Relationship between children's and parents' perceived water competence of the child

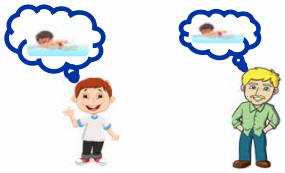
Lise Buelens, Eva D'Hondt, Julie Stainier, Eline Van der Linden , Kristine De Martelaer

VUB MODI MOTOR SKILLS & DIDACTICS RESEARCH GROUP

INTRODUCTION

Water competence

Physical Aspect	Cognitive Aspect	Affective aspect
Actual aquatic skills -> Actual movements / capabilities	Perceived aquatic skills -> Perceptions (self- & proxy report)	Attitude -> Behavior in, on, around water



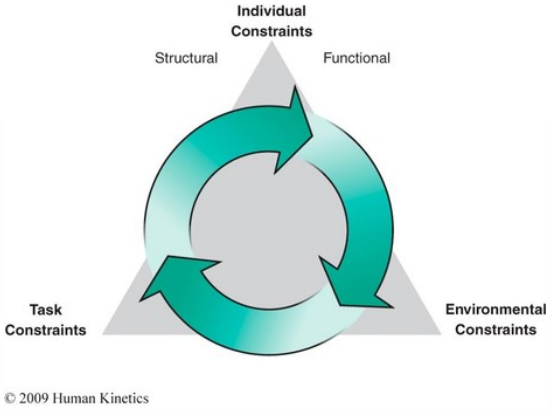
(Weiss et al., 2010; Gladissh, 2002; Theurer & Bhaysar, 2013; Langendorfer, 2011; Langendorfer, 2015; Stallman et al. 2017)

VUB VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

INTRODUCTION

WATER COMPETENCE – PHYSICAL ASPECT



(World Health Organization, 2018; Zuoziené et al. 2014; Bardid et al. 2016; Lovric & Papec, 2017; Mercado-Crespo et al. 2016; Stodden et al. 2017; Frost & McKelvie, 2004; Potard et al. 2004)

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

INTRODUCTION

WATER COMPETENCE – COGNITIVE ASPECT

Past experiences

Intrinsic motivation

Perceived (aquatic) skills

Reinforcement and personal interactions with significant others

Difficulty or challenge associated with the outcome

(Harter, 1996)

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

INTRODUCTION

WATER COMPETENCE – COGNITIVE ASPECT

Correct estimation:

- Safety
- Safe conduct in, on or around water
- Confidence and satisfaction

Wrong estimation:

- Underestimation vs. Overestimation
- Risk of drowning
- Lower levels of global self-worth

(Harter, 1996)

VUB VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

INTRODUCTION

WATER SAFETY

Water competence

- Physical Aspect
  ➔ **Actual aquatic skills**
- Cognitive Aspect
  ➔ **Perceived aquatic skills**
- Affective Aspect

Parental supervision and awareness about possible danger in, on around water

- **Attention:** Listening, watching, interaction
- **Proximity:** Distance
- **Continuity:** Amount of effective supervision

Langendorf et al. 2015; Stallman et al. 2017; Quan et al. 2015; Andersson 1999; Saluja et al. 2004; Matthews et al. 2018

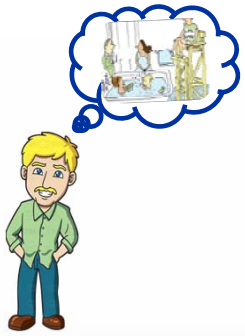
VUB VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

PURPOSE

A. Correlation between children's and parents' **perceived aquatic skills** of the child

B. The **freedom** parents give their children and the **awareness** they raise about possible dangers in, on and around water



VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

METHODS

Study design
- Exploratory cross-sectional study

Participants
- Inclusion criteria
- Exclusion criteria

Inclusion criteria:
- Program Lane 4 (or similar)
- 6-9 year olds
- Child and parent

Exclusion criteria:
- Known diseases, conditions, disorders (eg. obesity, mental retardation, Down syndroom)
- Competitive swimmers
- Not speaking Dutch, English or French

Settings
- Data collection: October 2018 – February 2019
- 6 swimming schools (Flanders and Brussels)
- Recruitment participants: e-mail & oral recruitment

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

QUESTIONNAIRES

Children

- Pictorial Water Competence Scale

Parents

- Pictorial Water Competence Scale
- Freedom and Awareness questionnaire
- Demographic questionnaire

VRIJE UNIVERSITEIT BRUSSEL

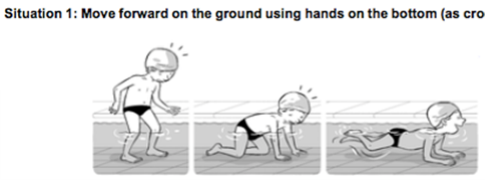
ARIS 2020.

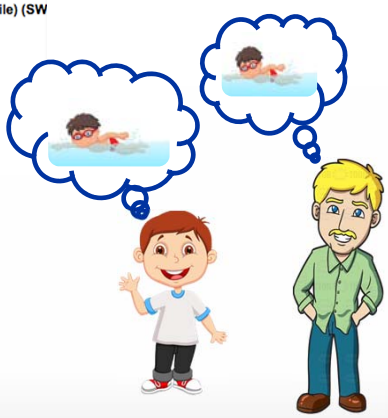
'DRAW' QUESTIONNAIRE A

Pictorial Water Competence Scale

- In development
- International expertise group
- 17 different aquatic skills
- Three options per skill
- Total score: 0-34

(Morgado, L., De Martelaer, K., Jidovtseff, B., Costa, A. et al. 2018)

