

# Logique et paradoxal : l'état de santé comme indicateur de l'efficacité du traitement

Thomas Perneger et Anne Lübbecke

# Evaluation de l'efficacité des ttt

- Death
- Disease
- Biomarkers
- Dysfunction

- Disability
- Discomfort
- Health
- Health utility

Patient-reported outcomes

- Dissatisfaction

Patient-reported experience

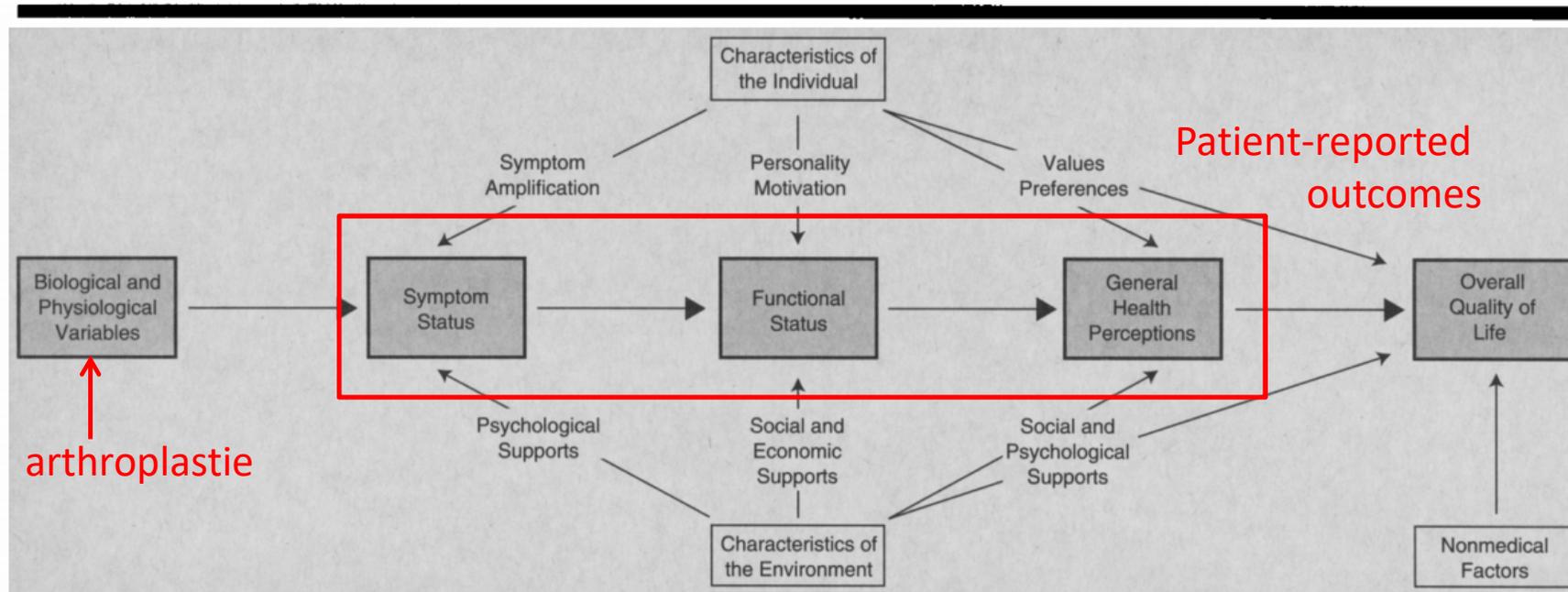
- Dollars

# Linking Clinical Variables With Health-Related Quality of Life

## A Conceptual Model of Patient Outcomes

Ira B. Wilson, MD, MSc, Paul D. Cleary, PhD

JAMA, 1995

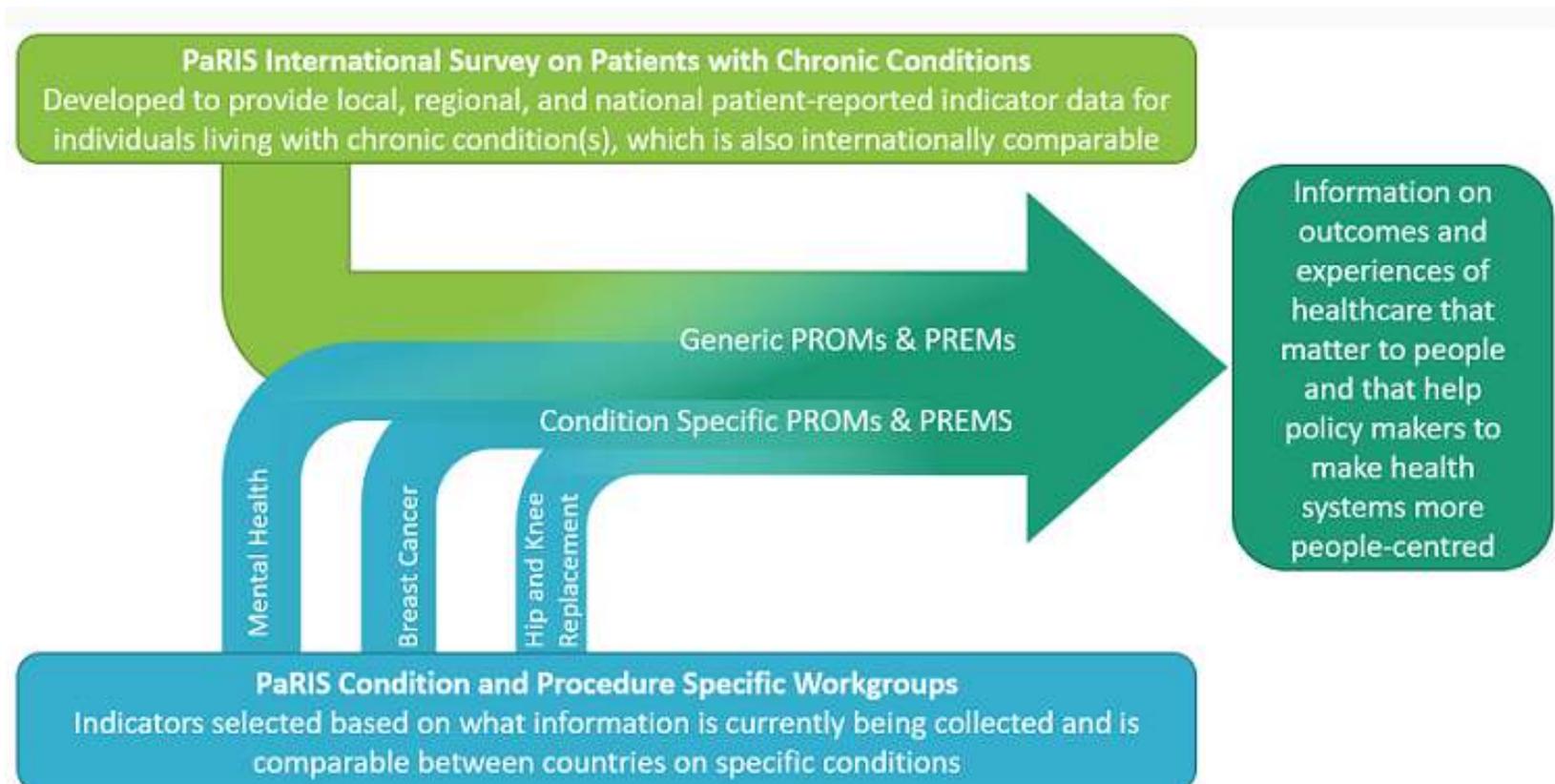


Relationships among measures of patient outcome in a health-related quality of life conceptual model.



# OECD - PaRIS

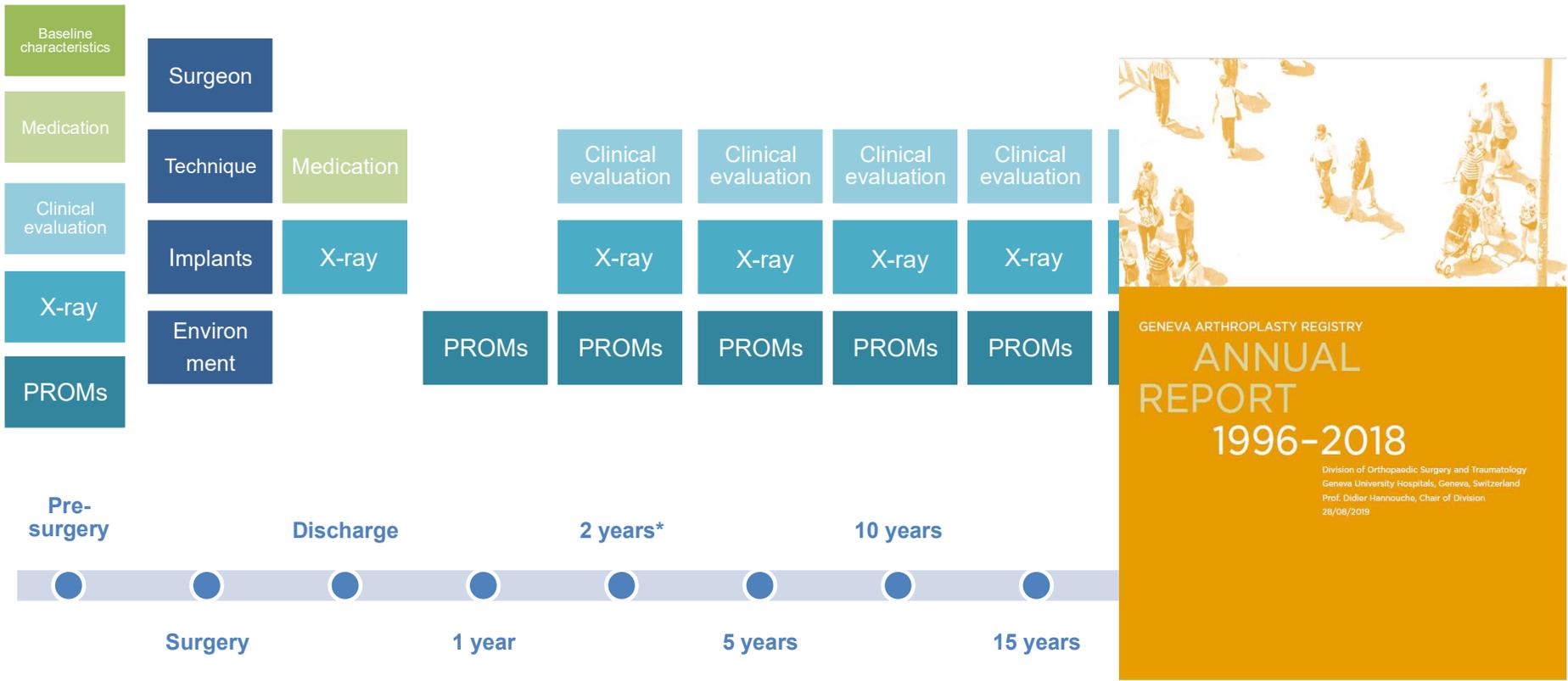
<http://www.oecd.org/health/health-systems/Measuring-what-matters-the-Patient-Reported-Indicator-Surveys.pdf>



