

# Invariance longitudinale de la mesure de la douleur chronique.

The Dutch-Flemish PROMIS Group.

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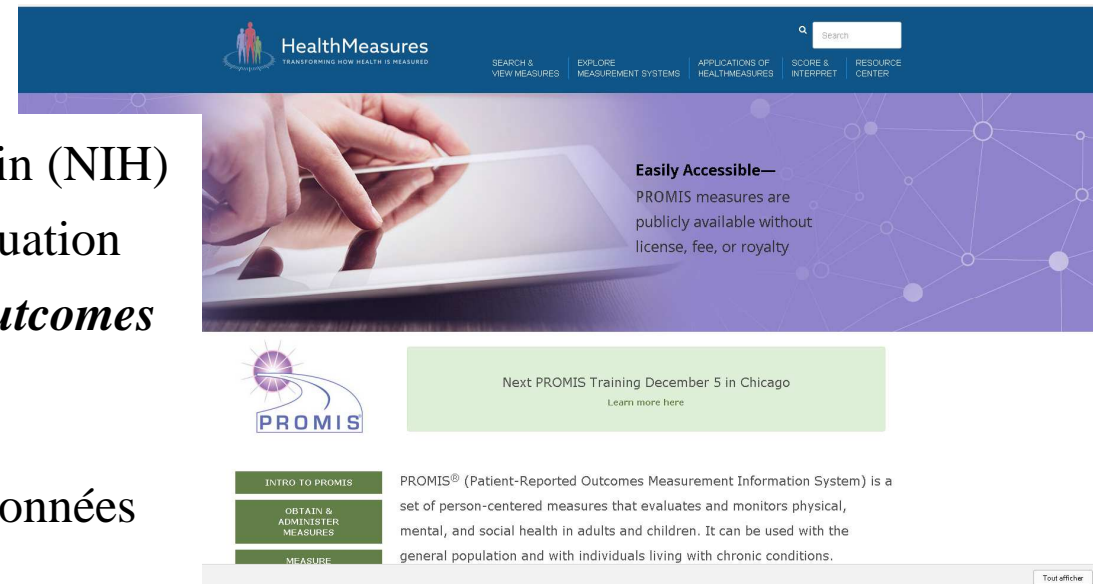
17/11/2017

## Contexte

- Donnée médicale informatisée + médecine centrée sur le patient
- Santé = données en silos inertes
- Nécessité de données probantes et cohérentes
- **Standardisation et harmonisation** (*croisement des données, comparaison entre systèmes et différentes échelles nationale, régionale ou internationale*)

# PROMIS for Big Data

- En 2004, l'institut national de la santé américain (NIH) initie un système de mesure des critères d'évaluation rapportés par les patients (*Patient Reported Outcomes Measurement Information System*)
- Importance de la qualité psychométrique des données PROs (effet seuil, effet plafond)
- Partage et recueil de données de façon homogène : **banques d'items** (fatigue, fonction physique, anxiété, etc.)
- **PROMIS = 7 000 items analysés et validés, traduits**



The screenshot shows the HealthMeasures website interface. At the top, there is a navigation menu with links for 'SEARCH & VIEW MEASURES', 'EXPLORE MEASUREMENT SYSTEMS', 'APPLICATIONS OF HEALTHMEASURES', 'SCORE & INTERPRET', and 'RESOURCE CENTER'. Below the menu is a banner featuring a hand interacting with a tablet and the text 'Easily Accessible— PROMIS measures are publicly available without license, fee, or royalty'. A green box below the banner announces 'Next PROMIS Training December 5 in Chicago' with a 'Learn more here' link. The main content area includes the PROMIS logo and a description of the system as a set of person-centered measures for physical, mental, and social health. A 'Tout afficher' button is visible in the bottom right corner.

