

Appendix 2 Detailed ICF Linking FIM™ and EBI

Detailed ICF Linking Table FIM™

Item	Item title	Item Description	Main concept(s)	Additional concept(s)	Perspective	Categorization of response	ICF Code main Concept	ICF Code additional concept	Comment
					Options: Descriptive (Performance, Capacity), Appraisal, Need/dependency	Options: Intensity, Frequency, Duration, Confirmation, qualitative attributes			
A	Eating	<i>Not included in this Online Appendix due to copyright</i>	eating, drinking		Need/ dependency	Intensity	d550 Eating, d560 drinking		
B	Grooming	<i>Not included in this Online Appendix due to copyright</i>	taking care of ones face, hair and hands		Need/ dependency	Intensity	d5100 Washing body parts, d520 Caring for body parts		d520 was linked on 2nd level as several body parts/ subspects are mentioned.
C	Bathing	<i>Not included in this Online Appendix due to copyright</i>	washing and drying several body parts		Need/ dependency	Intensity	d510 Washing oneself		
D	Dressing upper body	<i>Not included in this Online Appendix due to copyright</i>	dressing and undressing the upper body parts		Need/ dependency	Intensity	d5400 Putting on clothes, d5401 Taking off clothes		
E	Dressing Lower body	<i>Not included in this Online Appendix due to copyright</i>	dressing and undressing the upper body parts		Need/ dependency	Intensity	d5400 Putting on clothes, d5401 Taking off clothes, d5402 Putting on footwear, d5403 Taking off footwear		
F	Toileting	<i>Not included in this Online Appendix due to copyright</i>	managing toileting and related hygiene		Need/ dependency	Intensity	d530 Toileting		

G	Bladder management	<i>Not included in this Online Appendix due to copyright</i>	managing and controlling bladder	Need/ dependency	Intensity and Frequency	d5300 Regulating urination, b620 Urinary functions		
H	Bowel management	<i>Not included in this Online Appendix due to copyright</i>	managing and controlling bowel	Need/ dependency	Intensity and Frequency	d5301 Regulating defecation, b525 Defecation functions		
I	Transfers: bed, chair, wheelchair	<i>Not included in this Online Appendix due to copyright</i>	Transferring oneself from bed to a chair (incl. wheelchair) and back to bed	Need/ dependency	Intensity	d420 Transferring oneself	d410 Changing basic body position	d410 was taken as additional concept, as it depends on transfer starting and end point, not necessarily requested but potentially included
J	Transfers: toilet	<i>Not included in this Online Appendix due to copyright</i>	Getting on and off the toilet	Need/ dependency	Intensity	d420 Transferring oneself	d410 Changing basic body position	additional concept, as it depends on transfer starting and end point, not necessarily requested but potentially included
K	Transfers: tub or shower	<i>Not included in this Online Appendix due to copyright</i>	Getting in and out of the tub or shower	Need/ dependency	Intensity	d420 Transferring oneself	d410 Changing basic body position	d410 was taken as additional concept, as it depends on transfer starting and end point, not necessarily requested but potentially
L	Walking or using wheelchair	<i>Not included in this Online Appendix due to copyright</i>	Walking, using a wheelchair	Need/ dependency	Intensity	d450 Walking; d465 Moving around using equipment		
M	Stairs	<i>Not included in this Online Appendix due to copyright</i>	Going up and down stairs	Need/ dependency	Intensity	d4551 Climbing		Note that there is a new category to the ICF in the 2018 updates: <i>d451 Going up and down stairs</i> . <i>d4551 Climbing</i> still exists, but no longer includes going and up stairs. (http://www.who.int/classifications/documents/2018ICFUpdates.pdf?ua=1)

N	Comprehension	<i>Not included in this Online Appendix due to copyright</i>	Understanding auditory or visual communications conveyed in a spoken and written manner as well as through sign language or gestures	Need/ dependency	Intensity	d310 Communicating with - receiving - spoken messages, d315 Communicating with - receiving - nonverbal messages, d320 Communicating with - receiving - formal sign language messages, d325 Communicating with - receiving - written messages
O	Expression	<i>Not included in this Online Appendix due to copyright</i>	Expressing oneself in a vocal and non-vocal manner as well as in written form	Need/ dependency	Intensity	d330 Speaking, d335 Producing nonverbal messages, d340 Producing messages in formal sign language, d345 Written messages
P	Social Interaction	<i>Not included in this Online Appendix due to copyright</i>	getting along with others, participating with others	Need/ dependency	Intensity	d710 Basic interpersonal interaction
Q	Problem solving	<i>Not included in this Online Appendix due to copyright</i>	Problem solving	Need/ dependency	Intensity	d175 Solving problems
R	Memory	<i>Not included in this Online Appendix due to copyright</i>	recognizing and remembering daily activity	Need/ dependency	Intensity	b144 Memory functions