# Registre HUG des prothèses

## Geneva Arthroplasty Registry (GAR)

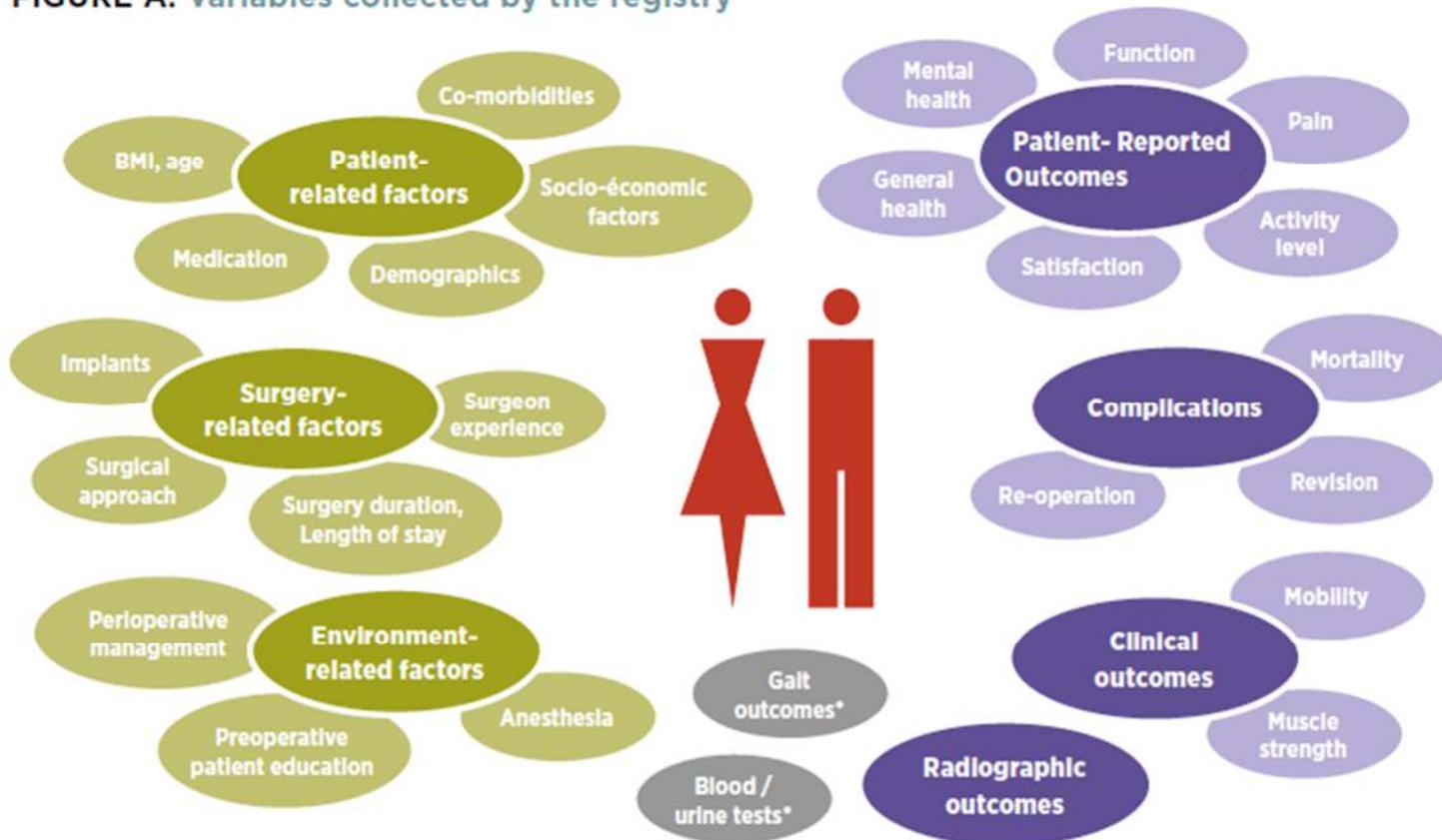
Complications - Death - Revision - Reoperation



# Registre HUG des prothèses

Geneva Arthroplasty Registry (GAR)

FIGURE A: Variables collected by the registry



# Patients GAR

	<b>Elective HIP</b>	<b>Elective KNEE</b>
	n=6793	n=4504
Women	56%	68%
Age, mean ( $\pm$ )	68.2 (12.7)	71 (10)
BMI, mean ( $\pm$ )	26.9 (4.9)	30 (6)
Obese	24.6%	43.5%
ASA $\geq$ 3	22.6%	27.5%
Education		
Low	37.6%	45.8%
Medium	31.4%	32.1%
High	31.0%	22.1%

# Instruments

- Short-Form 12
  - Instrument générique mesurant la santé perçue
  - 12 items (dont « self-rated health »)
  - MCS (Mental Component Score)
  - PCS (Physical Component Score)
- WOMAC (Western Ontario and MacMaster Universities Arthritis Index)
  - Instrument spécifique aux membres inférieurs
  - 12 items
  - WOMAC Pain
  - WOMAC Function

de 0 (le pire) à 100 (le mieux)

# Changement avant-après

## HIP

### III.4 Distribution of WOMAC score before and 1 year after primary THA

FIGURE 66: Distribution of WOMAC pain score before and 1 year after primary THA

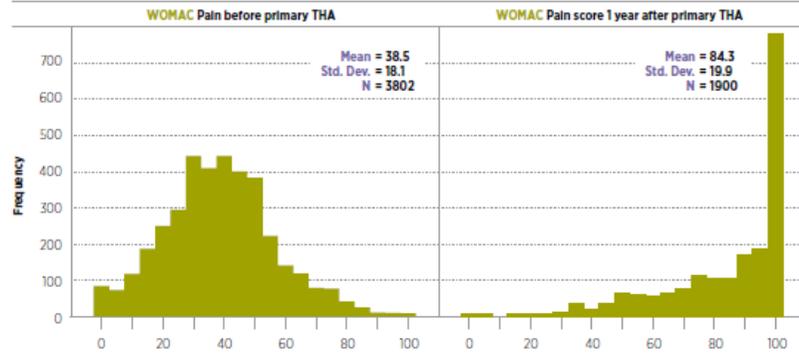
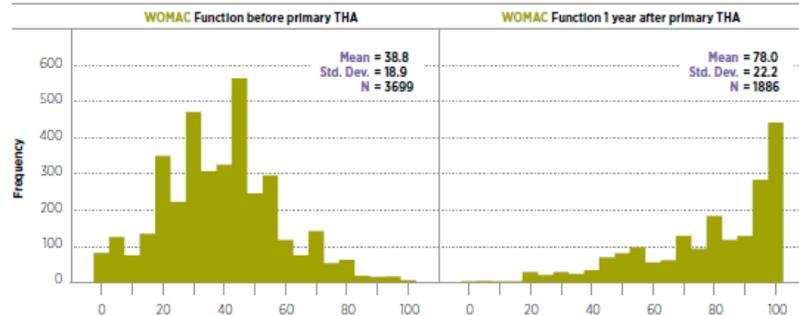


FIGURE 67: Distribution of WOMAC function score before and 1 year after primary THA



## KNEE

### III.2 Distribution of WOMAC score before and 1 year after primary TKA

FIGURE 25: Distribution of WOMAC pain score before and 1 year after primary TKA

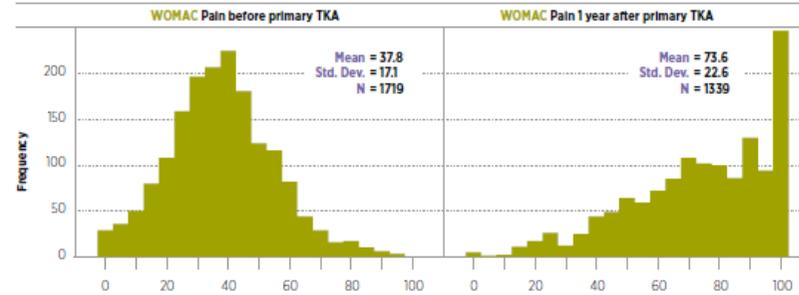
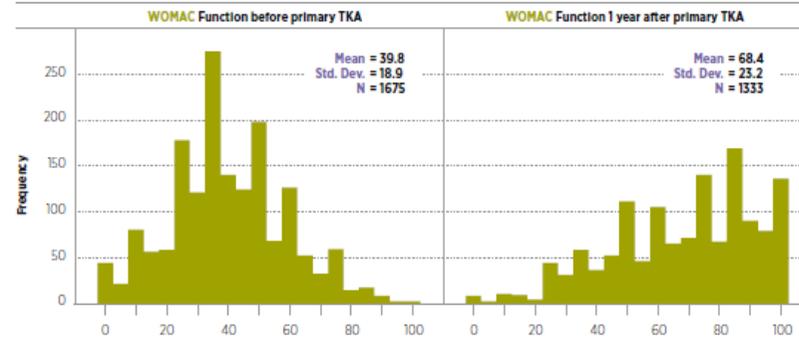