<http://www.healthmeasures.net/>

## Amsterdam / Bordeaux

- **Caroline B. Terwee, PhD**



- Professeure associée en Clinimétrie
- Coordinatrice du centre de connaissance sur les instruments de mesure
- Coordinatrice du Groupe PROMIS pour les Pays-Bas

- **Arlette Edjolo, PhD**



Psycho-épidémiologie  
du vieillissement  
et des maladies chroniques

- Postdoctorante en Epidémiologie :  
*Dépendance du sujet âgé, Vieillesse,  
Démence*
- Analyses longitudinales, psychométrie

# Projet

- Douleur chronique
  - Prévalence : 10,1 à 55,2% (Occident)
- Préalable
  - Validation psychométrique de l'échelle
  - Invariance transculturelle (âge, sexe)

## Objectif

Tester l'invariance longitudinale de l'échelle de mesure de la douleur néerlandaise

PROMIS Bank v1.1 – Pain Interference

**Pain Interference**

Please respond to each item by marking one box per row.

In the past 7 days...

		Not at all	A little bit	Somewhat	Quite a bit	Very much
PAINN1	How difficult was it for you to take in new information because of pain? .....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PAINN3	How much did pain interfere with your enjoyment of life? .....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PAINN5	How much did pain interfere with your ability to participate in leisure activities?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PAINN6	How much did pain interfere with your close personal relationships?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PAINN8	How much did pain interfere with your ability to concentrate?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PAINN9	How much did pain interfere with your day to day activities?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PAINN10	How much did pain interfere with your enjoyment of recreational activities?.....	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

# Méthodes (1)

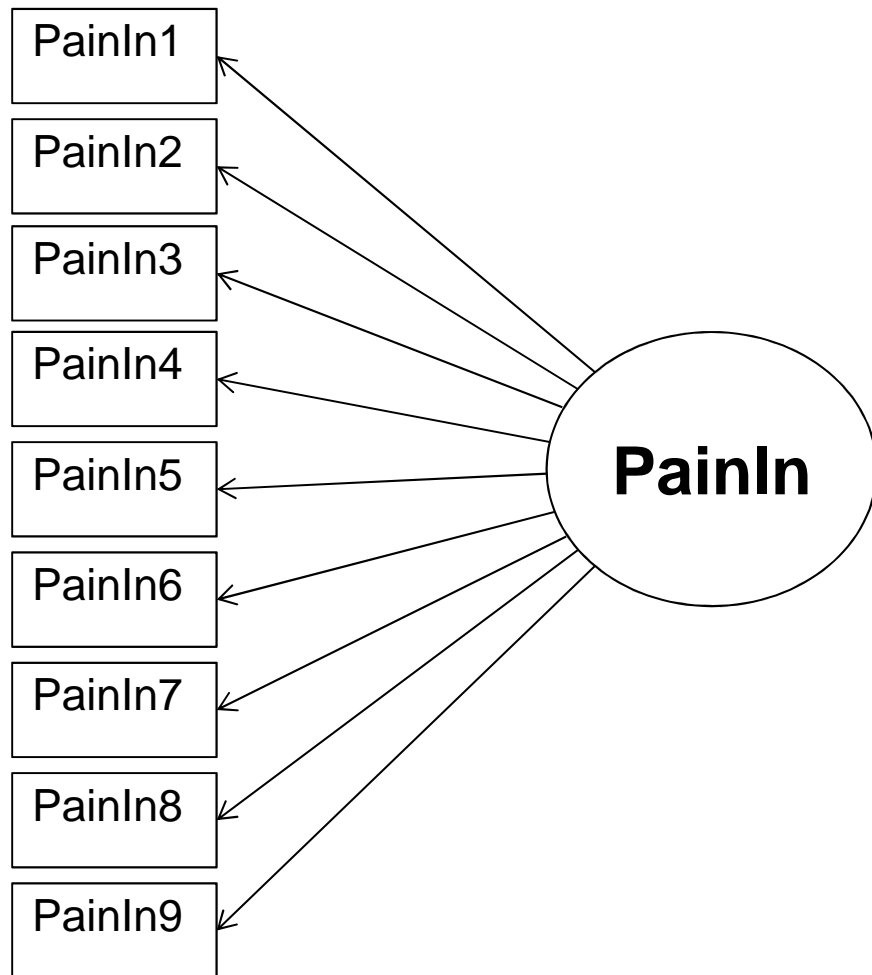
- Population

- Registre en ligne de patients de 29 praticiens de médecine musculo-squelettique (NL)
- Questionnaires remplis en ligne à l'inclusion et à 3 mois (Octobre 2013 - février 2014)
- N= 923 patients
  - âge moyen de 47 ans, 59% de femmes
  - douleur chronique de plus de 1 an (64%), douleur au niveau du bas du dos (51%), au niveau du cou ou des épaules (21%)