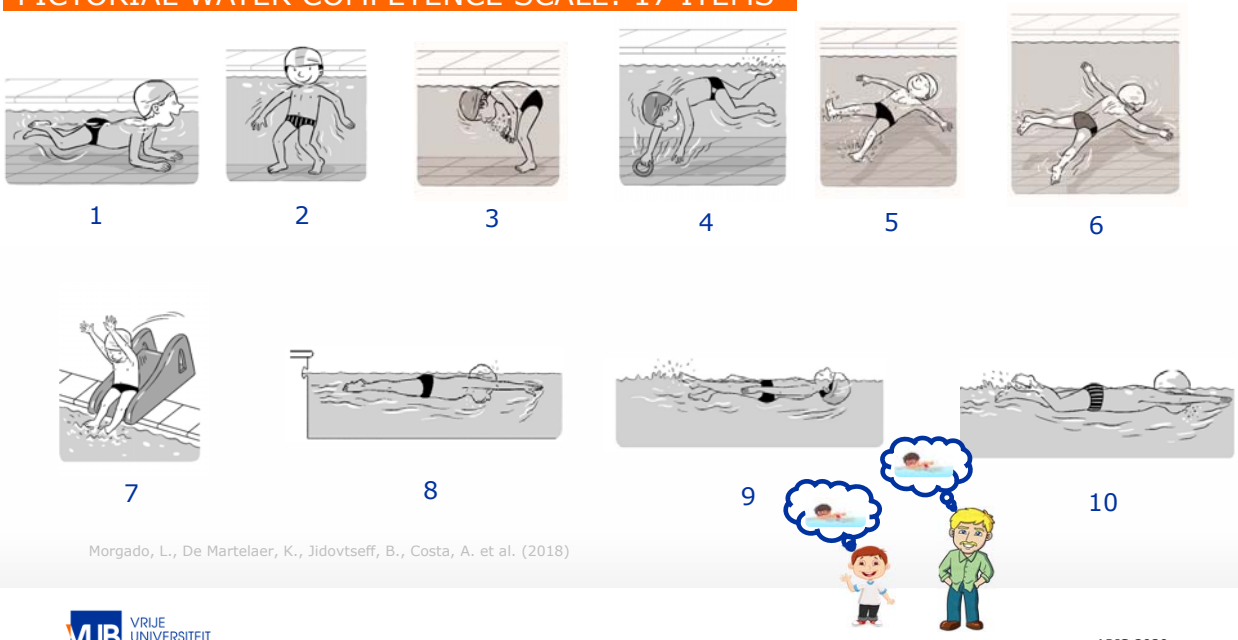




VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

PICTORIAL WATER COMPETENCE SCALE: 17 ITEMS

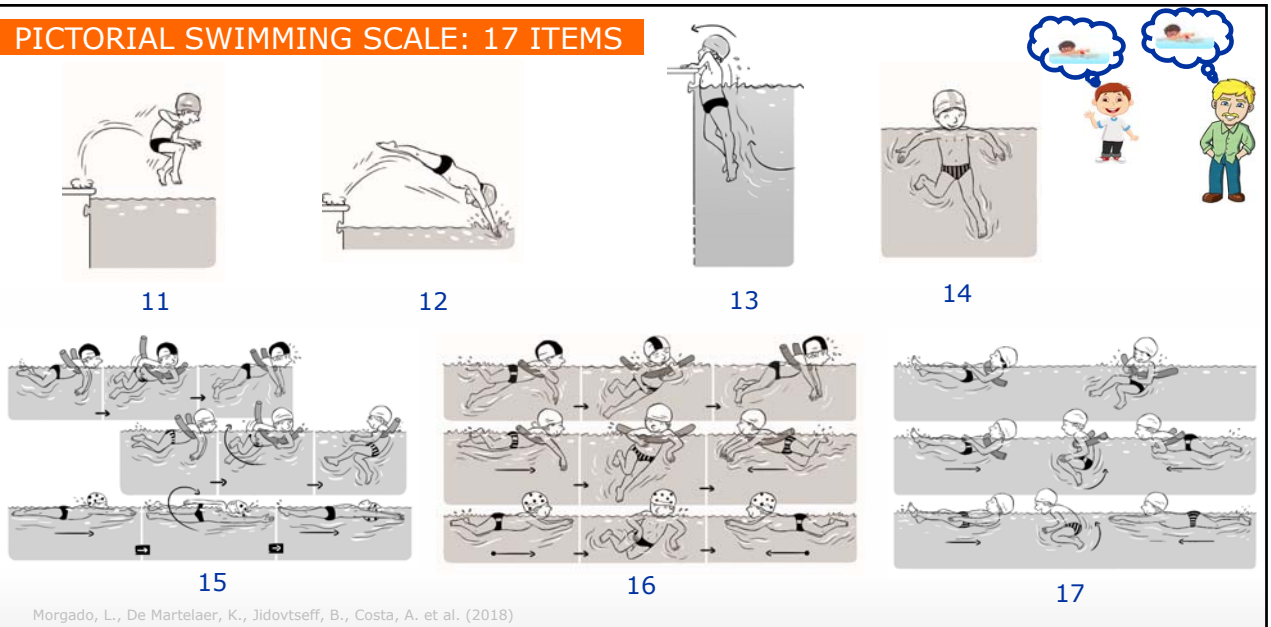


Morgado, L., De Martelaer, K., Jidovtseff, B., Costa, A. et al. (2018)

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

PICTORIAL SWIMMING SCALE: 17 ITEMS



Morgado, L., De Martelaer, K., Jidovtseff, B., Costa, A. et al. (2018)

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

QUESTIONNAIRE B

Freedom and Awareness questionnaire

Developed in function of this research, not yet validated

11 statements: **Likert scale 1-5**

2 dimensions:

- **Freedom (7):** total score 7-35
- Awareness raising (4): total score 4-20

Examples:

Freedom
I give myself a score linked to how free I leave my child **in general** when it plays **in, on and around the water**
How free do I leave my child **together with peers** (friends, brother, sister, cousin, niece) in a **small/undeep swimming pool** in the absence of a rescuer / (adult) supervisor

Not free **Very free**

1 2 3 4 5

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

QUESTIONNAIRE B

Freedom and Awareness questionnaire

Developed in function of this research, not yet validated

11 statements: **Likert scale 1-5**

2 dimensions:

- Freedom (7): total score 7-35
- **Awareness raising** (4): total score 4-20

Example:

Awareness
I talk to my child about possible dangers in a small/undeep swimming pool

Never **Very often**

1 2 3 4 5

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

METHODS

Statistical analyses

- Factor analysis: 2 dimensions
- Internal consistency: Cronbach's alpha
- Shapiro-Wilk normality tests
- Spearman's Rho correlations & Fisher r-to-z transformation
- Mann-Whitney U test
- 3-way ANOVA / Kruskall Wallis tests
- Friedman test

- Total group
- Girls – All parents
- Boys – All parents
- Mothers – All children
- Fathers – All children
- Boys – Fathers
- Mothers - Boys
- Girls – Fathers
- Girls - Mothers

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS

DESCRIPTIVE STATISTICS

- N = 134
- Mean age: 7.13 +/- 1.1
- 44% Girls; 56% Boys

- N = 134
- 71.9% Mothers; 28.1% Fathers

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS
INTERNAL CONSISTENCY

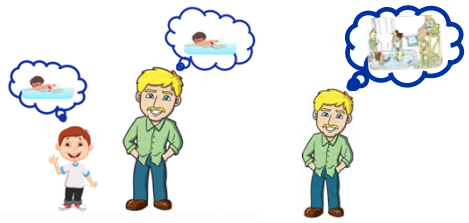


Table 1 Internal consistency of the different questionnaires

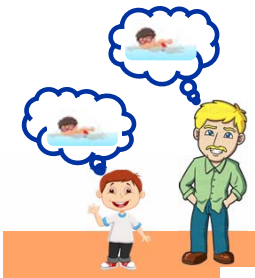
	Pictorial swimming scale children	Pictorial swimming scale parents	Freedom and awareness questionnaire		
			Freedom (D1)	Awareness raising (D2)	Total
Cronbach's alpha	0.871*	0.932*	0.826*	0.794*	0.739*

