Communication and CP: What do CFCS scores tell us?
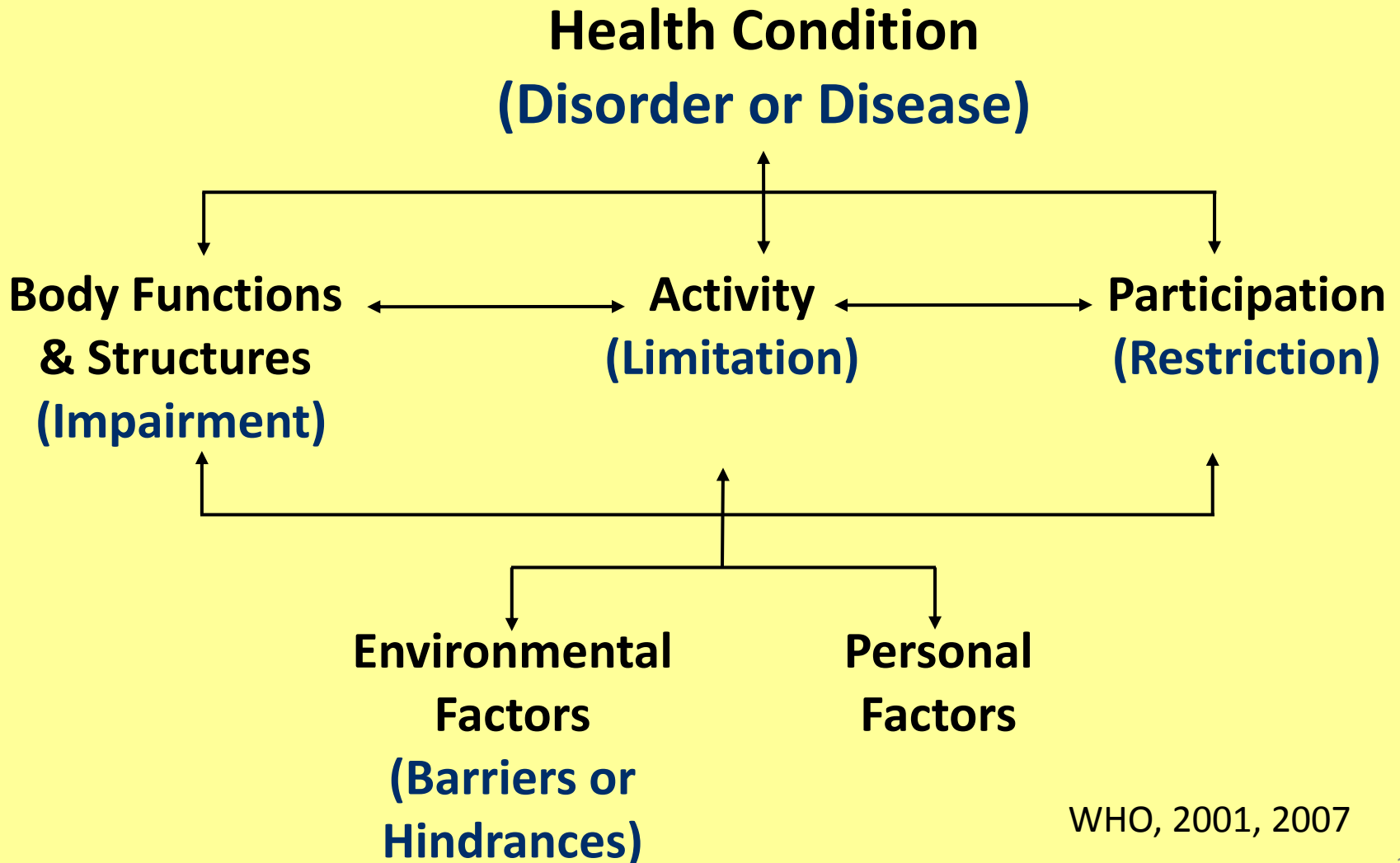
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1

WHO ICF Framework

Health Condition
(Disorder or Disease)

Body Functions & Structures ← → **Activity** ← → **Participation**
(Impairment) **(Limitation)** **(Restriction)**

Environmental Factors **Personal Factors**
(Barriers or Hindrances)

WHO, 2001, 2007

Shifting to ICF Activity/Participation

Classifications

- **Communication Function Classification System (CFCS)** (Hidecker et al., 2011)

  http://cfcs.us

- **Gross Motor Function Classification System (GMFCS)** (Palisano et al., 1997)

  http://www.canchild.ca/en/ measures/gmfcs.asp

- **Manual Ability Classification System** (Eliasson et al., 2006)

  http://www.macs.nu/

- **Eating and Drinking Ability Classification System (EDACS)** (Sellers et al., under development)