Abbreviations: ICF = International Classification of Functioning Disability and Health, FIM™ = Functional Independence Measure

Detailed ICF Linking Table EBI

Item No	Item title	Item Description	Main concept(s)	Additional concept(s)	Perspective	Categorization of response	ICF Code main Concept	ICF Code additional concept	Comment
		<i>Not included in this Online Appendix due to language</i>			Options: Descriptive (Performance, Capacity), Appraisal, Need/dependency	Options: Intensity, Frequency, Duration, Confirmation, qualitative attributes			
1	Feeding	<i>Not included in this Online Appendix due to language</i>	Eating, drinking		Need/ dependency	Intensity	d550 Eating, d560 Drinking		
2	Grooming	<i>Not included in this Online Appendix due to language</i>	Washing face, combing, shaving, cleaning teeth		Need/ dependency	Intensity	d520 Caring for body parts, d5100 Washing body parts		
3	Dressing	<i>Not included in this Online Appendix due to language</i>	Dressing		Need/ dependency	Intensity	d540 Dressing		
4	Bathing	<i>Not included in this Online Appendix due to language</i>	Washing oneself		Need/ dependency	Intensity	d510 Washing oneself		
5	Transfers (bed to chair and back)	<i>Not included in this Online Appendix due to language</i>	Transferring oneself		Need/ dependency	Intensity	d420 Transferring oneself	d410 Changing basic body position	additional concept, as it depends on transfer starting and end point, not necessarily requested but potentially included
6	Mobility	<i>Not included in this Online Appendix due to language</i>	Walking or using wheelchair/ or other asking aid		Need/ dependency	Intensity	d450 Walking, d465 Moving around using equipment		Depending on chosen item category

						Note that there is a new category to the ICF in the 2018 updates: d451 Going up and down stairs. d4551 Climbing still exists, but no longer includes going and up stairs. (http://www.who.int/classifications/documents/2018ICFUpdates.pdf?ua=1)
7	Stairs	<i>Not included in this Online Appendix due to language</i>	Going up and down stairs	Need/ dependency	Intensity	d4551 Climbing
8	Toilet use	<i>Not included in this Online Appendix due to language</i>	Toileting	Need/ dependency	Intensity	d530 Toileting
9	Bowel control	<i>Not included in this Online Appendix due to language</i>	Control over emptying the bowel, bowel management	Need/ dependency	Intensity	b525 Defecation functions; d5301 Regulating defecation
10	Bladder control	<i>Not included in this Online Appendix due to language</i>	Control over emptying the bladder, bladder management	Need/ dependency	Intensity	b620 Urination functions; d5300 Regulating urination
11	Comprehension	<i>Not included in this Online Appendix due to language</i>	Comprehending literal and implied meaning of messages conveyed in a spoken and written manner as well as through gestures	Descriptive	Intensity	d310 Communicating with - receiving - spoken messages, d315 Communicating with - receiving - nonverbal messages, d320 Communicating with - receiving - formal sign language messages, d325 Communicating with - receiving - written messages
12	Expression	<i>Not included in this Online Appendix due to language</i>	Expressing oneself in a spoken and written manner as well as through gestures	Need/ dependency	Intensity	d330 Speaking, d335 Producing nonverbal messages, d340 Producing messages in formal sign language, d345 Written messages

13	Social Interaction	<i>Not included in this Online Appendix due to language</i>	Social interaction with others	Descriptive	Frequency	d710 Basic interpersonal interaction	
14	Problem solving	<i>Not included in this Online Appendix due to language</i>	Problem-solving	Carrying out simple and complex tasks according to ist demands, psychological demands and responsibilities.	Need/ dependency	Intensity	d175 Solving problems d240 Handling stress and other psychological demands
15	Memory	<i>Not included in this Online Appendix due to language</i>	Memory		Need/ dependency & Descriptive	Intensity	b144 Memory functions Both perspectives are represented across the different item categories.
16	Vision/ Neglect	<i>Not included in this Online Appendix due to language</i>	Vision and visual neglect		Descriptive	Intensity	b210 Seeing functions; b1561 Visual perception