*Reliable questionnaire (Cronbach's alpha >0.70)

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS
DESCRIPTIVE STATISTICS



		Mean + / - St. dev.
Pictorial Water Competence Scale – Children		30.02 +/- 4.97
	Boys (n = 75)	30.69 +/-4.60
	Girls (n = 59)	29.17+/-5.32
Pictorial Water Competence Scale - Parents		28.31 +/- 6.20
	Fathers (n = 38)	28.97+/-6.26
	Mothers (n = 96)	28.04+/-6.19

Max 34

		Mean + / - St. dev.
Freedom and Awareness Questionnaire	*Total*	36.40 +/- 6.35
Max 55	*Fathers*	37.11+/-7.29
	Mothers	36.13+/-5.96
	Freedom (D1)	20.70 +/- 5.58
Max 35	*Fathers*	22.08+/-6.12
	Mothers	20.16+/-5.30
	Awareness Raising (D2)	15.70 +/- 3.20
Max 20	*Fathers*	15.03+/-3.47
	Mothers	15.97+/-3.07

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS – PICTORIAL SWIMMING SCALE

RELATIONSHIPS BETWEEN TOTAL GROUPS (ALL PARENTS & CHILDREN)

DIFFERENT SUBGROUPS (MOTHER - FATHER & GIRLS - BOYS)

	All children (N=134)		Girls (n=59)		Boys (n=75)	
	Rho	N	Rho	N	Rho	N
All parents (N=134)	0.550**	134	0.609**	59	0.507**	75
Fathers (n=38)	0.522**	38	0.733**	13	0.401*	25
Mothers (n=96)	0.558**	96	0.529**	46	0.574**	50

*significant at the 0.05 level
**significant at the 0.01 level
***significant at the 0.001 level

- **Fisher r-to-z transformation**: No significant differences between the different correlation coefficients

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS – PICTORIAL SWIMMING SCALE

DIFFERENCES ACCORDING TO GENDER: MANN-WHITNEY U

Children	
Mann-Whitney U	1669.500
Sig.	0.014**

Significant gender ≠ :
Boys > girls

N = 134
Boys (n=75): 30.69 ± 4.6
Girls (n=59): 29.17 ± 5.32

Parents	
Mann-Whitney U	1545.000
Sig.	0.165

No significant gender ≠

N = 134
Fathers (n=38): 28.97 ± 6.26
Mothers (n=96): 28.04 ± 6.19

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS – FREEDOM AND AWARENESS QUESTIONNAIRE

DIFFERENCES IN OUTCOMES: 3-WAY ANOVA

Freedom part

	F-value	Sig. (p)		Mean	St. Dev
Gender child	5.974	0.016*	Boys	19.76	0.62
			Girls	22.30	0.84
Gender parent	3.519	0.063	Fathers	22.00	0.90
			Mothers	20.05	0.52
Parent's perception	24.9	<0.001**	Low estimate	18.44	0.81
			High estimate	23.62	0.65
Gender child * Gender parent	0.054	0.817			
Gender child * Parent's perception	0.063	0.803			
Gender parent * Parent's perception	0.764	0.384			
Gender child * Gender parent * Parent's perception	0.175	0.677			

*significant at the 0.05 level
**significant at the 0.01 level

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

DISCUSSION

KEY FINDINGS

Perceived aquatic skills

Parents vs children

- Moderately significant positive relationship
- Children > parents

= literature

Boys vs girls

- Boys > girls

= literature

Fathers vs mothers

- No significant difference

Literature: fathers > mothers

(Mercado et al. 2016; Kennedy et al. 2012; Lalor et al. 2016; Hall et al. 2019; Stanley and Moran 2017; Moran et al. 2009)

Given freedom in, on and around water

Boys vs girls

- Boys < girls

≠ literature

Fathers vs mothers

- Fathers > mothers

= literature

High vs low estimation

- High > low

(Rosen & Peterson 1990; Mercado et al. 2016; Lalor et al. 2016; Hall et al. 2019; Stallman et al. 2017)

Awareness raising about possible dangers in, on and around water

Boys vs girls

- No significant difference

Fathers vs mothers

- No significant difference

High vs low estimation

- No significant difference

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

CONCERNS

Concerns

Children's perceived aquatic skills vs actual aquatic skills

- Risk management
- Perception of danger

Parent's perceived aquatic skills of the child vs actual aquatic skills

- Parental optimism
- Supervision needed & provided

(Morrongiello et al. 1998; Sandomierski 2011; Moran 2006b; Stanley and Moran 2017; Langendorfer 2011)

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

STRENGTHS - LIMITATIONS

Strengths

- Unique topic
- Pictorial Water competence scale: international project
- Practical relevance
- In function of water safety

Limitations

- Pictorial swimming scale: new and still developing measuring instrument
- Small sample of children and parents
- Specific swimming schools: selection bias
- Ceiling effect
- Snapshot of the perceptions

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

Larger sample size – randomised sampling technique

Age of the child

(Hall et al. 2019; Stodden et al. 2008)

FUTURE RESEARCH

Open water research – different environments – Danger perception

Parental education level

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

THANKS FOR YOUR ATTENTION!

VRIJE UNIVERSITEIT BRUSSEL

PURPOSE

C. Correlation between children's **actual and perceived aquatic skills** of

D. Correlation between children's **actual and parents' perceived aquatic skills** of the child

E. Differences between the **assessments** of a child's aquatic skill (i.e. PWCS* children; PWCS parents & AAST**)

*PWCS = Pictorial Water Competence Scale
**AAST = Actual Aquatic skill test

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

ACTUAL AQUATIC SKILL TEST

- Performance of the Pictorial Water Competence Scale
- After filling in Pictorial Water Competence Scale
- Same 17 aquatic skills as Pictorial Water Competence Scale
- Same scoring system as Pictorial Water Competence Scale
- "Perform as good as possible"

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS

DESCRIPTIVE STATISTICS ACTUAL AQUATIC SKILL TEST

	Actual aquatic skill		
AAST	31.51 ± 4.66	33.00	
Boys (n = 75)	31.76 ± 4.53	33.00	Max 34
Girls (n = 59)	29.17 ± 5.32	33.00	

