Know Pain, no Pain! – Development and preliminary testing of a Tool to assess Biopsychosocial Pain Concepts in Children

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Background

To be able to deliver tailored pain science education, it is necessary to assess a child's **biopsychosocial pain concept**. Presently, no (German) questionnaire exists[1,2]. A new tool is presented, the *biopsychosocial pain concept matrix* (BiPS matrix)[3], which assesses children's pain concepts with biological, psychological and social items on five domains: 1) cause, 2) consequences, 3) type of pain, 4) timeline, 5) treatment.

Aims:
1. To assess children's readability and understandability of the BiPS matrix
2. To provide initial data on its psychometric characteristics considering modulating factors such as children's knowledge of chronic pain and current pain status

Sample: Study I and Study II

Table 1: Cognitive Interviews with healthy children (*N* = 9)

Study I	*N*	Age *(M)*
Female	4 (44%)	9-19 years (*M*=13.76)
Male	5 (56%)	

Table 2: Online Survey in children of parents with cancer disease (*N* = 27)

Study II	*N*	Age *(M)*
Female	15 (56%)	9-19 years (*M*=13.76)
Male	12 (44%)	

The BiPS matrix

Table 3: Structure of the BiPS matrix with examples of items

Dimension	Biological	Psychological	Social
Cause	"Acute pain has a warning function."	"Thoughts can influence pain intensity."	"Pain intensity changes depending upon where you are and who you are with"
Consequences			
Type of pain			
Timeline			
Treatment			

The BiPS matrix for children and adolescents includes 40 items, each rated on a 5-point Likert scale: 0 = "*strongly disagree*" to 4 = "*strongly agree*".

Discussion

The BiPS matrix proved valid and beneficial for assessing a child's concept of pain. Cognitive interviews showed to be essential to test readability and understanding of the BiPS matrix in children. Implications for further item reduction and target-group-specific optimization can be drawn from the Online study.
Prospectively, the instrument seems to be closely intertwined with knowledge theory and pain and could thus be used for individualizing pain science education and therefore optimizing multiprofessionel pain therapy.

Results: Study I

Results from the **cognitive interviews** revealed some difficulties in understanding items. Young children particularly struggled with words such as "*chronic*" or "*acute*".

Table 4: Examples of children's statements from cognitive interviews

Item	Original item	Children's understanding
1	"Chronic pain does not have a warning function"	"*Chronic pain is a hereditary disease*"
8	"Pain intensity changes depending upon who you are with"	"*It's always embarrassing to show pain in front of friends, no matter how close we are*"

Results: Study II

After eliminating nine items, the total score of the BiPS matrix showed high internal consistency (α = .86) and moderate difficulty (P_i = 67.4).
The validity of the BiPS matrix was supported by significant positive correlations between the BiPS matrix total score and knowledge of chronic pain (r = .36, *p* < .05) as well as current pain status (r = .57, *p* < .01).

Table 5: Psychometric properties of the vertical and horizontal dimensions of the BiPS matrix.

Dimension	*k* (Number of Items)	R_{it} (Item-total correlation)	*P* (Difficulty index)	α (Cronbachs alpha)	*M* (BiPS total score)	SD (Standard Deviation)
Biological	9	.41	69.78	.73	2.63	0.33
Psychological	12	.44	71.48	.78	2.85	0.42
Social	10	.300	68.18	.63	2.61	0.32
Cause	7	.28	62.50	.49	2.31	0.38
Consequences	7	.33	72.93	.61	2.84	0.40
Type of pain	6	.39	73.38	.65	2.85	0.45
Timeline	3	.27	71.17	.42	2.78	0.33
Treatment	8	.41	71.38	.71	2.82	0.45