- Échelle

- **Douleur interférente:** 41 items cotés en échelle de Likert à 5 point allant de “*interférence nulle*” (=1) à “*interférence élevée*” (=5)

# Construit latent



PROMIS Bank v1.1 – Pain Interference

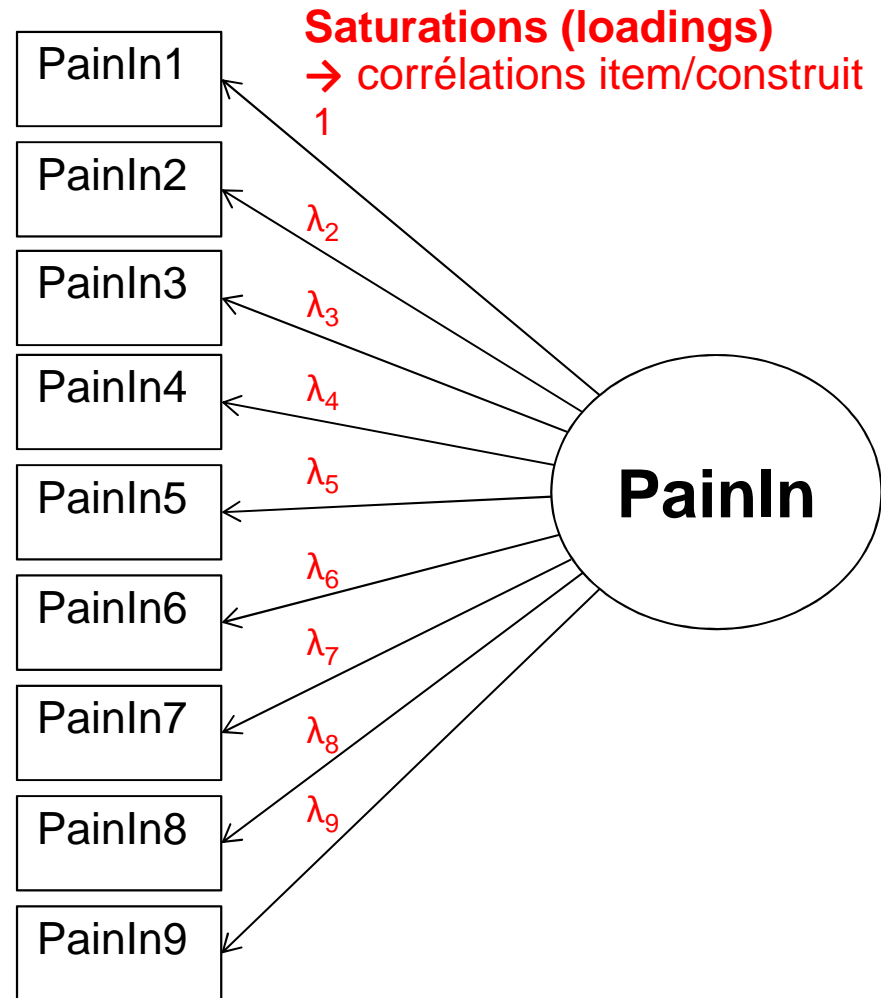
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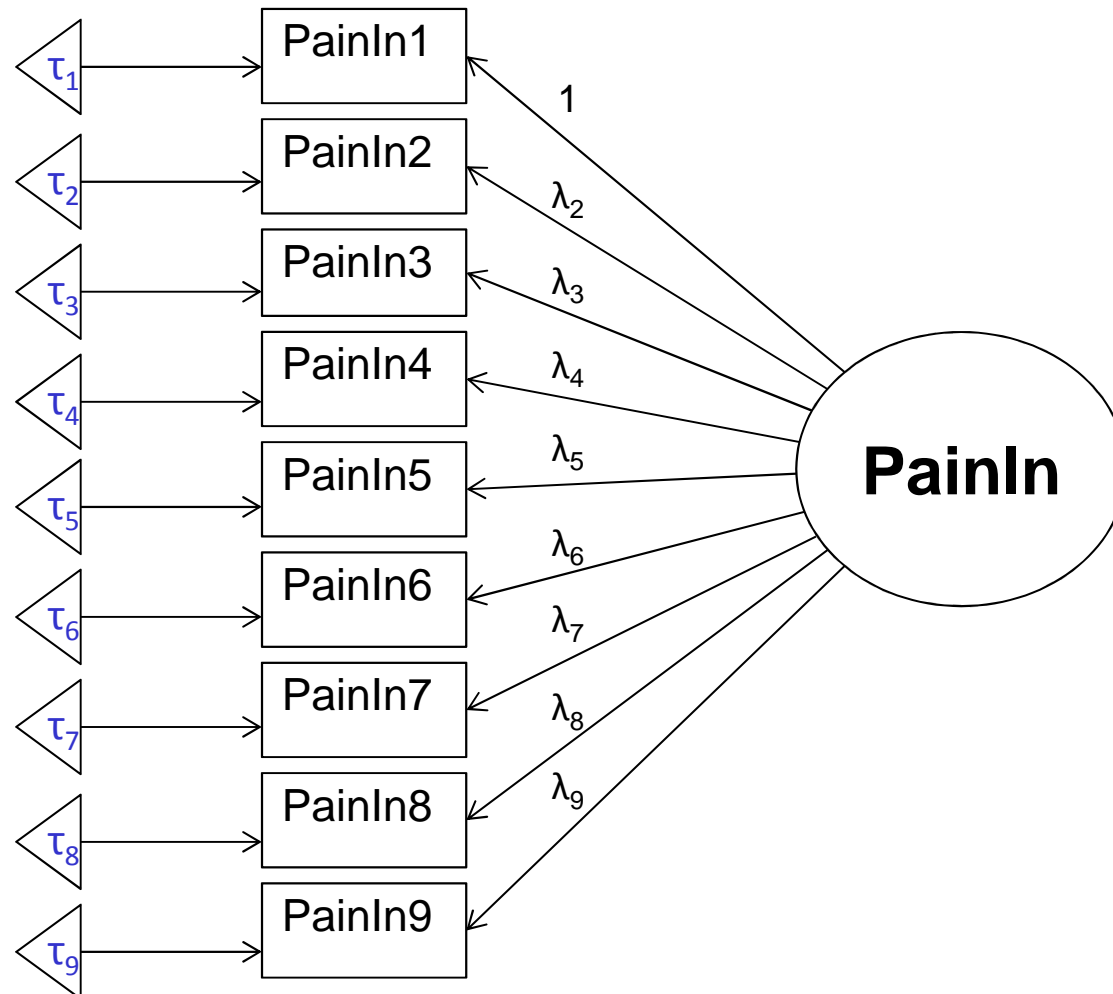
# Analyse Factorielle