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS-C

RELATIONSHIP BETWEEN CHILDREN'S ACTUAL AND PERCEIVED AQUATIC SKILLS

TOTAL GROUP (ALL CHILDREN) & DIFFERENT SUBGROUPS (BOYS-GIRLS)

Children's Actual vs. Perceived aquatic skill			
Actual \ Perceived	**All children (n=134)**	**Girls (n=59)**	**Boys (n=75)**
All children (n=134)	0.533***		
Girls (n=59)		0.647***	
Boys (n=75)			0.432***

*significant at the 0.05 level
**significant at the 0.01 level
***significant at the 0.001 level

VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS-D

RELATIONSHIP BETWEEN CHILDREN'S ACTUAL AND PARENTS' PERCEIVED AQUATIC SKILLS OF THE CHILD

TOTAL GROUP (ALL CHILDREN – ALL PARENTS) & DIFFERENT SUBGROUPS (FATHERS-MOTHERS & BOYS-GIRLS)

Children's Actual vs. Parents' Perceived aquatic skill of the child						
Children / Parents	All Children (n=134)		Girls (n=59)		Boys (n=75)	
	Rho	N	Rho	N	Rho	N
All parents (n=134)	0.613***	134	0.673***	59	0.542***	75
Mothers (n=96)	0.554***	38	0.601***	13	0.450**	25
Fathers (n=38)	0.712***	96	0.796**	46	0.681***	50

*significant at the 0.05 level
**significant at the 0.01 level
***significant at the 0.001 level

VUB VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS-E

DIFFERENCES BETWEEN THE DIFFERENT ASSESSMENTS OF A CHILD'S AQUATIC SKILL

(I.E. PWCS CHILDREN; PWCS PARENTS & AAST) - FRIEDMAN TEST

Friedman test	
Chi-Square	Sig.
56.191	< 0.001

Wilcoxon test		
	Z-score	Sig.
PWCS(Children) vs. PWCS (parents)	-3.957	< 0.001
AWCT vs. PWCS(children)	-4.906	< 0.001
AWCT vs. PWCS(parents)	-7.690	< 0.001

VUB VRIJE UNIVERSITEIT BRUSSEL

ARIS 2020.

RESULTS

FISHER R-TO-Z

Table 7 Fisher r-to-z transformation between the Spearman's Rho correlations

	Total sampe (N=134)	Girls – All par-ents (N=59)	Boys – All par-ents (N=75)	Moth-ers-All chil-dren (N=96)	Fa-thers-All chil-dren (N=38)	Girls-Moth-ers (N=46)	Girls-Fa-thers (N=13)	Boys-Moth-ers (N=50)	Boys-fathers (N=25)
Total sample (N=134)		-0.56	0.41	-0.09	0.21	0.17	-0.97	-0.21	0.84
Girls – all par-ents (N=59)			0.83	0.46	0.60	0.58	-0.66	0.27	1.12
Boys – All par-ents (N=75)				-0.45	-0.1	-0.16	-1.12	-0.51	0.55
Moth-ers-All chil-dren (N=96)					0.26	0.22	-0.92	-0.13	0.87
Fa-thers-All chil-dren (N=38)						-0.04	-0.99	-0.33	0.57
Girls-Moth-ers (N=46)							-0.99	-0.31	0.63
Girls-Fathers (N=13)								0.81	1.34
Boys-Moth-ers (N=50)									0.89
Boys-fathers (N=25)									

z-values are displayed
**significant at the 0.05 level*
***significant at the 0.01 level*

RESULTS

MANN-WHITNEY U

Parents vs children

	Parents vs Children
Mann-whtiney U	7586
Sig.	0.027*

**Significant at the level 0.05*

Parents (n=134): 28.31+/-6.20
Children (n=134): 30.02 +/- 4.97

QUESTIONNAIRES

- Demographic questionnaire
  - Age of the child
  - Gender of the child
  - Disorders
  - Gender of the parent
  - Educational level of the parent
  - Presence during swimming lessons

- Pictorial swimming scale
  - In development
  - 17 different aquatic skills: Three options
  - Total score: 0-34

(Morgado, L., De Martelaer, K., Jidovtseff, B., Costa, A. et al. 2018)

- "Freedom and Awareness"-questionnaire
  - Non-validated, developed in function of this research
  - 11 statements: scored 1-5
  - 2 dimensions:
    - freedom (7): total score 7-35
    - awareness raising (4): total score 4-20

VRIJE UNIVERSITEIT BRUSSEL

The relationship between children's and parents' perceived water competence of the child and the freedom parents give to their children in, on and around water
21-3-2020 | 35

INTRODUCTION

PURPOSE OF THE STUDY

- Differences in actual water competence and perceived water competence according to gender.
- Relationship between actual and perceived water competences in children aged 6-9 years
  - Influence of gender ♂ VS. ♀
  - Influence of the amount of time children go swimming outside of the swimming school
- Assessment of individual items

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

STATISTICAL ANALYSIS: RESULTS

IBM SPSS STATISTICS 25: DESCRIPTIVE STATISTICS

Variables	Mean	SD	N	Min	Max
Actual water competence (0-34)	31.60	4.58	140	7	34
Actual water competence (ANCOVA)	31.67	4.53	135	7	34
Boys	31.79	4.47	77		
Girls	31.50	4.64	58		
Perceived water competence (0-34)	30.16	4.91	140	7	34
Perceived water competence (ANCOVA)	30.18	4.95	135	7	34
Boys	30.75	4.56	77		
Girls	29.41	5.36	58		
Age	7.21y	1.12y	140	6y	9y

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

STATISTICAL ANALYSIS: RESULTS

IBM SPSS STATISTICS 25: DESCRIPTIVE STATISTICS

Variables	Mean	SD	N	Min	Max
Actual water competence (0-34)	31.60	4.58	140	7	34
Actual water competence (ANCOVA)	31.67	4.53	135	7	34
Boys	31.79	4.47	77		
Girls	31.50	4.64	58		
Perceived water competence (0-34)	30.16	4.91	140	7	34
Perceived water competence (ANCOVA)	30.18	4.95	135	7	34
Boys	30.75	4.56	77		
Girls	29.41	5.36	58		
Age	7.21y	1.12y	140	6y	9y

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

STATISTICAL ANALYSIS: RESULTS

IBM SPSS STATISTICS 25: DESCRIPTIVE STATISTICS

Variables	Mean	SD	N	Min	Max
Actual water competence (0-34)	31.60	4.58	140	7	34
Actual water competence (ANCOVA)	31.67	4.53	135	7	34
Boys	31.79	4.47	77		
Girls	31.50	4.64	58		
Perceived water competence (0-34)	30.16	4.91	140	7	34
Perceived water competence (ANCOVA)	30.18	4.95	135	7	34
Boys	30.75	4.56	77		
Girls	29.41	5.36	58		
Age	7.21y	1.12y	140	6y	9y