FIGURE 26: Distribution of WOMAC function score before and 1 year after primary TKA



# 1) Symptômes et « santé »

- Est-ce que **les associations** entre les symptômes (douleur, fonction) et les perceptions globales de la santé (mentale, physique) **sont modifiées** par une intervention hautement efficace (arthroplastie)?
- Population: pts opérés d'une prothèse de la hanche ou du genou, évalués avant l'intervention et 1 an après



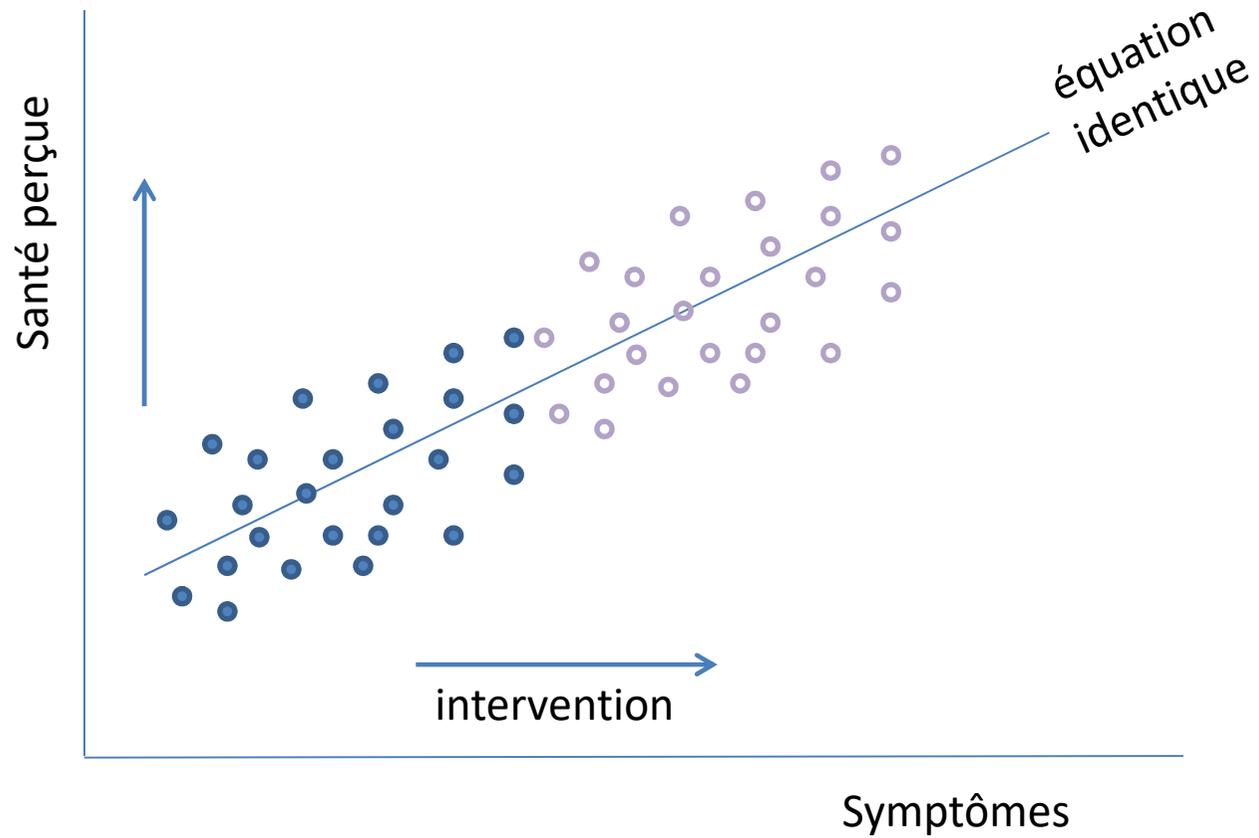
RESEARCH ARTICLE

## Symptoms of osteoarthritis influence mental and physical health differently before and after joint replacement surgery: A prospective study

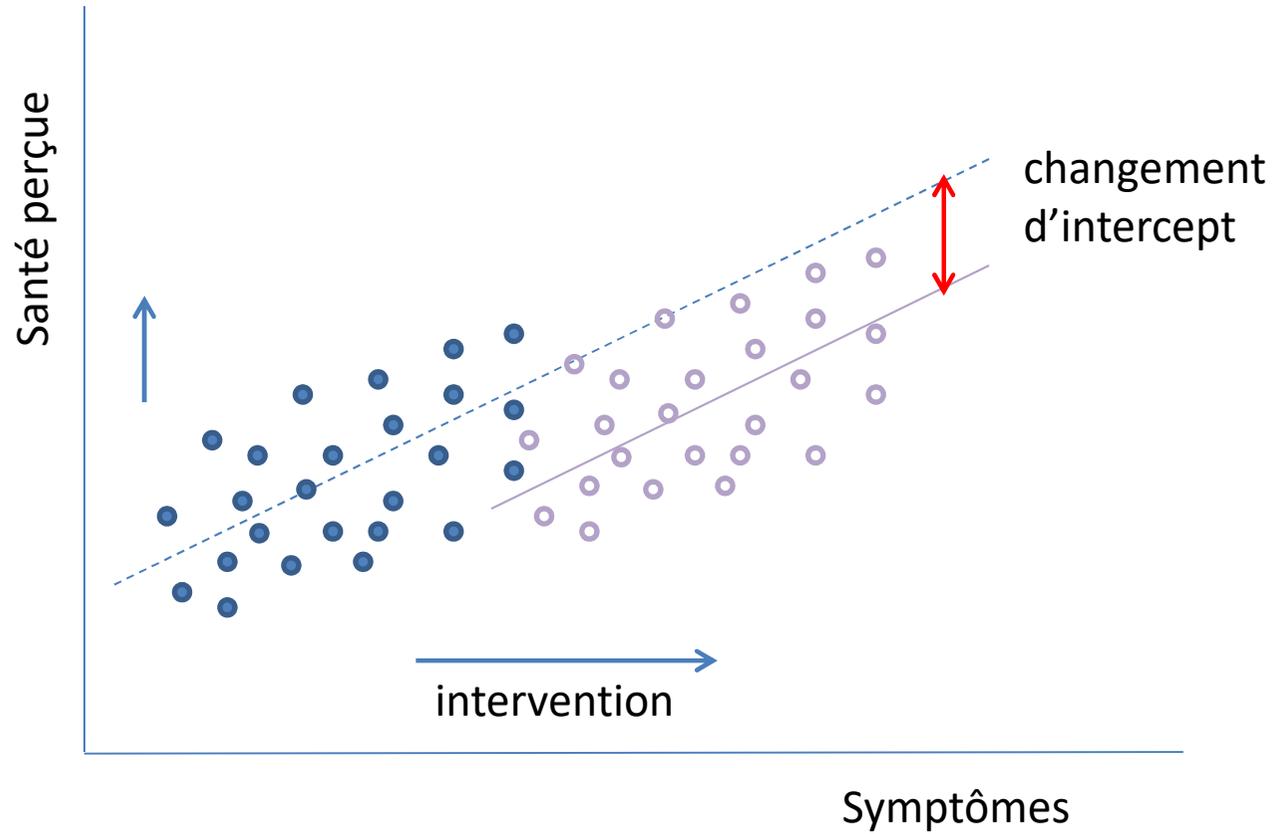
Thomas V. Perneger<sup>1\*</sup>, Didier Hannouche<sup>2</sup>, Hermès H. Miozzari<sup>2</sup>, Anne Lübbecke<sup>2</sup>

<sup>1</sup> Division of Clinical Epidemiology, Geneva University Hospitals, Geneva, Switzerland, <sup>2</sup> Division of Orthopedic Surgery and Traumatology, Geneva University Hospitals, Geneva, Switzerland