Outcomes

- **Focus on the Outcomes of Communication Under Six (FOCUS)**

  (Thomas-Stonell et al., 2010)

  http://www.hollandbloorview.ca/ research/FOCUS/

Activity-Focused Classification Tools

Level	GMFCS **Mobility**	MACS **Handling objects**	CFCS **Communicating**
I.	Walks without limitations.	Handles objects easily and successfully.	Effective sender/receiver with unfamiliar and familiar partners
II.	Walks with limitations.	Handles most objects but with somewhat reduced quality and/or speed of achievement.	Effective but slower sender/receiver with unfamiliar and familiar partners
III.	Walks using a hand-held mobility device.	Handles objects with difficulty; needs help to prepare and/or modify activities.	Effective sender/receiver with familiar partners
IV.	Self-mobility with limitations; May use powered mobility.	Handles a limited selection of easily managed objects in adapted situations.	Inconsistent sender and/or receiver with familiar partners
V.	Transported in a manual wheelchair.	Does not handle objects and has severely limited ability to perform even simple actions.	Seldom effective sender/receiver even with familiar partners

Inter-relationships of functional status in cerebral palsy:

Analyzing Gross Motor Function, Manual Ability, and Communication Function Classification Systems in children

Hidecker et al, 2012

AIM

- **Investigate the relationship among GMFCS (mobility), MACS (hand use) and CFCS (communication) in children with cerebral palsy**

PARTICIPANTS AND METHODS

- **222 children** met the case definition: children diagnosed with CP, aged 2-17 years, born in Michigan

- GMFCS, MACS, CFCS reported by mothers.

- CP types and associated impairments from physican referral forms.

CORRELATION RESULTS

- GMFCS-MACS r_s = .69 Strong
- CFCS-MACS r_s = .54 Moderate
- GMFCS-CFCS r_s = .47 Moderate

- May be due to overlapping locations and amounts of original brain injury
- Mobility, hand function, or communication function not likely to functionally predict each other

GMFCS-MACS-CFCS RESULTS

GMFCS Level I (n=59)

		CFCS Level					Row Totals
MACS Level		I	II	III	IV	V	
	I	**21**	**5**	**5**	**0**	**0**	31
	II	**9**	**7**	**3**	**4**	**0**	23
	III	**4**	**1**	**0**	**0**	**0**	5
	IV	**0**	**0**	**0**	**0**	**0**	0
	V	**0**	**0**	**0**	**0**	**0**	0
	Column Totals	34	13	8	4	0	59

GMFCS-MACS-CFCS RESULTS

GMFCS Level II (n=62)

CFCS Level

MACS Level	I	II	III	IV	V	
I	11	5	1	0	0	17
II	11	5	9	3	0	28
III	3	3	2	3	1	12
IV	2	0	1	1	0	4
V	0	0	0	0	1	1
Column Totals	27	13	13	7	2	62

GMFCS-MACS-CFCS RESULTS

GMFCS Level III (n=26)

CFCS Level

MACS Level	I	II	III	IV	V	
I	4	0	0	3	0	7
II	5	3	2	0	1	11
III	3	1	2	0	0	6
IV	0	0	0	2	0	2
V	0	0	0	0	0	0
Column Totals	12	4	4	5	1	26

GMFCS-MACS-CFCS RESULTS

GMFCS Level IV (n=26)

CFCS Level

MACS Level	I	II	III	IV	V	
I	1	0	0	0	0	1
II	1	0	3	0	0	4
III	3	2	4	5	0	14
IV	1	1	3	0	0	5
V	0	0	0	0	2	2
Column Totals	6	3	10	5	2	26

GMFCS-MACS-CFCS RESULTS

GMFCS Level V (n=49)

CFCS Level

MACS Level		I	II	III	IV	V	
	I	0	0	0	0	0	0
	II	1	2	0	1	0	4
	III	1	2	2	2	0	7
	IV	1	2	8	7	3	21
	V	0	1	3	5	8	17
Column Totals		3	7	13	15	11	49

Propose Functional Profiles

- By considering the GMFCS, MACS, & CFCS separately and in combinations
  - "All I's" GMFCS I, MACS I, & CFCS I
  - "All V's" GMFCS V, MACS V, & CFCS V
  - GMFCS III (uses crutches)
    MACS I (uses hands functionally)
    CFCS II (uses a speech-generating device)
  - GMFCS IV (uses powered wheel chair)
    MACS I (uses hands functionally)
    CFCS II (uses a speech-generating device)

FUTURE DIRECTIONS

- Relate functional profiles to measures of activities & participation

- Increase sample size to compare possible differences by age & type of CP

- Repeat analysis in population-based samples

Early predictors of communication function in children with cerebral palsy:
Methods of communication and associated impairments

Hidecker et al., 2013

AIMS

1) **Investigate the relationship between CFCS levels and communication methods and associated impairments.**

2) **Identify potential predictors of CFCS levels.**

PARTICIPANTS AND METHODS

- **215 children** met the case definition: children diagnosed with CP, aged 2-17 years, born in Michigan

- CP types and associated impairments from physican referral forms.