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

STATISTICAL ANALYSES: RESULTS

Test	Numbers
Factor analysis	α = 0.93 (Actual) α = 0.87 (Perceived)
Pearson's correlation & Fisher r-to-z transformation	r = 0.68, p < 0.001 (Total: mod. pos. correlation) r = 0.62, p < 0.001 (Boys: mod. pos. correlation) r = 0.74, p < 0.001 (Girls: high pos. correlation) z = -1,31, p < 0.001 (Significant difference)

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

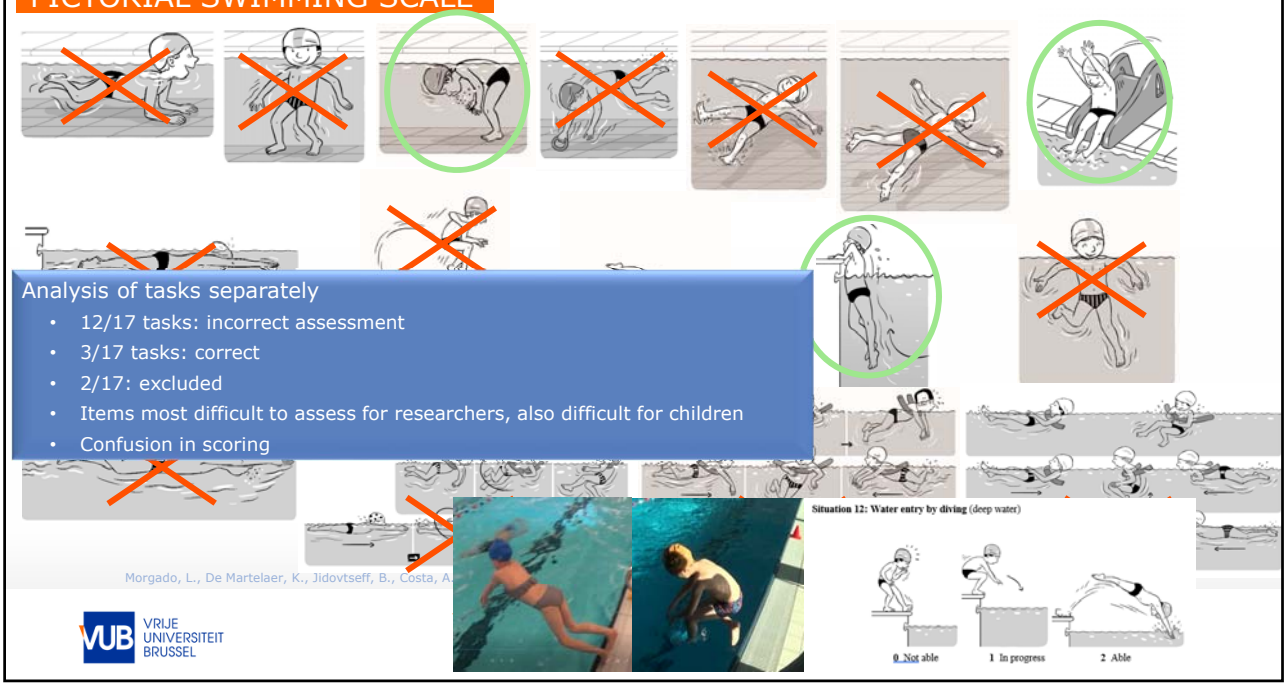
STATISTICAL ANALYSES: RESULTS

Test	Numbers
One way ANCOVA (actual)	F = 0.12, p = 0.725 (Gender) F = 0.06, p = 0.815 (Frequency of swimming)
One way ANCOVA (Perceived)	F = 2.76, p = 0.099 (Gender) F = 2.01, p = 0.159 (Frequency of swimming)
2x2 Repeated measures ANCOVA	F = 2.14, p = 0.145 (Gender) F = 21.64, p < 0.001 (Type of water competence) (AWC = 31.67 ± 4.53; PWC = 30.18 ± 4.95; Mean difference of M = 1.49)
Fisher's exact test	12/17: Significant difference 2/17: Excluded 3/17: No significant difference

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

PICTORIAL SWIMMING SCALE



Analysis of tasks separately

- 12/17 tasks: incorrect assessment
- 3/17 tasks: correct
- 2/17: excluded
- Items most difficult to assess for researchers, also difficult for children
- Confusion in scoring

Morgado, L., De Martelaer, K., Jidovtseff, B., Costa, A.

VRIJE UNIVERSITEIT BRUSSEL

DISCUSSION

Other studies also found positive correlations between children's actual and perceived water competence

Few articles about water competence, a lot of articles about motor competence

Age:

- A lot of contradictions
- Younger children rather use feedback, rather than reflecting on themselves
- Transition ??? Overestimation -> underestimation (on dry land)

(Toftegaard-Stoeckel et al. 2010; groenfeldt & Andersen, 2010; Liong et al. 2015; Babic et al. 2014; De Meester et al. 2016; Zuoziené et al. 2014; Lovric & Papec, 2017; Mercado-Crespo et al. 2015)

DISCUSSION

Gender:

Present study:
- Actual and perceived water competence: ♂ > ♀
- Assessment: ♂ = ♀

One article in the water: actual water competence: ♂ > ♀

Dry land: in general for actual and perceived locomotor skills: ♂ = ♀

Amount of time children go swimming outside of the swimming school.

➔ Did not have an influence on children's abilities to assess themselves.

Participation in swimming lessons

➔ Some research: previous swimming lessons decrease risk of drowning

LIMITATIONS AND STRENGTHS

Limitations	Strengths
• Cross-sectional design: no evolution	• Necessary sample size was calculated and met. (G-power)
• Pictorial scale: current testing inter- and intra rater reliability	• Pictorial scale: developed by international group
• Children with same background + swimming lessons	• Convenience sampling
• Only tested in swimming pools	• Accurate representation Belgian swimming schools
• Different results with parental supervision?	• Important topic for prevention drowning
• Three-point scale -> five-point scale	• Testing specific aquatic tasks: elaborated (walking in water, blowing bubbles, entering, exiting, catching object, vertically treading water, floating, propulsion and turning around axes)
• Swimming skills: ex. swimming 25 meters	
• Time consuming (reporting/recall bias)	
• Specific age group: 6-9 years	

VRIJE UNIVERSITEIT BRUSSEL

CIAPSE- 2019- De Martelaer et al.

