

**Perceived functional impairments in patients with nonspecific chronic wrist pain and the effect of a sensorimotor control-based exercise program on these impairments.**

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**Introduction**

**Nonspecific chronic wrist pain**

- Prevalence – 9.3%, with more women than men having wrist pain (ie, 12.1%, and 6.5%, respectively).
- In our hand clinics (HPRN), the 12-month prevalence of people with chronic wrist pain seeking health care is about 5% of the total patient population


**Focus of treatment**

- Various physical therapy methods predominantly focus on the pain itself
- Preferable is to focus on a sensorimotor controlled exercise program
  - Maladaptive motor-control strategies in:
    - Low back pain
    - ACL knee
    - Shoulder problems
    - Chronic wrist pain

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**SMoC – Wrist program**

Videler protocol (1999) from the Netherlands adapted to new insights in sensory motorcontrol en muscle function around the wrist in (2020)



**Maladaptive motor-control strategies in:**

- Low back pain
- ACL knee
- Shoulder problems

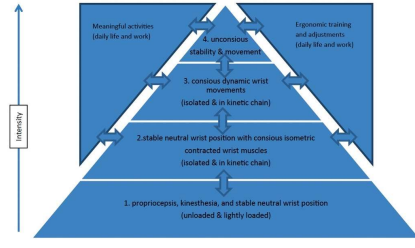
**Poor proprioception and inadequate neuromuscular control make most dynamic carpal instabilities symptomatic**

References:  
Videler AJ, Knoben M, Bui M, Straker L. Oefentherapie Wrist-Chroniche Publicatie: Exercise Therapy for Chronic Wrist Complaints, first edn. Amsterdam: Department of Plastic, Reconstructive and Handurgery, Academic Medical Center; 1999.  
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Foster M, Garcia-Elias M, Lusk A, Clark-Peterson M. Role of muscles in the stabilization of ligament-deficient wrist. J Hand Ther. 2016;29(2):164-676.

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**SMoC – Wrist program**

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**Fig. 2. Pyramid model of the Sensorimotor Control of the Wrist exercise program (SMoC-Wrist) for patients with nonspecific chronic wrist pain.**

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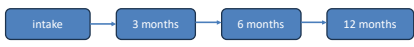
**Study the effect of SMoC**

**Purpose**

To monitor the effect of a sensorimotor control-based exercise program (SMoC), and to obtain a clear patient impairment profile of patients with nonspecific chronic wrist pain.

**Design**

Prospective cohort study 12 months follow up



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**Subjects**

Patients from HPRN

**Inclusion criteria:**

- Chronic non-specific wrist pain or midcarpal laxity/intability non-dissociative
- Complaints for more than three months

**Exclusion criteria:**

- Wrist/hand trauma three months preceding intake, with a diagnosed complete laesion of the SL or LT ligament
- Operation wrist/hand three months preceding intake
- Fracture upper extremity three months preceding intake
- Midcarpal shift test grade 5 (evident self provoked catch-up clunk)
- Radiocarpale- / CMC1 artrose or Reumatoid arthritis

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### Methods

**Assessment:**

- Questionnaire: PRWHE (pain & function), SF12, MHI-5, DASH-Work, WAI-1
- Assessment by therapist: gripforce, mobility, PSFS, pain (NRS 10)
- Intake, 3 months, 6 months, 12 months

**Analysis:**

- ICF-core set for hand conditions
- Differences over time: repeated measurement ANOVA (ES: partial Eta squared ( $\eta_p^2$ ))
- Differences between two groups: paired T-Tests (ES: Cohen D)
- Missings handled with multiple imputation

**Profile check:**

- Questionnaire handtherapists HPRN (for check patient profile) (n=16)

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### Results – disability coding

ICF-code	Description	Frequency (n)	PSFS-intake Mean [SD]
D920	Recreation leisure activity	N=40	2,85 [2,89]
D4451	Pushing	N=34	2,94 [2,50]
D430	Lifting and carrying objects	N=26	4,50 [1,86]
D360	Using communication devices and techniques	N=17	4,24 [2,02]
D630	Preparing mails	N=14	4,20 [2,04]

- 111 eligible subjects
- 2 activities per patient (PSFS)
- Coded with the ICF core set of Hand Condition
- 3 reviewers (individual)
- Consenses over coding
- 4th reviewer when no consensus was achieved

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### Results over time (1)