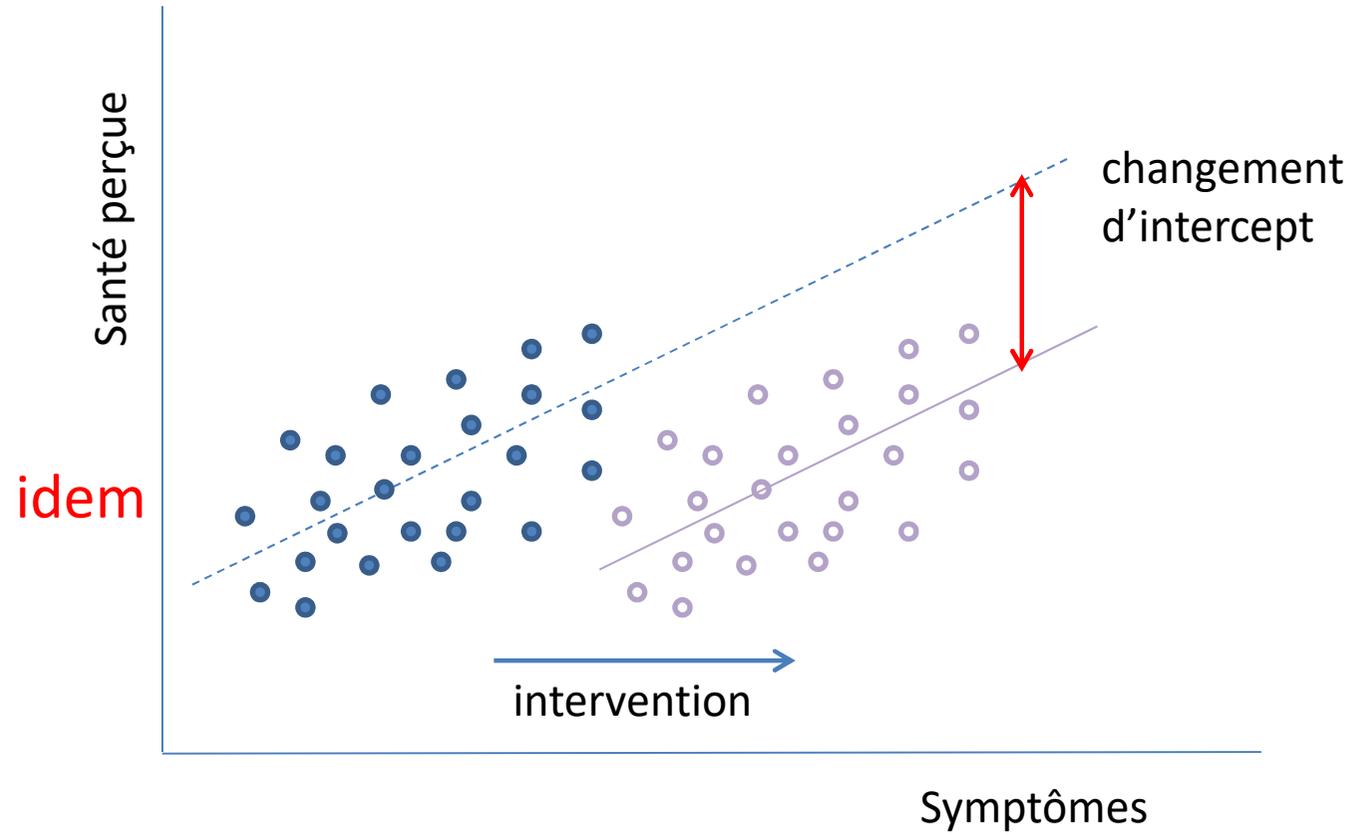
# Chaîne causale simple?