FUTURE

FUTURE RESEARCH

- Children with different backgrounds
- Clinical populations
- No prior swimming lessons
- Different situations (open water)
- Longitudinal study design

Water safety research needs to continue developing to decrease the risk of drowning!!!

FUTURE

IMPLICATIONS OF THIS RESEARCH

Implications of this research

- Base for future research
- Education sessions about water safety and children's perceptions
- App or book: tips, exercices, test batteries for teachers about both actual and perceived water competences
- Informing parents about their child's perceptions
- Adjusting swimming diploma's -> skills that are hard to assess
- Educational game for children.

GAME

A child needs to grow up in a game and needs to learn how to swim.

- Challenges
- Competitions against virtual players
- Selecting correct tips
- Selecting body position

➔Development of the child with attention to important skills and technique

➔Motivation for personal development

VRIJE UNIVERSITEIT BRUSSEL

The relationship between children's actual and perceived water competence using a pictorial swimming scale

27-6-2019 | 47

CONCLUSION

Children: 6-9 years, participating in swimming lessons:
UNDERESTIMATE (???) their water competence.

***No significant influence* from gender**
or the amount of time children go swimming outside of the swimming school on the relationship between children's actual and perceived water competence.

12 out of 17 tasks were NOT correctly assessed

A lot of work has to be done !

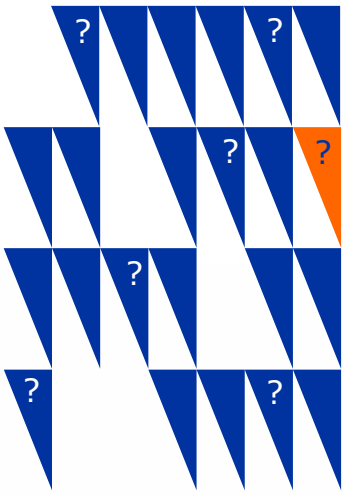
VRIJE UNIVERSITEIT BRUSSEL

The relationship between children's actual and perceived water competence using a pictorial swimming scale

27-6-2019 | 48

THANK YOU.

Questions ?



PARALLEL RESEARCH

LISE BUELENS

The relationship between children's and parents' perceived water competence of the child and the freedom parents give their children in, on and around water.

- Moderate positive correlation between children's and parents' perceptions about the water competence of the child.
- Freedom parent grant their children in, on and around water
  - Girls were granted more freedom than boys.
  - Fathers gave their children more freedom than mothers
  - Parents with high perceptions of their children -> more freedom

STATISTICAL ANALYSIS

IBM SPSS STATISTICS 25

Descriptive statistics

Internal consistency of pictorial scale

- Factor analysis

Relationship between actual and perceived water competence: total group, all girls, all boys

- Pearson's correlation analysis

Differences in actual water competence according to gender (boys vs. girls) of the child, adjusted for the frequency of swimming outside of the swimming school. + analogous for the perceived water competence.

- Two one-way ANCOVA's

Difference in total score of the pictorial scale: according to the type of test (actual vs. perceived = within factor) as well as the gender (boys vs. girls) of the child, adjusted to the frequency of swimming outside of the swimming school.

- 2x2 Repeated measures ANCOVA

The relationship between actual and perceived water competence for each separate item of the pictorial scale

- Fisher's exact test

DISCUSSION

Other studies also found positive correlations between children's actual and perceived water competence

Pictorial scale vs. Questionnaire

Few articles about water competence, a lot of articles about motor competence

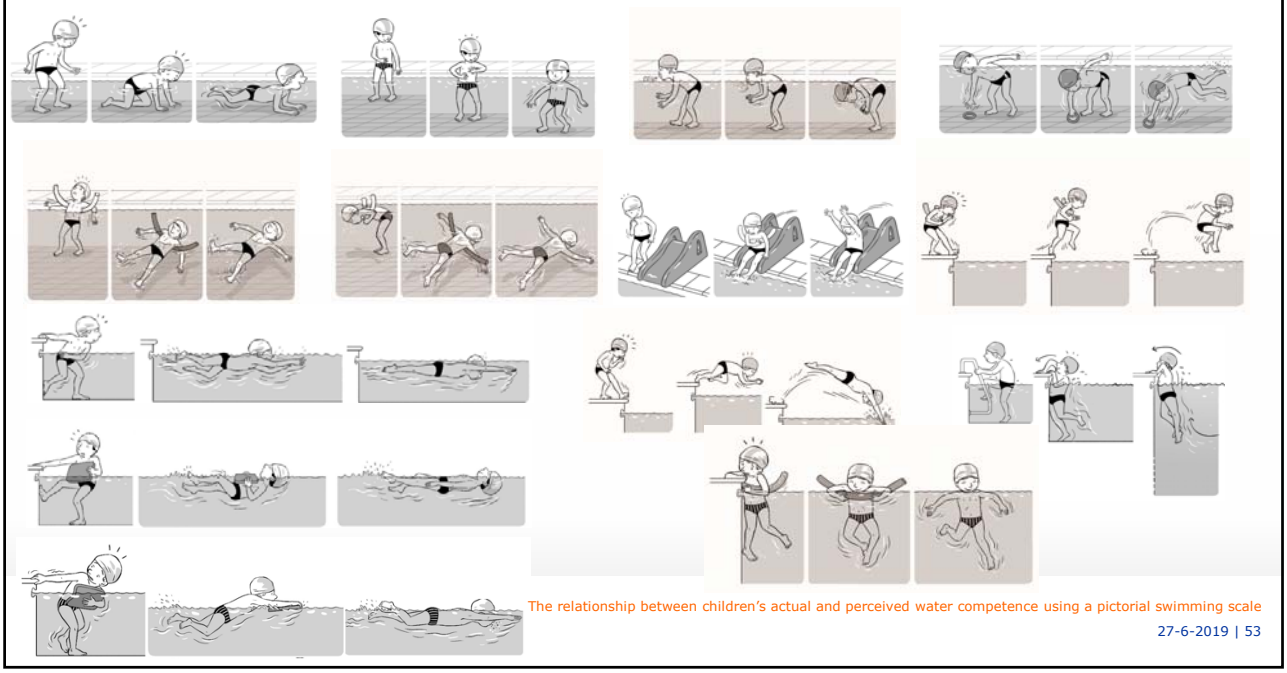
Age:

- A lot of contradictions
- Same age group: positive correlation between actual and perceived motor competence (depending on tasks performed). Some studies found an overestimation.
- Younger children rather use parental and other feedback, rather than reflecting on themselves
- >9 years: weak positive correlations between actual and perceived. Often an understimation.
- Transition ??? Overestimation -> underestimation (on dry land)

Gender

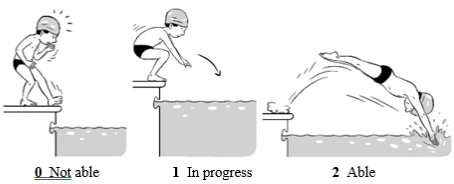
- Boys score higher on actual and perceived water competence. But girls and boys assess themselves equally.
- One article in the water: found gender differences
- Dry land: in general it is found that boys and girls can equally assess themselves on actual and perceived locomotor skills, but boys are better at assessing object control skills.