ICF-CODE	DESCRIPTION	PSFS INTAKE MEAN [SD]	PSFS 6 MONTHS MEAN [SD]	T-VALUE	P-VALUE	EFFECT SIZE COHEN'S D	BI 95% ES GEM.
D920	Recreation leisure activity	2,85 [2,89]	7,51 [2,04]	-9,42	0,00	-1,49	[-1,94, -1,03]
D4451	Pushing	2,94 [2,50]	6,85 [2,99]	-6,63	0,00	-1,14	[-1,57, -0,70]
D430	Lifting and carrying objects	4,50 [1,86]	7,93 [1,90]	-6,49	0,00	-1,27	[-1,79, -0,75]
D360	Using communication devices and techniques	4,24 [2,02]	7,49 [1,52]	-5,11	0,00	-1,24	[-1,87, -0,59]
D630	Preparing mails	4,20 [2,04]	7,36 [2,65]	-4,19	0,01	-1,12	[-1,78, -0,43]

Cohen's D:  $d \leq 0,2$  small effect, between  $d = 0,2 - 0,5$  medium effect,  $d \geq 0,8$  large effect

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### Results over time (2)

	INTAKE MEAN [SD]	3 MONTHS MEAN [SD]	6 MONTHS MEAN [SD]	PARTIAL $\eta^2$ INTAKE VS 3MTHS	PARTIAL $\eta^2$ 3 MONTH VS 6MTHS	PARTIAL $\eta^2$ INTAKE VS 6MTHS
PSFS	3,55 [1,95]	6,62 [2,46] *	7,51 [2,00]*	0,56	0,11	0,56
PRWHE TOTAL	44,27 [16,83]	21,77 [13,11] *	19,58 [14,96]	0,56	0,02	0,49
PRWHE Pain	26,86 [8,50]	14,43 [8,04] *	12,22 [8,78] **	0,57	0,05	0,51
PRWHE function	17,77 [9,39]	7,21 [5,63] *	7,34 [7,44]	0,51	0,00	0,40

\* $P < 0,001$ ; \*\* $p = 0,03$   
 partial Eta squared ( $\eta_p^2$ ):  $\eta_p^2 \leq 0,01$  small effect,  $\eta_p^2 = 0,01 - 0,06$  medium effect,  $\eta_p^2 > 0,14$  large effect.  
 MID PRWHE =12; MID PSFS=2

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### Results – Effects over time (3)

Time Point	PRWHE Total	PRWHE Pain	PRWHE Function
Intake	~44	~27	~18
3 months	~22	~15	~8
6 months	~20	~13	~7

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### Results – patient profile

- Female
- Mean age 29 years
- Diagnosis MCI
- Dominant hand
- Extension of the wrist and grip strength slightly less than the other wrist, however still within the normal range.
- Mental health was good, though pay attention to the coping style (survey handtherapists)
- Disabilities:
  - D920: Recreation and leisure activity
  - D4451: Pushing
  - D430: Lifting and carrying objects
  - D360: Using communication devices and techniques
  - D630: Preparing meals

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## Discussion

- No controle group
  - RCT the holy grail?
  - Does RCT reduce reality to what it not is? – difficult to implement
- Artikel Xpert-group (retrospective study)
  - Brand M, Selles RW, van Kooij YE, Feitz R, Videler AJ, Slijper HP, Wouters RM. Outcomes of an exercise program in patients with dorsal or volar midcarpal laxity: a cohort study of 213 patients. *Disabil Rehabil.* 2023;8:1-7.
- Sensori-motor control in patients with DRF
  - Muurling M, Lötters FJB, Geelen JE, Schouten AC, Mugge W. A long-term effect of distal radius fracture on the sensorimotor control of the wrist joint in older adults. *J Hand Ther.* 2021;34(4):567-576
  - Karagiannopoulos C, Michlovitz S. Rehabilitation strategies for wrist sensorimotor control impairment: From theory to practice. *J Hand Ther.* 2016;29(2):154-165.

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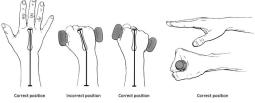
## Conclusion

This study showed promising results on perceived impairment and pain of a sensorimotor control-based exercise program in patients with chronic nonspecific wrist pain (SMoC).

A clear patient profile on impairment could be formulated for the group of patients with chronic nonspecific wrist pain.

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## Thanks for your attention!



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