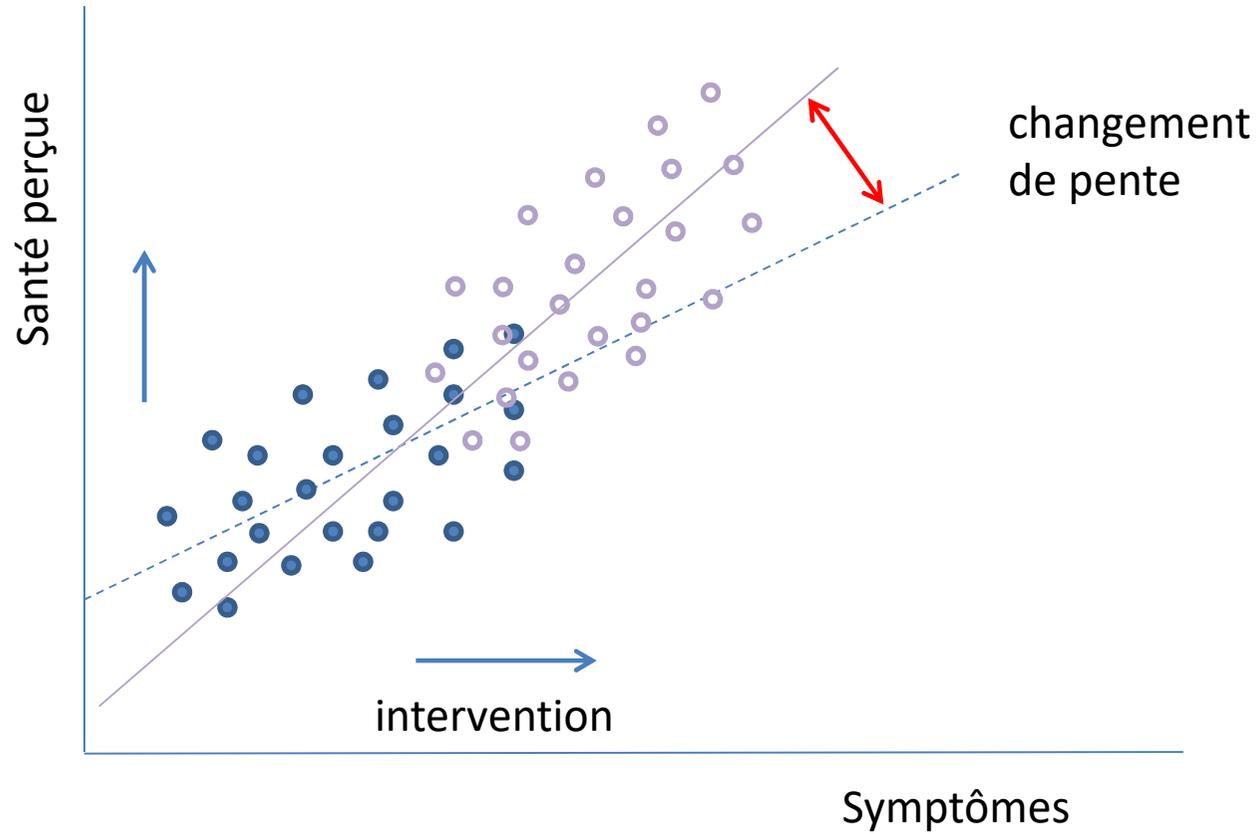
# Alternative 1



# Alternative 1b

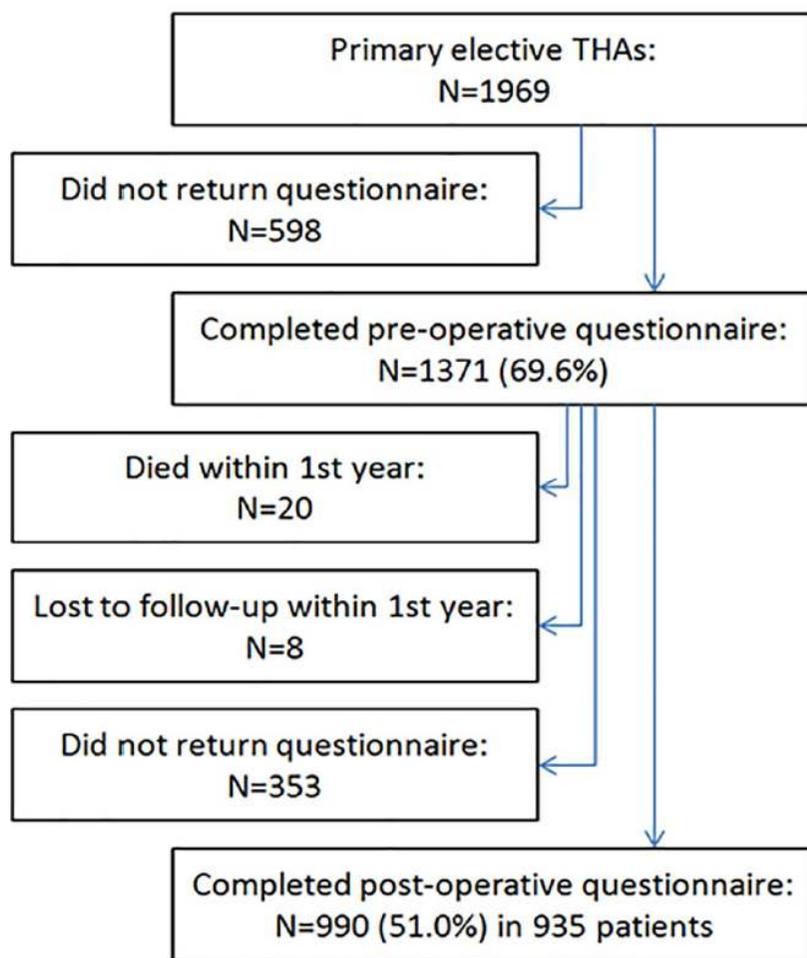


# Alternative 2



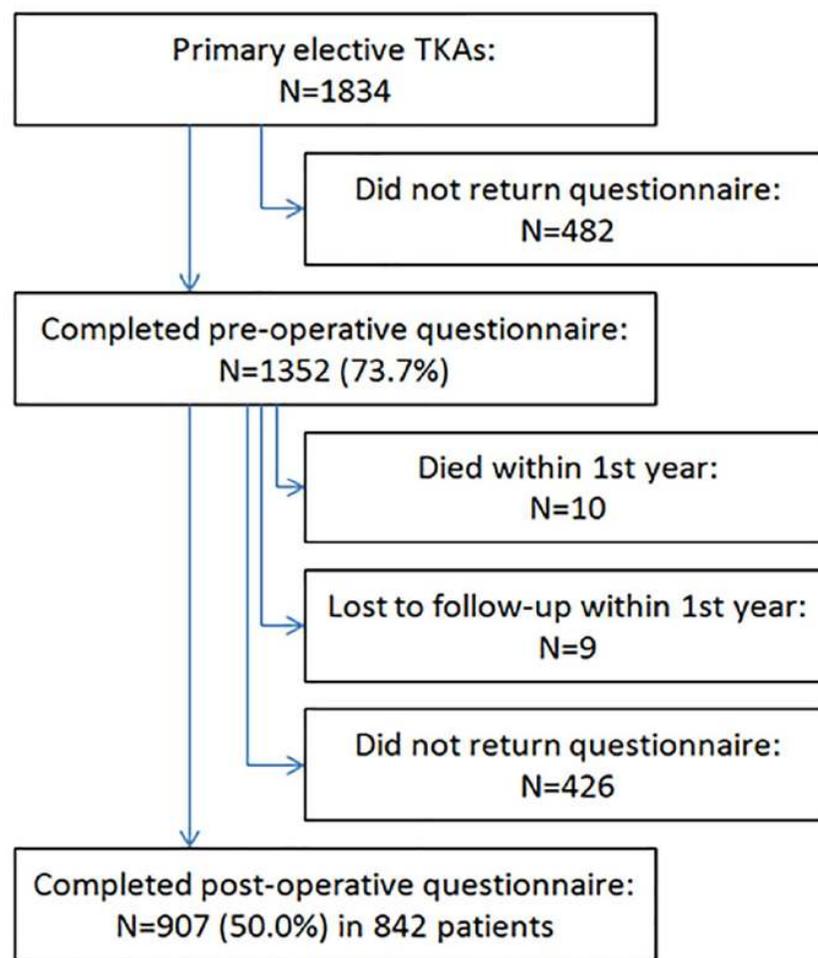
# Patients

## Arthroplastie hanche



N=990

## Arthroplastie genou



N=907

# Descriptif

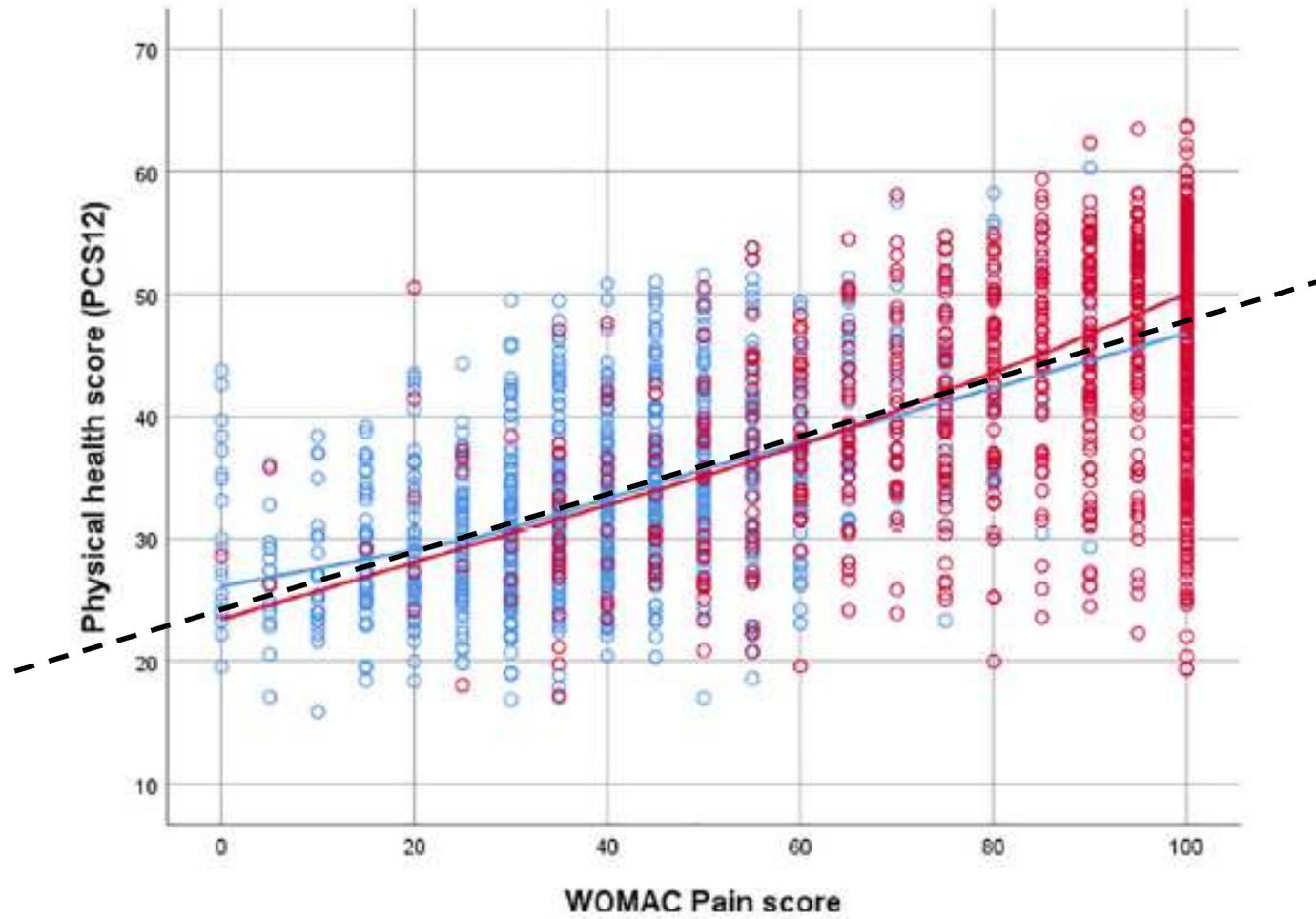
**Table 1. Baseline characteristics.**

	Total hip arthroplasty N = 990	Total knee arthroplasty N = 907
Women, N (%)	532 (53.7)	594 (65.5)
Age, years, mean (SD)	68.6 (11.9)	71.5 (9.4)
Age groups, N (%)		
22–59 years	214 (21.6)	96 (10.6)
60–69 years	264 (26.7)	268 (29.5)
70–79 years	332 (33.5)	352 (38.8)
80–95 years	180 (18.2)	191 (21.1)
Body mass index, mean (SD)	26.9 (4.8)	29.7 (5.3)
Obese, N (%)	232 (23.4)	398 (43.9)
Current smoker, N (%)	169 (17.1)	97 (10.7)
Current activity level (1–10), mean (SD)	3.6 (1.7)	3.6 (1.6)
Current hip/knee pain level (0–10), mean (SD)	6.1 (1.9)	6.2 (1.9)
Heart disease, N (%)	66 (6.7)	48 (5.3)
Diabetes mellitus, N (%)	99 (10.0)	151 (16.6)
High blood pressure, N (%)	499 (50.4)	568 (62.6)
ASA score at operation, N (%)		
1	109 (11.0)	42 (4.6)
2	724 (73.1)	708 (78.1)
3	157 (15.9)	157 (17.3)

# Changement avant-après

	Time	Total hip arthroplasty	Total knee arthroplasty
SF12 Mental Component score	Pre-operative	44.6 (11.1)	45.2 (11.4)
	At one year	47.6 (10.5)	47.0 (11.3)
SF12 Physical Component score	Pre-operative	33.7 (7.6)	34.7 (7.4)
	At one year	44.2 (9.8)	40.8 (9.2)
WOMAC Pain score	Pre-operative	39.8 (18.1)	39.2 (17.4)
	At one year	84.4 (20.0)	73.4 (22.5)
WOMAC Function score	Pre-operative	40.6 (18.9)	43.6 (19.2)
	At one year	78.7 (21.7)	70.1 (22.7)

# Hanche

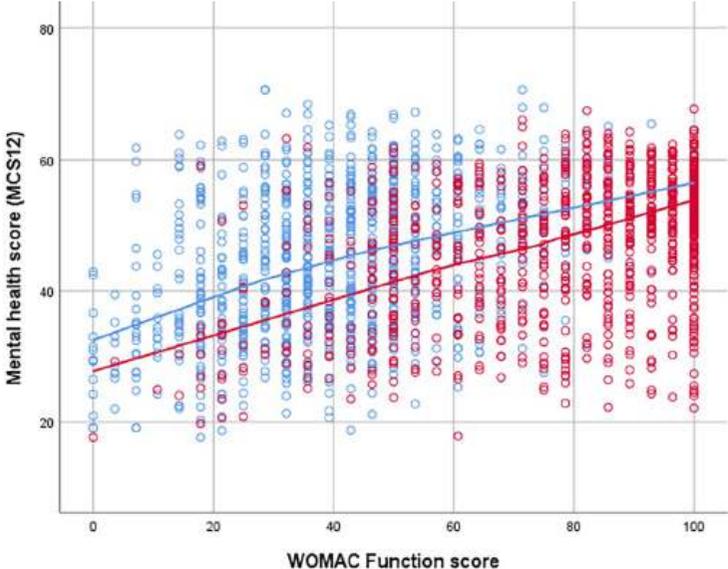
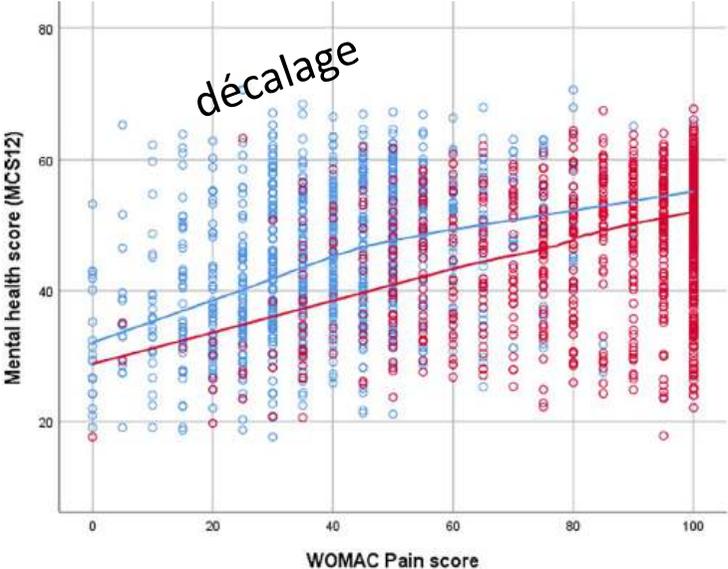