- CFCS and methods of communication reported by mothers.

- Potential predictors from maternal interview.

RESULTS **n, (%)

Associated Impairments	All 215	CFCS I 81 (38)	CFCS II 42 (20)	CFCS III 42 (20)	CFCS IV 35 (16)	CFCS V 15 (7)
Cognitive impairment	**60 (28)**	**9 (4)**	**13 (6)**	**15 (7)**	**16 (27)**	**7 (3)**
Hearing impairment	**9 (4)**	**4 (2)**	**0**	**1(<1)**	**2 (1)**	**2 (1)**
Seizure	**59 (27)**	**9 (4)**	**10 (5)**	**10 (5)**	**18 (8)**	**12 (5)**
Speech impairment	**76 (35)**	**8 (4)**	**18 (8)**	**20 (9)**	**22 (10)**	**8 (4)**
Visual impairment	**67 (31)**	**24 (11)**	**13 (6)**	**11 (5)**	**13 (6)**	**6 (3)**
No comorbidities	74 (34)	43 (20)	16 (7)	12 (6)	2 (1)	1 (<1)
One comorbidity	57 (27)	25 (12)	8 (4)	14 (7)	8 (4)	2 (1)
Two comorbidities	51 (24)	11 (5)	10 (5)	6 (3)	17 (8)	7 (3)
Three or more comorbidities	33 (15)	2 (1)	8 (4)	10 (5)	8 (4)	5 (2)

RESULTS **MULTIPLE METHODS USED n, (%)

Communication methods used	All 215	CFCS I 81 (38)	CFCS II 42 (20)	CFCS III 42 (20)	CFCS IV 35 (16)	CFCS V 15 (7)
Speech**	**164 (76)**	**81 (38)**	**37 (17)**	**29 (13)**	**15 (7)**	**2 (1)**
Speech only**	58 (27)	43 (20)	11 (5)	2 (1)	1 (<1)	1 (<1)
Sounds **	**125 (58)**	**28 (13)**	**23 (11)**	**33 (15)**	**29 (13)**	**12 (6)**
Eye gaze, facial expression, gesture, pointing**	**131 (61)**	**36 (17)**	**27 (13)**	**37 (17)**	**26 (12)**	**5 (2)**
Manual sign*	**53 (25)**	**13 (6)**	**11 (5)**	**17 (8)**	**12 (6)**	**0**
Aided AAC	**46 (21)**	**8 (4)**	**5 (2)**	**14 (7)**	**18 (8)**	**1 (<1)**
Communication boards, books, and/or pictures**	38 (18)	8 (4)	4 (2)	12 (6)	14 (6)	0
VOCAs or SGDs**	24 (11)	1 (<1)	3 (1)	7 (3)	11 (5)	2 (1)

CRUDE AND ADJUSTED ODDS RATIO (OR) FOR CFCS LEVELS I, II, III, AND COMBINED IV/V

	Crude OR	Conf Interval		Adj. OR	Conf Interval	
Gestational age						
<=32 weeks	**.53***	.32	.86	**.33***	.16	.65
> 32 weeks	REF					
Comorbidities						
No comorbidities	REF					
One or more comorbidities	**2.19***	1.14	4.20	**1.91***	1.40	2.6
First words						
<= 24 months old						
> 24 months old	**10.05***	5.49	18.39	**Interaction effect**		
Communication methods used						
Speech only	**.10***	.05	.20	**Interaction effect**		

FUTURE DIRECTIONS

- Explore reasons behind aided AAC use or not

- Increase sample size to allow model building

- Repeat analysis in population-based samples

Additional Research Projects

- Phase 1: Further development of CFCS
  - Ordinality of the five CFCS levels
  - Extension of CFCS to adults with cerebral palsy
  - Extension of CFCS to other disorders
    - Development of the Autism Classification of Social Function
  - Factors affecting parents' and professionals' agreement on CFCS
  - Translations & validation of CFCS in other languages
- Phase 2: Analysis using CFCS data
  - Michigan OWL data
  - Ontario Ministry of Children and Youth Services preschool speech and language programs

- CFCS Website (translations & FAQs available) http://cfcs.us/download

Available on website:

Chinese-Simplified

Chinese-Traditional

Dutch

German

Hebrew

Norwegian-SCPE

Spanish

Swedish-SCPE

Turkish

In process:

French

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QUESTIONS????????????