PICTORIAL SWIMMING SCALE



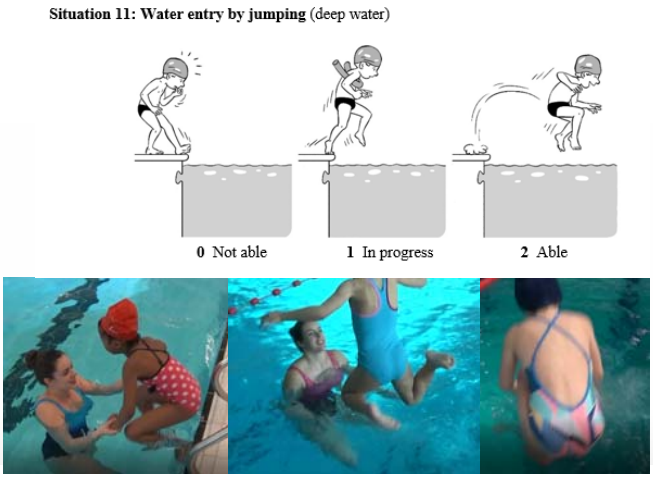
DISCUSSION

EVALUATION DIFFICULTIES



DISCUSSION

EVALUATION DIFFICULTIES



STATISTICAL ANALYSIS: RESULTS

Test	Numbers	Interpretation
Factor analysis	α = 0.93 (actual) α = 0.87 (perceived)	The scales are **sufficiently reliable** in terms of internal consistency of the items.
Pearson's correlation & Fisher r-to-z transformation	r = 0.68, p < 0.001 (total) r = 0.62, p < 0.001 (boys) r = 0.74, p < 0.001 (girls) z = -1,31, p < 0.001	For the total sample and for the boys separately a **moderate positive correlation** was found. For the girls a **high positive correlation** was found, which differed significantly from the correlation of the boys.

STATISTICAL ANALYSIS: RESULTS

Test	Numbers	Interpretation
One way ANCOVA (actual)	F = 0.12, p = 0.725 F = 0.06, p = 0.815	**No significant differences** were found according to gender or the amount of time children go swimming outside of the swimming school.
One way ANCOVA (Perceived)	F = 2.76, p = 0.099 F = 2.01, p = 0.159	**No significant differences** were found according to gender or the amount of time children go swimming outside of the swimming school.
2x2 Repeated measures ANCOVA	F = 2.14, p = 0.145 F = 21.64, p < 0.001 (AWC = 31.67 ± 4.53; PWC = 30.18 ± 4.95)	**No significant interaction effect** was found with gender. **A significant main effect** of type of water competence was observed, with a mean difference of M = 1.49.
Fisher's exact test		12 out of 17 items were found to show a **significant difference** when comparing actual vs. perceived scores. Skills 1 and 2 were excluded. Skills 3, 7 and 13, which represent blowing bubbles under water, water entry by gliding and water exit, respectively, **did not differ significantly**. Skills 12 and 17 were the items with the least correct assessments.

VRIJE UNIVERSITEIT BRUSSEL

STATISTICAL ANALYSIS

ITEMS OF THE ACTUAL AND PERCEIVED WATER COMPETENCE

Actual	*0 = Not able*		*1 = in progress*		*2 = able*	
	N	%	N	%	N	%
Skill 1	0	0.0	0	0.0	140	100.0
Skill 2	0	0.0	0	0.0	140	100.0
Skill 3	0	0.0	2	1.4	138	98.6
Skill 4	5	3.6	3	2.1	132	94.3
Skill 5	3	2.1	18	12.9	119	85.0
Skill 6	2	1.4	8	5.7	130	92.9
Skill 7	2	1.4	1	0.7	137	97.9
Skill 8	5	3.6	7	5.0	128	91.4
Skill 9	4	2.9	13	9.3	123	87.9
Skill 10	3	2.1	7	5.0	130	92.9
Skill 11	4	2.9	6	4.3	130	92.9
Skill 12	12	8.6	72	51.4	56	51.4
Skill 13	3	2.1	0	0.0	137	97.9
Skill 14	6	4.3	15	10.7	119	85.0
Skill 15	4	2.9	18	12.9	118	84.3
Skill 16	4	2.9	18	12.9	118	84.3
Skill 17	6	4.3	22	15.7	112	80.0

Perceived	*0 = Not able*		*1 = in progress*		*2 = able*	
	N	%	N	%	N	%
Skill 1	6	4.3	11	7.9	123	87.9
Skill 2	5	3.6	19	13.6	116	82.9
Skill 3	3	2.1	25	17.9	112	80.0
Skill 4	8	5.7	14	10.0	118	84.3
Skill 5	3	2.1	26	18.6	111	79.3
Skill 6	5	3.6	17	12.1	118	84.3
Skill 7	1	0.7	2	1.4	137	97.9
Skill 8	4	2.9	18	12.9	118	84.3
Skill 9	3	2.1	20	14.3	117	83.6
Skill 10	2	1.4	12	8.6	126	90.0
Skill 11	7	5.0	13	9.3	120	85.7
Skill 12	8	5.7	37	26.4	95	67.9
Skill 13	13	9.3	19	13.6	108	77.1
Skill 14	2	1.4	21	15.0	117	83.6
Skill 15	11	7.9	19	13.6	110	78.6
Skill 16	7	5.0	23	16.4	110	78.6
Skill 17	16	11.4	34	24.3	90	64.3

VRIJE UNIVERSITEIT BRUSSEL

STATISTICAL ANALYSIS

F-SCORES

	F-score	p	Partial Eta Squared
AWC x gender	0.12	0.72	0.001
PWC x gender	2.76	0.10	0.020
AWC x swimming	0.06	0.82	0.000
PWC x swimming	2.01	0.16	0.015
Main effect: AWC x PWC	21.64	0.00	0.136
Main effect: gender	1.72	0.19	0.120
Interaction effect: (AWC x PWC) x gender	2.14	0.14	0.015