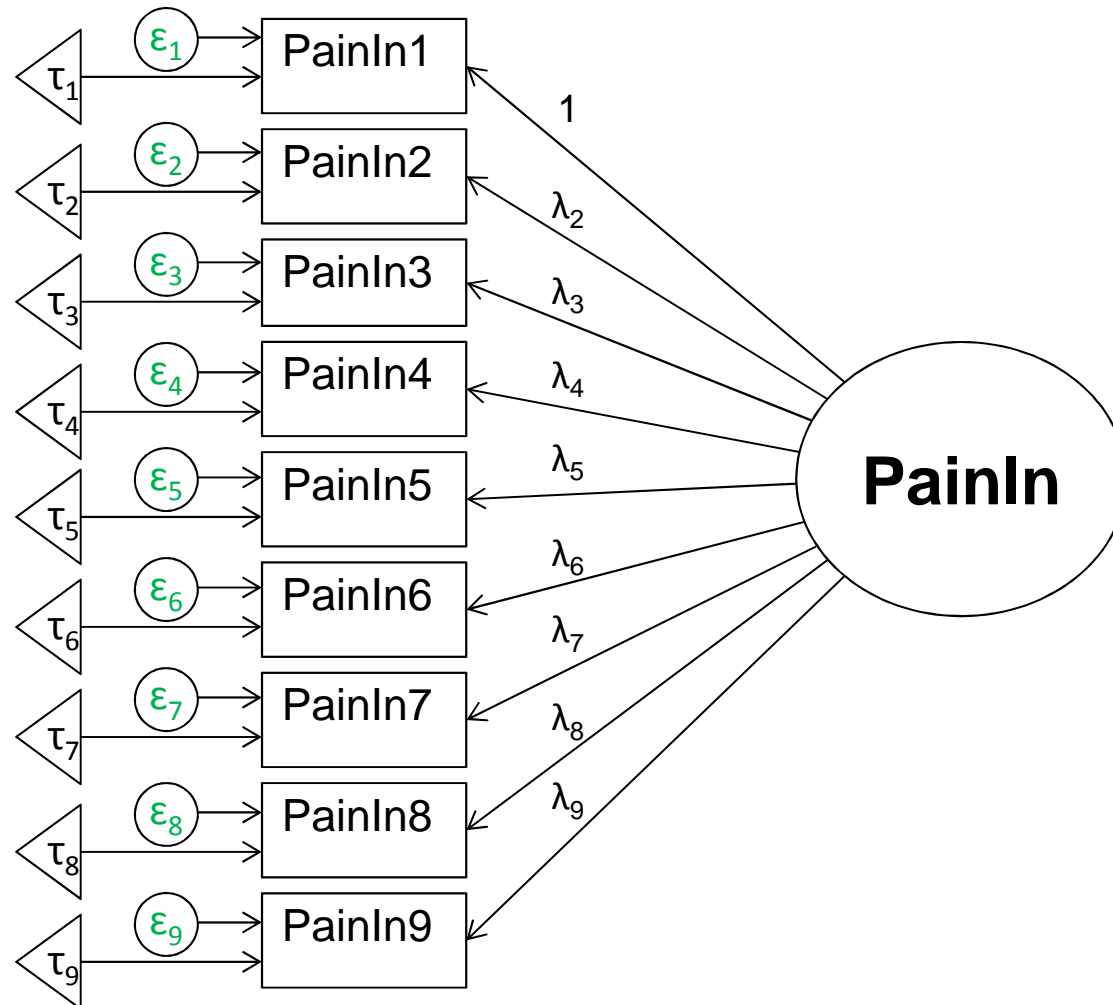
# Analyse Factorielle

Intercepts

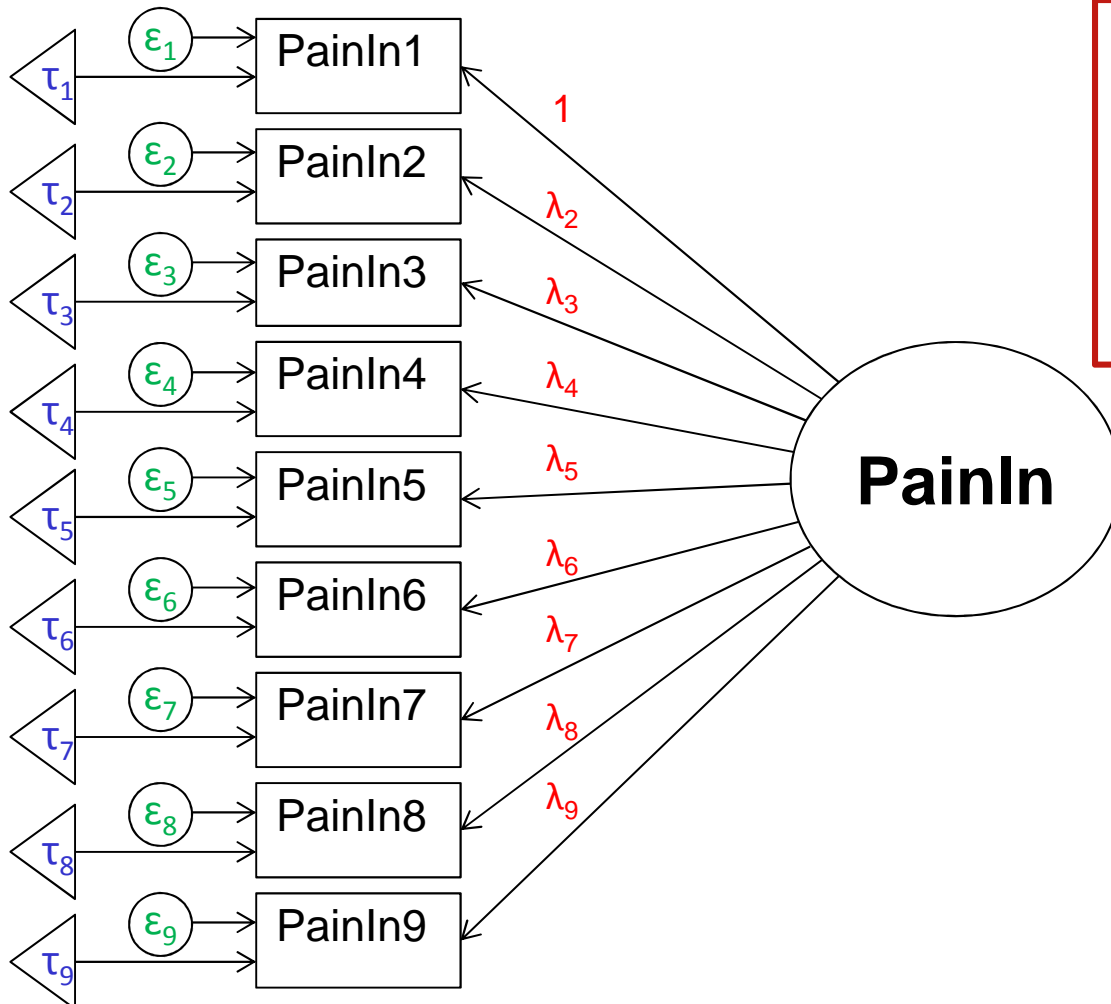


# Analyse Factorielle

Variance résiduelle  
(residuals)



# Analyse Factorielle



Pour un item  $i$ , la réponse observée  $y$  pour l'item  $i$  du sujet  $s$  est :

$$\text{CFA} : y_{is} = \tau_i + \lambda_i \text{PainIn}_s + \epsilon_{is}$$

$$\text{Régression linéaire} : y_{is} = \beta_{0i} + \beta_{1i} X_s + e_{is}$$

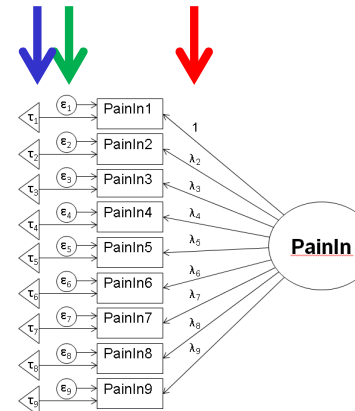
# Méthodes (2)

- Analyse en **groupes multiples** (R package *Lavaan*, fonction 'cfa')

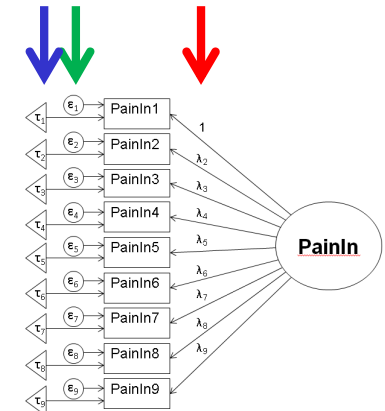
Model	Invariance test	Factor loadings	Item intercepts	Item residual variances
M1	Configural	Fixed and free		
M2	Metric (weak factorial)	Fixed		
M3	Scalar (strong factorial)	Fixed	Fixed	
M4	Residual (strict factorial)	Fixed	Fixed	Fixed

Indices	Excellent fit	Acceptable fit
RMSEA (root mean squared error of Approximation)	$\leq 0.06$	0.06-0.08
PNFI (parsimony normed fit index)	$\geq 0.95$	0.90-0.95
NNFI (Tucker-Lewis index)	$\geq 0.95$	0.90-0.95
CFI (comparative fit index)	$\geq 0.95$	0.90-0.95

T1



T2



Orri M et al. 2016.