○ avant

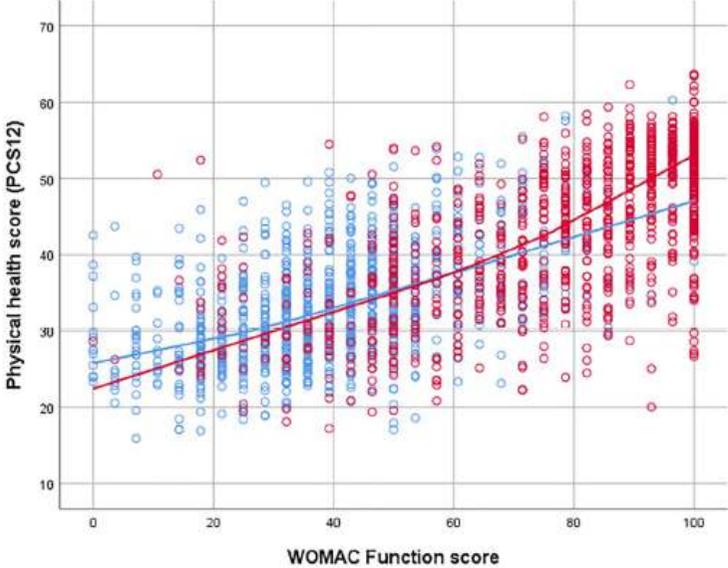
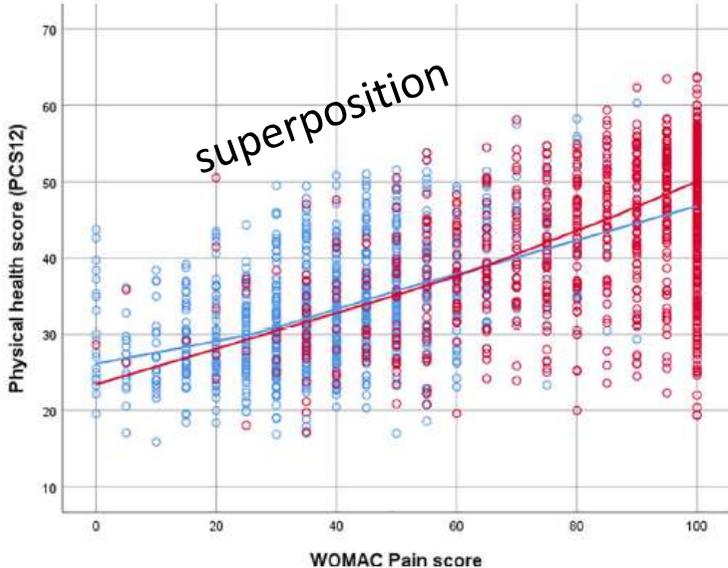
○ après

# Hanche

Mental



Physique

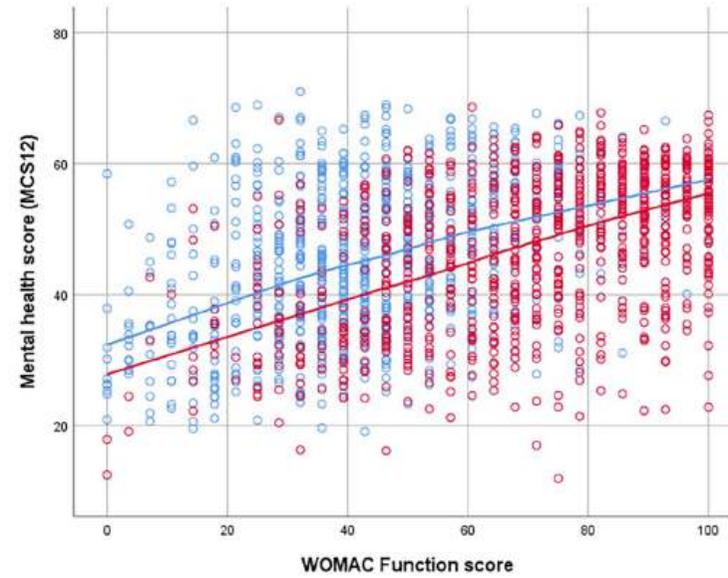
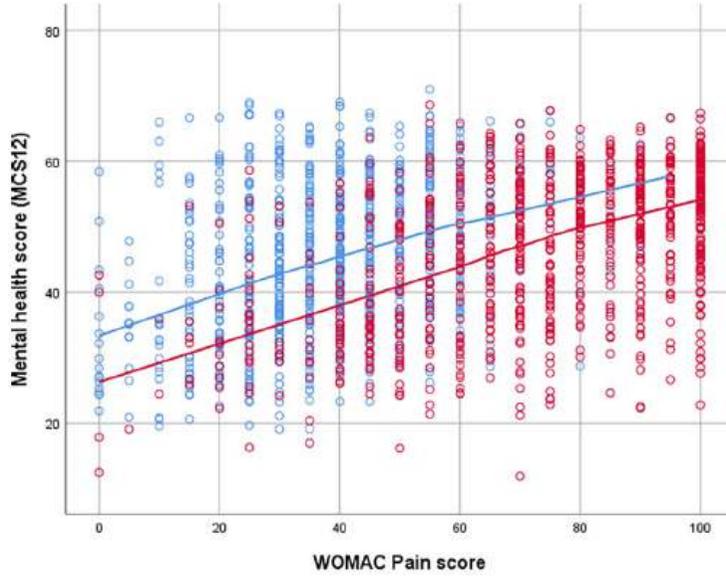


Douleur

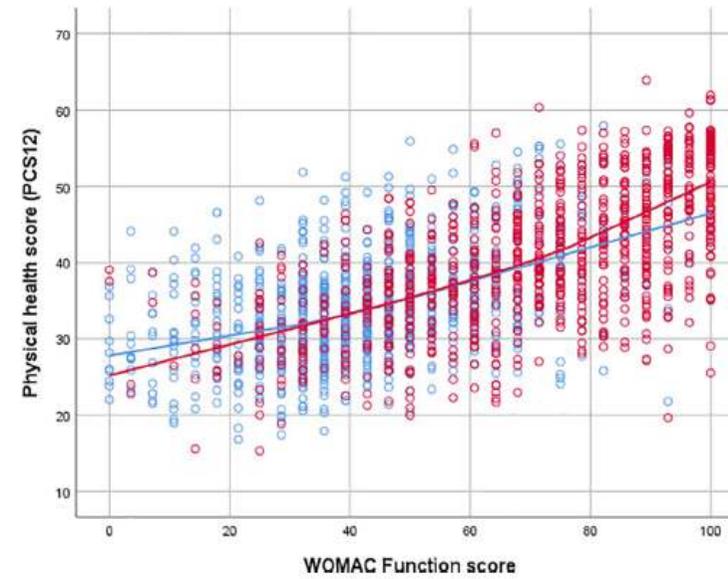
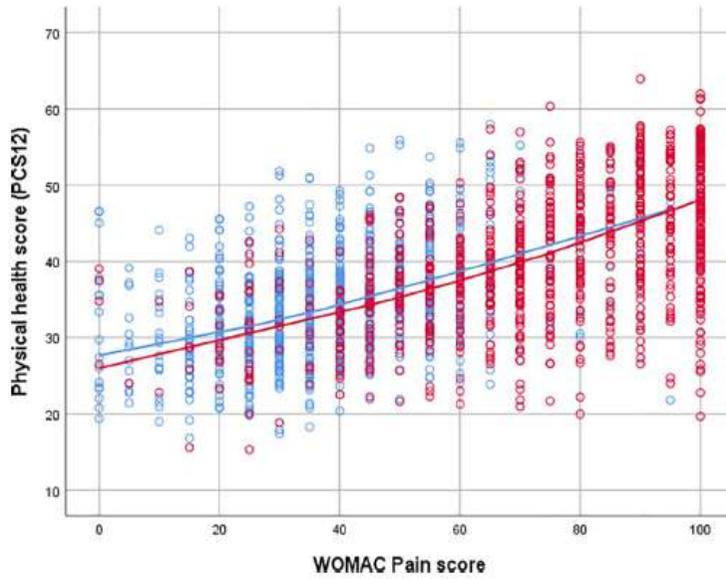
Fonction

# Genou

Mental



Physique



Douleur

Fonction

# Modèles linéaires simples

Table 3. Linear regression models.

Independent variable $\gamma$		Total hip arthroplasty			Total knee arthroplasty		
		Value at WOMAC score of 50 (intercept)	Difference for 10 points of WOMAC score (slope)	Variance explained ( $R^2$ )	Value at WOMAC score of 50 (intercept)	Difference for 10 points of WOMAC score (slope)	Variance explained ( $R^2$ )
	Dependent variable $\succ$	SF12 Mental Component Score			SF12 Mental Component Score		
WOMAC Pain score	Preoperative	46.9 (46.2–47.6)	2.3 (2.0–2.7)	0.14	47.8 (46.9–48.6)	2.4 (2.0–2.8)	0.13
	At 1 year	40.9 (39.7–42.1)	2.0 (1.7–2.3)	0.14	41.2 (40.3–42.2)	2.5 (2.2–2.8)	0.24
WOMAC Function score	Preoperative	46.6 (45.9–47.4)	2.2 (1.9–2.6)	0.14	46.8 (46.1–47.5)	2.4 (2.0–2.7)	0.16
	At 1 year	41.3 (40.3–42.3)	2.2 (1.9–2.5)	0.21	42.0 (41.2–42.9)	2.5 (2.2–2.8)	0.24
	Dependent variable $\succ$	SF12 Physical Component Score			SF12 Physical Component Score		
WOMAC Pain score	Preoperative	35.8 (35.3–36.2)	2.1 (1.8–2.3)	0.24	36.7 (36.2–37.2)	1.9 (1.6–2.1)	0.19
	At 1 year	35.5 (34.4–36.5)	2.6 (2.3–2.8)	0.27	35.5 (34.8–36.3)	2.2 (2.0–2.5)	0.30
WOMAC Function score	Preoperative	35.6 (35.1–36.1)	2.1 (1.9–2.3)	0.27	35.8 (35.3–36.2)	1.8 (1.6–2.0)	0.22
	At 1 year	35.5 (34.7–36.2)	3.0 (2.8–3.3)	0.46	35.6 (35.0–36.2)	2.6 (2.4–2.8)	0.41

Stratified simple linear regression models, at both points in time, with the SF12 Physical Component Score or the SF12 Mental Component Score as dependent variables, and the WOMAC Pain or Function scores as independent variables, in patients with arthroplasty of the hip or knee. 95% confidence intervals are in parentheses. SF12: Short-Form 12-item questionnaire. WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index 12-item questionnaire.