DESCRIPTIVE STATISTICS FOR ANCOVA ANALYSIS

Variables	*Mean*	*SD*	*N*	*Min*	*Max*
Actual water competence	31.67	4.53	135	7	34
Boys	31.79	4.47	77		
Girls	31.50	4.64	58		
Perceived water competence	30.18	4.95	135	7	34
Boys	30.75	4.56	77		
Girls	29.41	5.36	58		
Swimming outside of the swimming school	2.76	0.86	135	1	5

VRIJE UNIVERSITEIT BRUSSEL

The relationship between children's actual and perceived water competence using a pictorial swimming scale

27-6-2019 | 59

STATISTICAL ANALYSIS

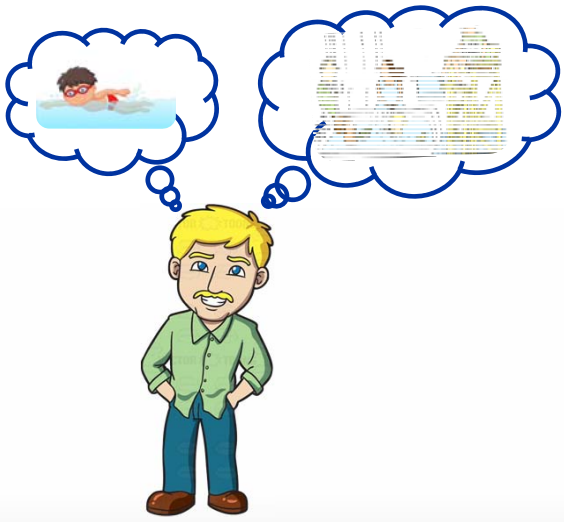
ASSESSMENT SKILLS ACTUAL AND PERCEIVED WATER COMPETENCE WITH FISHER'S EXACT TEST.

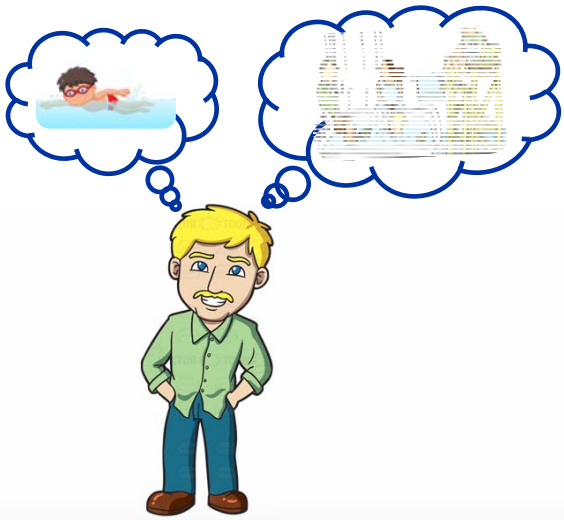
	Skills with same score on AWC as PWC (n=140)	*Fisher's exact test* Value	Exact sig. (2-sid
Skill 1: Moving forward using hands (SW)	123	/	/
Skill 2: Walking in water (UW-S)	116	/	/
Skill 3: Blowing bubbles (UW-H)	112	3.25	0.36
Skill 4: Catching object (UW-S)	119	19.79	0.00*
Skill 5: Floating on the back (UW)	107	19.82	0.00*
Skill 6: Floating on the frond (UW)	119	22.50	0.00*
Skill 7: Water entry by gliding (UW)	134	9.86	1.00
Skill 8: Push and glide (UW)	116	14.80	0.00*
Skill 9: Leg propulsion on the back (UW)	117	27.10	0.00*
Skill 10: Leg propulsion on the front (UW)	122	13.66	0.01*
Skill 11: Water entry by jumping (DW)	122	27.67	0.00*
Skill 12: Water entry by diving (DW)	73	22.60	0.00*
Skill 13: Water exit (DW)	127	4.44	0.13
Skill 14: Vertical treading water (DW)	111	17.32	0.00*
Skill 15: Turning in aligned position (DW)	109	36.26	0.00*
Skill 16: Changing direction (DW)	104	12.84	0.01*
Skill 17: Turning in transverse rotation (DW)	92	21.52	0.00*

VRIJE UNIVERSITEIT BRUSSEL

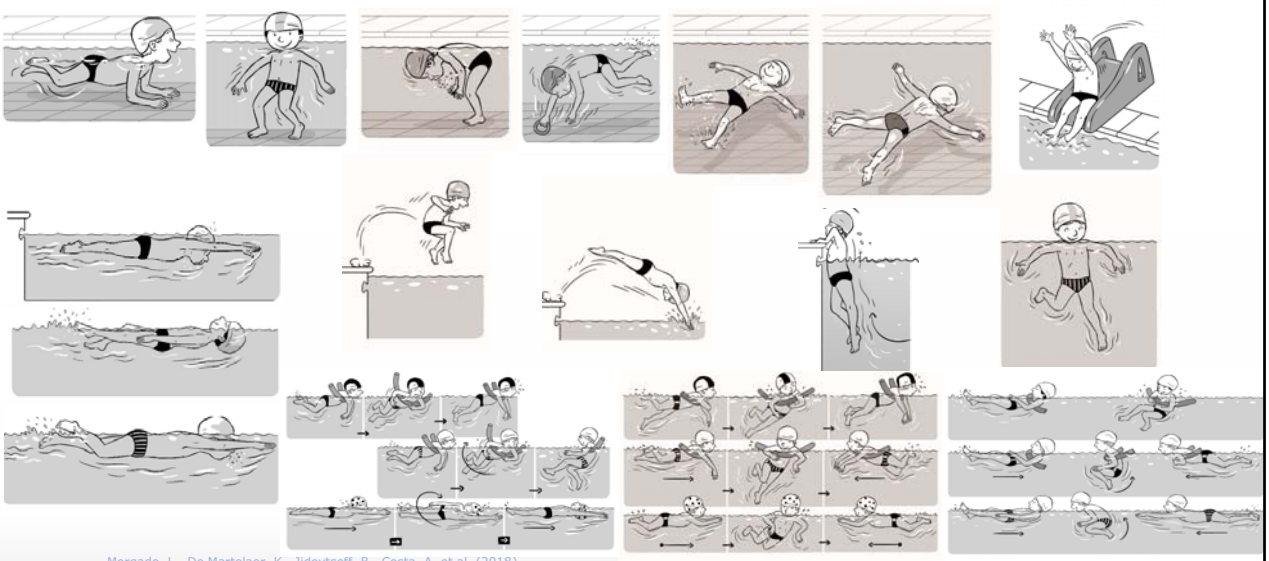
The relationship between children's actual and perceived water competence using a pictorial swimming scale

27-6-2019 | 60





PICTORIAL SWIMMING SCALE: 17 ITEMS



Morgado, L., De Martelaer, K., Jidovtseff, B., Costa, A. et al. (2018)