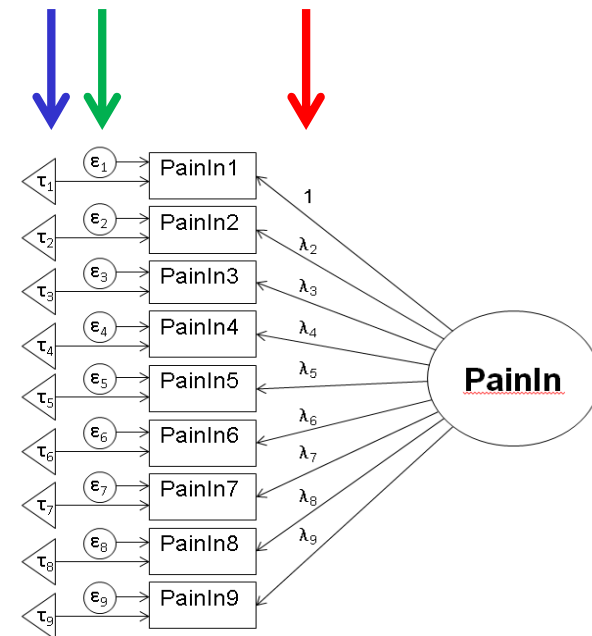
# Méthodes (3)

- Analyse **SEM longitudinal** (R package *Lavaan*, fonction 'lavaan')

Model	Invariance test	Factor loadings	Item intercepts	Item residual variances
M1	Configural	Fixed and free		
M2	Metric (weak factorial)	Fixed		
M3	Scalar (strong factorial)	Fixed	Fixed	
M4	Residual (strict factorial)	Fixed	Fixed	Fixed

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Orrí M et al. 2016.



# Resultats (1)

- Analyse en **groupes multiples** (R package *Lavaan*, fonction 'cfa')

Model	Invariance test	Factor loadings	Item intercepts	Item residual variances	Chisq	Df	Pvalue	CFI	TLI	RMSEA
M1	Configural	Fixed and free			59800	1480	0.0000	0.987	0.986	0.171
M2	Metric (weak factorial)	Fixed			64326	1519	0.0000	0.986	0.986	0.174
M3	Scalar (strong factorial)	Fixed	Fixed		60126	1638	0.0000	0.987	0.988	0.163
M4	Residual (strict factorial)	Fixed	Fixed	Fixed	60162	1638	0.0000	0.987	0.988	0.163

> 0.08 !

Model comparison (Scaled Chi Square difference test - ANOVA test)

	Df	Chisq	Chisq diff	Df diff	Pr(>Chisq)
M1	1480	59800			
M2 vs. M1	1519	64326	176.33	39	2.20E-16 ***
M3 vs. M2	1638	60162	649.33	119	2.20E-16 ***
M4 vs. M3	1639	60162	0	0	1

**Pas  
d'invariance  
longitudinale**

## Resultats (2)

- Analyse **SEM longitudinal** (R package *Lavaan*, fonction 'lavaan')

*Model comparison (Scaled Chi Square difference test - ANOVA test)*

	Df	Chisq	Chisq diff	Df diff	Pr(>Chisq)
<b>M1</b>	3041	26856			
<b>M2 vs. M1</b>	3081	27140	284.49	40	<b>2.20E-16 ***</b>
<b>M3 vs. M2</b>	3121	28286	1146	40	<b>2.20E-16 ***</b>
<b>M4 vs. M3</b>	3122	28431	144.71	1	<b>2.20E-16 ***</b>

**Pas  
d'invariance  
longitudinale**

## Discussion

- Absence d'invariance longitudinale
- Une 3ème approche : fonctionnement différentiel des items (DIF)
  - approche groupes multiples → discutable ?
- Questionnement sur la qualité des données ? →  $RMSEA > 0.08$
- Effet de maturation (changement du score lié à l'effet du temps qui passe) ou **effet de pratique** (rappel des réponses données lors de la passation précédente) ?
- Peut-on vraiment distinguer la modification d'un construit de son changement de niveau ? (Psychométriciens vs. biostatisticiens)



## Conclusion

- Résultat négatif pour le moment, mais...
- Collaboration fructueuse (toujours actuelle)
  - Expertise en psychométrie +++
  - 2 publications en révision:
    - Edjolo A., *et al.* Development of the Central Africa Daily Functioning Interference scale (CA-DFI) for dementia diagnosis in older adults. The EPIDEMCA study. (*Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring*)
    - Berga V., Edjolo A., *et al.* Validation of short form of routinization scale: norms in general population in elderly (*European Review of Applied Psychology*)