# Changements à 1 an

- Santé mentale:
  - Intercept baisse: au même niveau de douleur ou de fonction, la santé mentale est **plus basse**
  - (Pente +/- identique: la santé mentale varie de manière similaire avec un incrément de douleur ou de fonction)
- Santé physique:
  - Intercept reste identique: la santé physique est **la même** pour un niveau donné de douleur ou de fonction
  - (Pente plus raide: la santé physique varie plus fortement aux valeurs extrêmes de douleur ou de fonction)

# Pourquoi le MCS ne suit pas les symptômes

- Attentes déraisonnables des patients
  - Symptômes acceptables avant l'intervention deviennent inacceptables après
- Effet négatif (sur l'humeur) de la chirurgie et de la réhabilitation?
- Inertie de l'état émotionnel habituel?

## 2) Item santé (« self-rated health »)

- Diriez-vous que votre santé est excellente, très bonne, bonne, moyenne, ou mauvaise?

Quality of Life Research (2019) 28:503–508  
<https://doi.org/10.1007/s11136-018-2018-x>

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### The paradox of self-rated health following joint replacement surgery

Thomas Perneger<sup>1,2</sup> · Anne Lübbecke<sup>2,3</sup>

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© Springer Nature Switzerland AG 2018

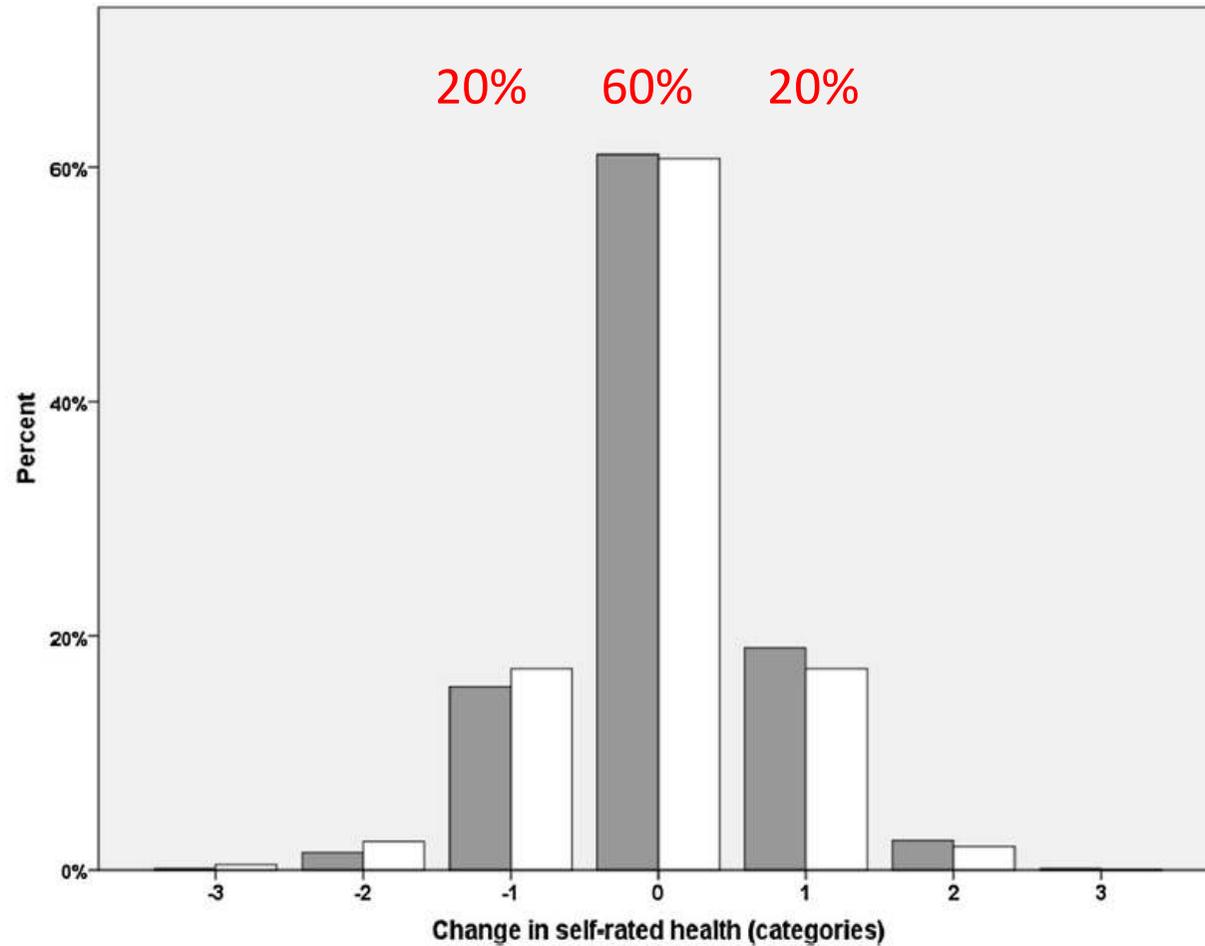
# « Self-rated health »

	Total hip arthroplasty ( <i>N</i> =990)		Total knee arthroplasty ( <i>N</i> =907)	
	Pre-operative	At 1 year	Pre-operative	At 1 year
Self-rated health, <i>N</i> (%)				
Excellent	39 (3.9)	77 (7.8)	41 (4.5)	40 (4.4)
Very good	224 (22.6)	195 (19.7)	166 (18.3)	163 (18.0)
Good	566 (57.2)	557 (56.3)	529 (58.3)	522 (57.6)
Fair	138 (13.9)	144 (14.5)	149 (16.4)	156 (17.2)
Poor	23 (2.3)	17 (1.7)	22 (2.4)	26 (2.9)
Intraclass correlation coefficient (95% CI)	0.60 (0.55–0.63)		0.56 (0.51–0.60)	

Rien ne change!

# Changement à 1 an

**Fig. 1** Distribution of change in self-rated health on a 5-category scale (excellent, very good, good, fair, poor), expressed in number of categories, between the pre-operative assessment and 1 year after surgery, in patients with total hip arthroplasty (gray bars) and total knee arthroplasty (white bars)



**Table 2** Changes between assessments made pre-operatively and 1 year after surgery for 12 dichotomized items of the SF12 Health Survey, with conditional odds ratios, in patients with total hip arthroplasty and total knee arthroplasty

Abbreviated item content	Positive answer	Negative answer	Total hip arthroplasty			Total knee arthroplasty		
			Positive answer		McNemar odds ratio (95% CI)	Positive answer		McNemar odds ratio (95% CI)
			Before surgery (%)	1 year after surgery (%)		Before surgery (%)	1 year after surgery (%)	
Self-rated health	Excellent or very good	Good, fair or poor	26.6	27.5	1.1 (0.8–1.5)	22.8	22.4	0.9 (0.7–1.3)
Limited in moderate activities	Not at all	Yes, a little, or yes, a lot	18.2	51.3	9.9 (7.0–13.8)	24.0	37.3	2.5 (2.0–3.3)
Limited in climbing several flights of stairs	Not at all	Yes, a little, or yes, a lot	12.3	41.0	10.5 (7.2–15.2)	10.7	25.2	4.0 (2.9–5.6)
Due to physical health, accomplished less	No	Yes	15.7	63.3	12.5 (9.1–17.2)	22.4	52.3	5.1 (3.9–6.6)
Due to physical health, was limited in kind of activities	No	Yes	18.0	58.4	11.0 (8.0–15.2)	25.8	48.5	3.7 (2.9–4.8)
Pain interfered with work	Not at all or a little bit	Moderately, quite a bit or Extremely	12.3	63.6	26.4 (16.9–41.3)	13.3	50.5	11.5 (8.0–16.5)
Due to emotional problems, accomplished less	No	Yes	45.4	65.9	3.2 (2.6–4.1)	44.8	60.9	2.6 (2.0–3.2)
Due to emotional problems, was less careful	No	Yes	41.9	68.4	5.0 (3.9–6.6)	47.1	59.6	2.1 (1.7–2.7)
Felt calm and peaceful	All, most or a good bit of the time	Some, a little or none of the time	53.7	69.6	3.1 (2.4–4.0)	55.0	64.5	2.0 (1.5–2.5)
Had a lot of energy	All, most or a good bit of the time	Some, a little or none of the time	25.5	41.4	3.4 (2.6–4.5)	27.2	37.7	2.1 (1.6–2.7)
Felt downhearted and blue	A little or none of the time	All, most, a good bit or some of the time	45.4	57.2	2.5 (1.9–3.3)	44.1	54.0	2.0 (1.5–2.6)
Physical or emotional problems interfered with social activities	A little or none of the time	All, most or some of the time	38.4	64.1	5.4 (4.1–7.1)	44.0	57.7	2.4 (1.9–3.1)

# Santé est liée aux autres items du SF-12

**Table 3** Associations (odds ratios and 95% confidence intervals) between “excellent” or “very good” self-rated health and positive ratings on the other 11 items of the SF12 Health Survey, before and after surgery, in patients with total hip arthroplasty and total knee arthroplasty