In a regression analysis, 22% of the variance in the BiPS total score, was explained by the children's age (*B* = .05, *SE*(*B*) = .02, β = .47, *t* = 2.64, *p* < .05) (Figure 1). Children's understanding increased with higher age.
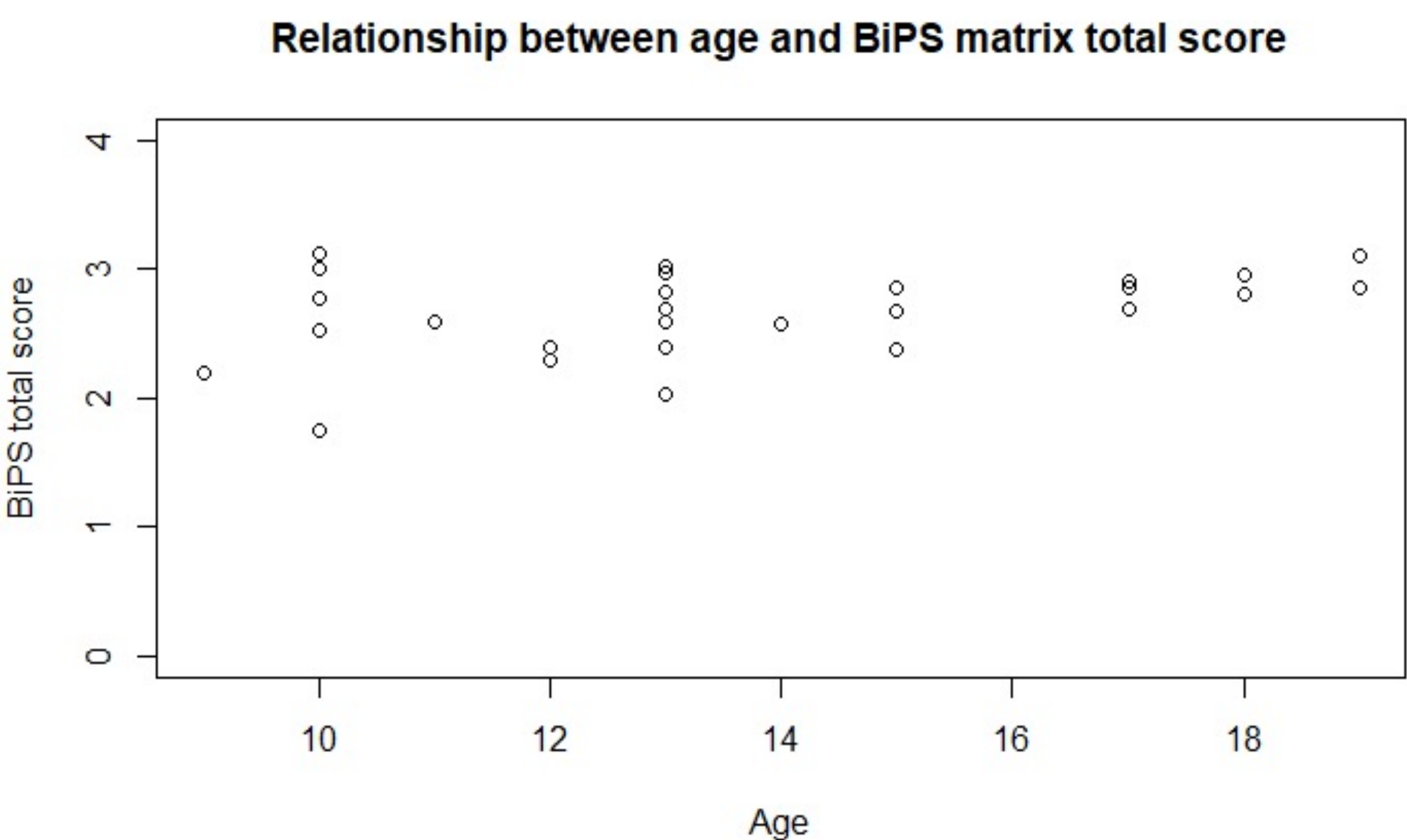

Figure 1: Graphical illustration of the relationship between age and conceptual pain knowledge (BiPS total score).

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