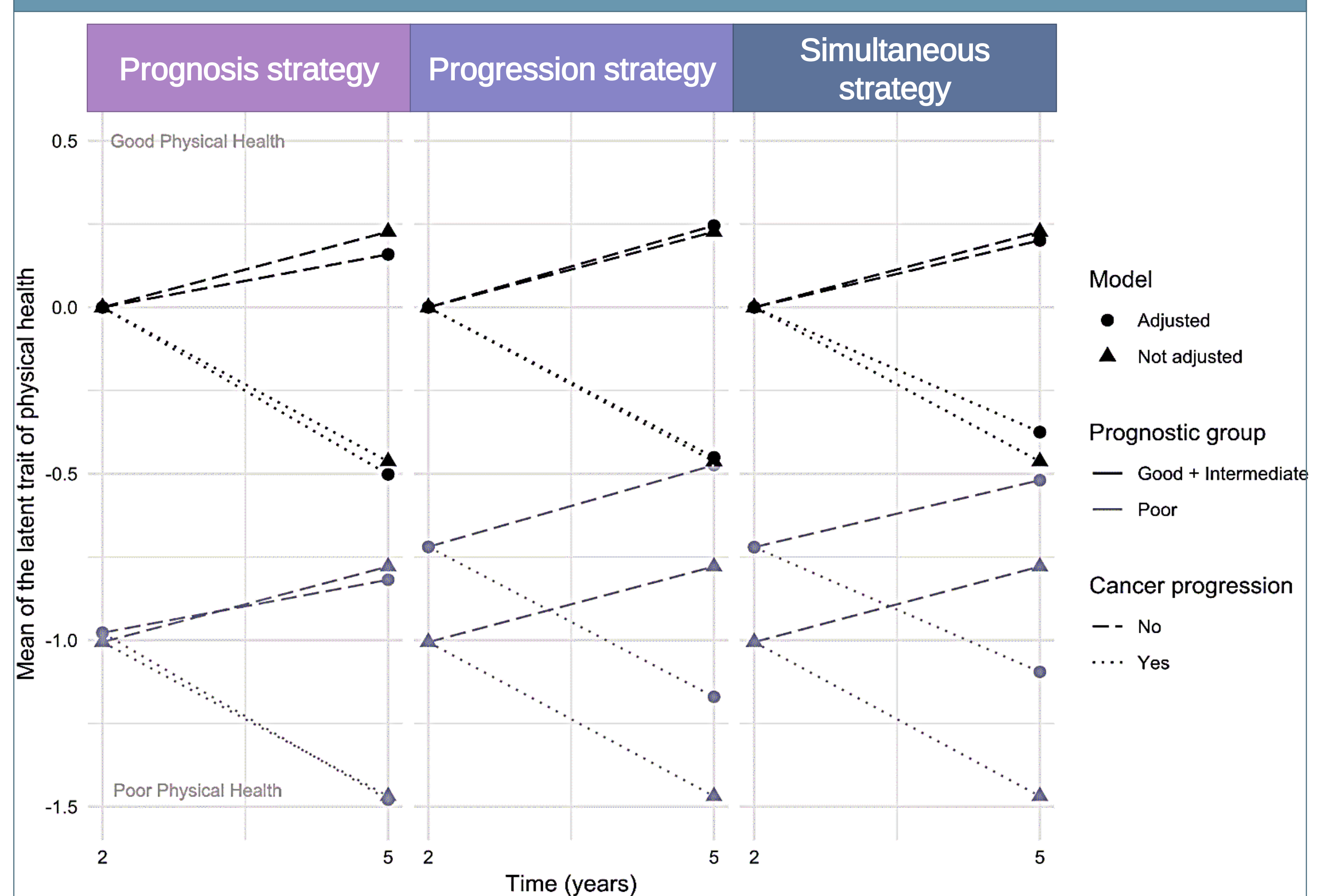
INTERMEDIATE (N=734): colorectal, bladder, kidney, cervical, endometrial, upper aerodigestive tract, non-Hodgkin lymphoma

POOR (N=125): lung

RESULTS: Items affected by DIF and RS (X)

	Prognosis groups vs Inter	DIF						RC											
		No cancer progression			Cancer progression			No cancer progression			Cancer progression								
		Good vs Inter	Good vs Poor	Inter vs Poor	Good vs Inter	Good vs Poor	Inter vs Poor	Good	Inter	Poor	Good	Inter	Poor						
Item 1 (General Health)																			
Prognosis																			X
Progression	X																		
Simultaneous	X				X					X								X	X
Item 2b Climbing several flights of stairs (Physical Functioning)																			
Prognosis																			X
Progression	X	X	X				X	X		X	X	X							
Simultaneous	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Item 3a Reduced work or other activities (Role Physical)																			
Prognosis																			X
Progression																		X	X
Simultaneous																		X	X
Item 5 Limitations in work or other activities (Bodily Pain)																			
Prognosis																			X
Progression																		X	X
Simultaneous																		X	X

RESULTS: Impact of DIF and RS on physical health



- 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)