Abbreviated item content	Total hip arthroplasty		Total knee arthroplasty	
	Before surgery	1 year after surgery	Before surgery	1 year after surgery
Limited in moderate activities	2.9 (2.1–4.1)	6.1 (4.4–8.6)	3.0 (2.1–4.2)	5.5 (3.9–7.7)
Limited in climbing several flights of stairs	2.9 (2.0–4.3)	5.1 (3.8–6.9)	2.0 (1.3–3.1)	5.3 (3.8–7.5)
Due to physical health, accomplished less	2.0 (1.4–2.8)	4.0 (2.8–5.7)	1.9 (1.4–2.7)	6.2 (4.2–9.3)
Due to physical health, was limited in kind of activities	1.9 (1.3–2.7)	4.0 (2.9–5.6)	1.9 (1.4–2.7)	3.7 (2.6–5.2)
Pain interfered with work	2.5 (1.7–3.7)	6.3 (4.2–9.4)	3.1 (2.1–4.6)	6.9 (4.6–10.2)
Due to emotional problems, accomplished less	2.9 (2.1–3.8)	5.6 (3.7–8.3)	2.7 (1.9–3.7)	5.2 (3.4–7.9)
Due to emotional problems, was less careful	2.8 (2.1–3.8)	7.0 (4.5–10.9)	3.3 (2.4–4.6)	7.0 (4.5–11.1)
Felt calm and peaceful	2.7 (2.0–3.7)	4.9 (3.3–7.4)	4.2 (2.9–6.0)	6.4 (4.0–10.2)
Had a lot of energy	3.2 (2.3–4.3)	5.4 (4.0–7.3)	3.9 (2.8–5.5)	7.3 (5.1–10.4)
Felt downhearted and blue	2.9 (2.2–3.9)	4.8 (3.4–6.8)	3.7 (2.7–5.2)	4.7 (3.2–6.8)
Physical or emotional problems interfered with social activities	2.4 (1.8–3.2)	6.1 (4.1–9.1)	2.4 (1.8–3.3)	5.6 (3.7–8.4)

# Santé est liée aux scores WOMAC

**Table 4** Mean values (standard deviations) of WOMAC Pain and Function scores, according to self-rated health, before and after surgery, in patients with total hip arthroplasty and total knee arthroplasty

	Total hip arthroplasty		Total knee arthroplasty	
	Pre-operative	One year after surgery	Pre-operative	One year after surgery
<b>WOMAC Pain score, mean (SD)</b>				
Self-rated health				
Excellent	51.5 (15.6)	93.4 (12.8)	48.2 (21.6)	89.9 (15.8)
Very good	46.4 (17.1)	92.4 (12.8)	43.9 (16.0)	85.7 (15.4)
Good	39.5 (17.5)	85.5 (17.6)	39.9 (17.0)	75.2 (19.8)
Fair	30.0 (16.2)	66.2 (25.6)	31.4 (15.4)	56.0 (21.4)
Poor	21.8 (15.9)	70.3 (31.3)	23.2 (15.0)	38.1 (26.9)
Eta squared	0.11	0.18	0.08	0.26
<b>WOMAC Function score, mean (SD)</b>				
Self-rated health				
Excellent	54.9 (17.9)	91.8 (16.0)	56.4 (20.0)	88.4 (16.0)
Very good	47.7 (18.6)	90.4 (14.2)	50.6 (18.2)	83.0 (17.3)
Good	40.2 (17.9)	79.7 (18.7)	44.2 (18.4)	72.0 (19.8)
Fair	29.5 (15.8)	55.6 (22.7)	33.1 (16.7)	51.5 (20.3)
Poor	23.1 (16.0)	50.0 (25.1)	23.9 (14.9)	36.0 (23.9)
Eta squared	0.12	0.28	0.12	0.27

# Le paradoxe...

- Tout s'améliore après l'arthroplastie, sauf la santé perçue qui ne change pas
- Mais la santé perçue est fortement associée, avant et après arthroplastie
  - Aux autres items du SF-12
  - Aux scores WOMAC
- Hypothèses
  - Manque de fiabilité? non
  - Déconnexion entre santé et autres mesures de PRO? Non
  - Reconceptualisation?
  - Caractère « intrinsèque » de la santé perçue?

# « Response shift »

- Maladies chroniques:
  - Le patient s'adapte à son état changeant
  - Les scores de santé ne reflètent pas la détérioration/amélioration
- Causes possibles:
  - Recalibration
  - Priorités différentes; reconceptualisation
  - Biais de mesure (changement des propriétés de l'instrument)

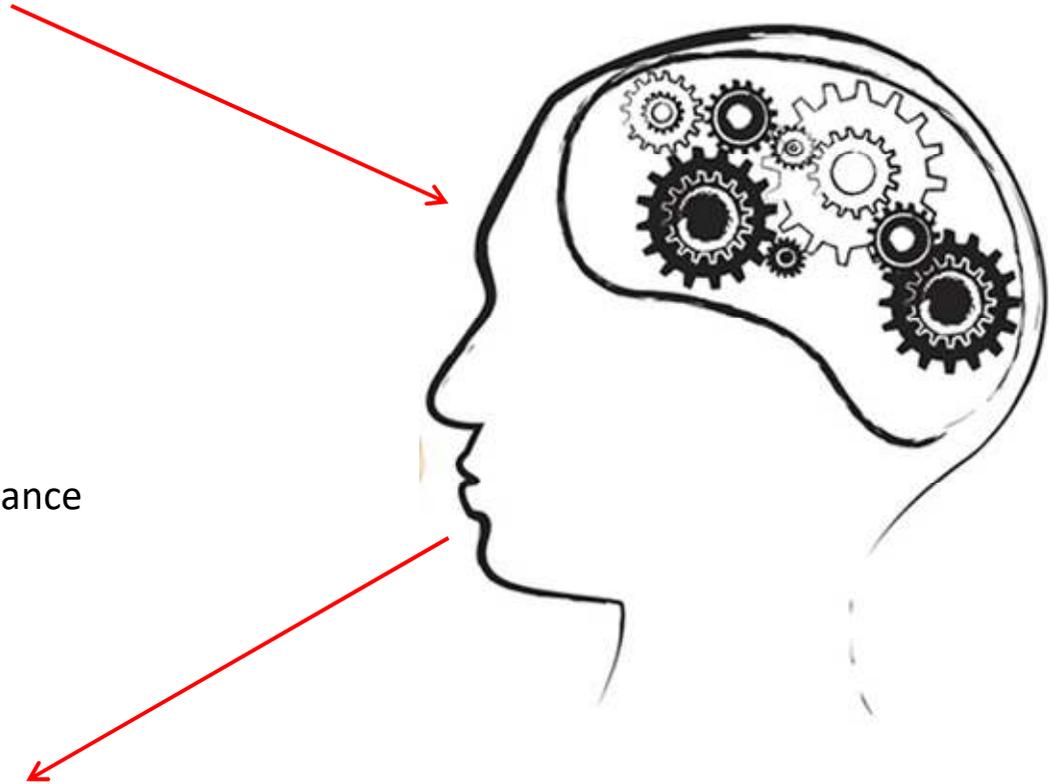
# Trois évolutions 1 an après arthroplastie

- Santé globale perçue (self rated health) ne change pas!
- Santé mentale change dans le sens prévu, mais en partie seulement
- Santé physique change exactement comme prévu par l'amélioration des symptômes



# C'est compliqué!

- Et votre santé?
  - Définition
  - Symptômes, diagnostics
  - Image de soi
  - Humeur du moment
  - Culture
  - Désirabilité sociale, reconnaissance
  - Temporalité, oubli
  - Comparaison aux autres
  - ...
- Moyenne!



# Conclusion

- Une séquence causale simple « **intervention** → **symptôme** → **santé perçue** » ne fonctionne pas toujours
- Utilité de mesurer plusieurs indicateurs de succès d'une intervention
- Importance de mener une recherche de base sur « ce qui compte pour les patients » et sur la meilleure manière de le mesurer

# Modèles linéaires mixtes

Table 4. Mixed linear regression model results.

Independent variable ▼		Total hip arthroplasty		Total knee arthroplasty	
		Value at WOMAC score of 50 (intercept)	Difference for 10 points of WOMAC score (slope)	Value at WOMAC score of 50 (intercept)	Difference for 10 points of WOMAC score (slope)
	Dependent variable ➤	SF12 Mental Component Score		SF12 Mental Component Score	
WOMAC Pain score	Preoperative	46.5 (45.8 to 47.2)	1.9 (1.5 to 2.2)	47.3 (46.5 to 48.1)	2.0 (1.7 to 2.4)
	Change at 1 year	-4.0 (-5.3 to -2.8)	-0.4 (-0.7 to 0.0)	-5.0 (-6.0 to -3.9)	-0.0 (-0.4 to 0.4)
	P-value	<0.001	0.074	<0.001	0.89
WOMAC Function score	Preoperative	46.3 (45.7 to 47.0)	1.9 (1.6 to 2.2)	46.5 (45.8 to 47.2)	2.1 (1.8 to 2.5)
	Change at 1 year	-3.5 (-4.5 to -2.4)	-0.2 (-0.6 to 0.2)	-3.8 (-4.7 to -2.8)	0.0 (-0.3 to 0.4)
	P-value	<0.001	0.29	<0.001	0.82
	Dependent variable ➤	SF12 Physical Component Score		SF12 Physical Component Score	
WOMAC Pain score	Preoperative	35.6 (35.0 to 36.1)	1.9 (1.6 to 2.2)	36.5 (36.0 to 37.1)	1.8 (1.5 to 2.0)
	Change at 1 year	0.1 (-0.9 to 1.2)	0.6 (0.2 to 0.9)	-0.9 (-1.7 to -0.1)	0.4 (0.1 to 0.7)
	P-value	0.79	0.001	0.035	0.007
WOMAC Function score	Preoperative	35.5 (35.0 to 36.0)	2.0 (1.8 to 2.2)	35.7 (35.2 to 36.1)	1.7 (1.5 to 1.9)
	Change at 1 year	0.2 (-0.6 to 1.0)	1.0 (0.7 to 1.3)	0.1 (-0.6 to 0.8)	0.8 (0.6 to 1.1)
	P-value	0.45	<0.001	0.87	<0.001

Mixed linear regression models, with a random intercept for each patient, and for a contralateral joint nested within patient (when required), of the SF12 Physical or Mental component score as dependent variables, and the WOMAC Pain or Function scores as independent variables, in patients with arthroplasty of the hip or knee. 95% confidence intervals are in parentheses. SF12: Short-Form 12-item questionnaire. WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index 12-item questionnaire.

# OECD – Self-rated health in context



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