Abbreviations: ICF = International Classification of Functioning Disability and Health, EBI = Extended Barthel Index

Appendix 3 DIF Strategy and effect size calculation for the three testlet approach (FIM1, FIM2, EBI50)

Analysis Name (Testlets)	Person Factor	Testlet	DIF		Interpretation
			Uniform (U) Non- uniform (N)	p-values	
Three Testlets (FIM1, FIM2, EBI50)	clinic	FIM1	Uniform	0.001211	Artificial DIF, since it disappears in Split2
	clinic	FIM2	Uniform & Non-uniform	0.000000 0.000084	
	clinic	EBI50	Uniform & Non-uniform	0.000000 0.002534	basis for Split1
Split1 (FIM1, FIM2, EBI_clinic1, EBI_clinic2, EBI_clinic3, EBI_clinic4, EBI_clinic5)	clinic	FIM1	Uniform	0.001678	
	clinic	FIM2	Uniform	0.001211	basis for Split2
Split2 (FIM1, FIM2_clinic1, FIM2_clinic2, FIM2_clinic3, FIM2_clinic4, FIM2_clinic5, EBI_clinic1, EBI_clinic2, EBI_clinic3, EBI_clinic4, EBI_clinic5)			No DIF present anymore		Successful split, FIM1 Testlet is free of DIF and can be taken as an anchor for the t-test and effect-size calculation

Abbreviations: DIF =Differential Item Functioning, FIM = Functional Independence Measure, EBI= Extended Barthel index

Testlet description: FIM1 incorporates FIM™ items (A, C, E, G, I, K, M, O, Q), FIM2 incorporates FIM™ items (B, D, F, H J, L, N, P, R), EBI50 incorporates all EBI items (1, 2, 3, 4, 5, 6, 7, 8 ,9, 10, 11, 12, 13, 14, 15, 16)

Effect Size Calculation

	ThreeTestlets	Split2
Mean person location	0.33	0.37
SD person location	1.41	2.03
Sample size	265	265
Effect Size	0.02	

Appendix 4 Transformation FIM™ - EBI

FIM raw	Location FIM	Common metric 0-100	Common metric 0-100	Location EBI	EBI50 raw
18	-3.015	8.4	9.3	-2.951	0
19	-2.568	14.7	14.3	-2.597	1
20	-2.290	18.6	17.8	-2.349	2
21	-2.116	21.0	20.2	-2.174	3
22	-1.989	22.8	22.3	-2.029	4
23	-1.886	24.3	24.1	-1.900	5
24	-1.799	25.5	25.8	-1.779	6
25	-1.723	26.5	25.8	-1.779	6
26	-1.654	27.5	27.4	-1.662	7
27	-1.590	28.4	29.0	-1.548	8
28	-1.531	29.2	29.0	-1.548	8
29	-1.475	30.0	30.6	-1.435	9
30	-1.421	30.8	30.6	-1.435	9
31	-1.370	31.5	32.1	-1.326	10
32	-1.320	32.2	32.1	-1.326	10
33	-1.272	32.9	33.6	-1.219	11
34	-1.226	33.5	33.6	-1.219	11
35	-1.181	34.1	33.6	-1.219	11
36	-1.137	34.8	35.1	-1.116	12
37	-1.094	35.4	35.1	-1.116	12
38	-1.051	36.0	36.5	-1.015	13
39	-1.010	36.5	36.5	-1.015	13
40	-0.970	37.1	36.5	-1.015	13
41	-0.931	37.6	37.8	-0.917	14
42	-0.892	38.2	37.8	-0.917	14
43	-0.854	38.7	39.2	-0.822	15
44	-0.817	39.2	39.2	-0.822	15
45	-0.781	39.7	39.2	-0.822	15
46	-0.745	40.2	40.5	-0.730	16
47	-0.710	40.7	40.5	-0.730	16
48	-0.676	41.2	41.7	-0.640	17
49	-0.642	41.7	41.7	-0.640	17
50	-0.609	42.2	41.7	-0.640	17
51	-0.576	42.6	42.9	-0.553	18
52	-0.544	43.1	42.9	-0.553	18
53	-0.513	43.5	42.9	-0.553	18
54	-0.481	43.9	44.1	-0.468	19
55	-0.450	44.4	44.1	-0.468	19
56	-0.420	44.8	45.3	-0.385	20
57	-0.390	45.2	45.3	-0.385	20
58	-0.360	45.6	45.3	-0.385	20
59	-0.331	46.0	46.4	-0.304	21
60	-0.302	46.5	46.4	-0.304	21
61	-0.273	46.9	46.4	-0.304	21
62	-0.244	47.3	47.5	-0.224	22
63	-0.215	47.7	47.5	-0.224	22
64	-0.187	48.1	47.5	-0.224	22
65	-0.159	48.5	48.6	-0.147	23
66	-0.130	48.9	48.6	-0.147	23
67	-0.102	49.3	49.7	-0.071	24
68	-0.074	49.6	49.7	-0.071	24
69	-0.046	50.0	49.7	-0.071	24
70	-0.018	50.4	50.7	0.004	25
71	0.010	50.8	50.7	0.004	25
72	0.037	51.2	50.7	0.004	25

FIM raw	Location FIM	Common metric 0-100	Common metric 0-100	Location EBI	EBI50 raw
73	0.065	51.6	51.8	0.077	26
74	0.094	52.0	51.8	0.077	26
75	0.122	52.4	52.8	0.149	27
76	0.150	52.8	52.8	0.149	27
77	0.178	53.2	52.8	0.149	27
78	0.207	53.6	53.8	0.220	28
79	0.236	54.0	53.8	0.220	28
80	0.265	54.4	54.7	0.290	29
81	0.294	54.8	54.7	0.290	29
82	0.323	55.2	54.7	0.290	29
83	0.353	55.6	55.7	0.360	30
84	0.383	56.1	55.7	0.360	30
85	0.413	56.5	56.7	0.429	31
86	0.444	56.9	56.7	0.429	31
87	0.475	57.3	57.6	0.497	32
88	0.507	57.8	57.6	0.497	32
89	0.539	58.2	58.6	0.566	33
90	0.571	58.7	58.6	0.566	33
91	0.604	59.1	59.6	0.634	34
92	0.638	59.6	59.6	0.634	34
93	0.672	60.1	60.5	0.702	35
94	0.707	60.6	60.5	0.702	35
95	0.742	61.1	61.5	0.770	36
96	0.778	61.6	61.5	0.770	36
97	0.815	62.1	62.4	0.838	37
98	0.852	62.6	62.4	0.838	37
99	0.891	63.2	63.4	0.906	38
100	0.930	63.7	63.4	0.906	38
101	0.969	64.3	64.3	0.974	39
102	1.010	64.8	65.3	1.042	40
103	1.052	65.4	65.3	1.042	40
104	1.094	66.0	66.3	1.111	41
105	1.138	66.6	66.3	1.111	41
106	1.182	67.2	67.2	1.180	42
107	1.228	67.9	68.2	1.250	43
108	1.275	68.5	68.2	1.250	43
109	1.323	69.2	69.2	1.324	44
110	1.372	69.9	70.3	1.401	45
111	1.423	70.6	70.3	1.401	45
112	1.476	71.4	71.5	1.487	46
113	1.532	72.1	71.5	1.487	46
114	1.589	72.9	72.9	1.588	47
115	1.650	73.8	72.9	1.588	47
116	1.714	74.7	74.7	1.713	48
117	1.782	75.7	74.7	1.713	48
118	1.855	76.7	77.3	1.898	49
119	1.934	77.8	77.3	1.898	49
120	2.020	79.0	77.3	1.898	49
121	2.117	80.3	81.1	2.173	50
122	2.230	81.9	81.1	2.173	50
123	2.367	83.8	81.1	2.173	50
124	2.547	86.4	81.1	2.173	50
125	2.832	90.4	81.1	2.173	50
126	3.280	96.6	81.1	2.173	50

The values represented in **bold** are the values to take when transforming EBI50 scores to FIM™
 Abbreviations: FIM™ Functional Independence Measure, EBI Extended Barthel Index