

# Bone & Joint Open



## Supplementary Material

10.1302/2633-1462.410.BJO-2023-0105.R1

**Table i.** Adjusted multiplier table according to Bayley and Pinneau.<sup>1</sup> All data in the “Delayed”, “Average”, and “Accelerated” columns are shown in percentages.

Male					Female				
Years	Months	Delayed	Average	Accelerated	Years	Months	Delayed	Average	Accelerated
					8	0	80.40	79.00	75.00
						1	80.70	79.37	75.33
						2	81.00	79.73	75.67
						3	81.30	80.10	76.00
						4	81.63	80.40	76.37
						5	81.97	80.70	76.73
					8.5	6	82.30	81.00	77.10
						7	82.73	81.37	77.43
						8	83.17	81.73	77.77
						9	83.60	82.10	78.10
						10	83.77	82.30	78.40
						11	83.93	82.50	78.70
					9	0	84.10	82.70	79.00
						1	84.43	83.00	79.33
						2	84.77	83.30	79.67
						3	85.10	83.60	80.00
						4	85.33	83.87	80.30
						5	85.57	84.13	80.60
					9.5	6	85.80	84.40	80.90
						7	86.07	84.70	81.23
						8	86.33	85.00	81.57
						9	86.60	85.30	81.90
						10	86.87	85.60	82.20
						11	87.13	85.90	82.50
10	0	81.20	78.40	74.70	10	0	87.40	86.20	82.80
	1	81.33	78.63	74.90		1	87.73	86.60	83.23
	2	81.47	78.87	75.10		2	88.07	87.00	83.67
	3	81.60	79.10	75.30		3	88.40	87.40	84.10
	4	81.70	79.23	75.47		4	88.80	87.73	84.60
	5	81.80	79.37	75.63		5	89.20	88.07	85.10
10.5	6	81.90	79.50	75.80	10.5	6	89.60	88.40	85.60
	7	81.97	79.67	75.97		7	89.97	88.80	86.33
	8	82.03	79.83	76.13		8	90.33	89.20	87.07
	9	82.10	80.00	76.30		9	90.70	89.60	87.80
	10	82.17	80.13	76.43		10	91.07	89.93	87.97

	11	82.23	80.27	76.57		11	91.43	90.27	88.13
11	0	82.30	80.40	76.70	11	0	91.80	90.60	88.30
	1	82.43	80.67	77.00		1	91.93	90.73	88.43
	2	82.57	80.93	77.30		2	92.07	90.87	88.57
	3	82.70	81.20	77.60		3	92.20	91.00	88.70
	4	82.87	81.40	77.93		4	92.33	91.13	88.83
	5	83.03	81.60	78.27		5	92.47	91.27	88.97
11.5	6	83.20	81.80	78.60	11.5	6	92.60	91.40	89.10
	7	83.43	82.10	79.07		7	92.70	91.53	89.30
	8	83.67	82.40	79.53		8	92.80	91.67	89.50
	9	83.90	82.70	80.00		9	92.90	91.80	89.70
	10	84.10	82.93	80.30		10	93.00	91.93	89.83
	11	84.30	83.17	80.60		11	93.10	92.07	89.97
12	0	84.50	83.40	80.90	12	0	93.20	92.20	90.10
	1	84.73	83.70	81.20		1	93.27	92.53	90.50
	2	84.97	84.00	81.50		2	93.33	92.87	90.90
	3	85.20	84.30	81.80		3	93.40	93.20	91.30
	4	85.67	84.63	82.13		4	93.90	93.50	91.67
	5	86.13	84.97	82.47		5	94.40	93.80	92.03
12.5	6	86.60	85.30	82.80	12.5	6	94.90	94.10	92.40
	7	86.70	85.63	83.17		7	95.00	94.40	92.77
	8	86.80	85.97	83.53		8	95.10	94.70	93.13
	9	86.90	86.30	83.90		9	95.20	95.00	93.50
	10	87.27	86.73	84.27		10	95.60	95.27	93.83
	11	87.63	87.17	84.63		11	96.00	95.53	94.17
13	0	88.00	87.60	85.00	13	0	96.40	95.80	94.50
	1		88.07	85.37		1	96.63	96.10	94.83
	2		88.53	85.73		2	96.87	96.40	95.17
	3		89.00	86.10		3	97.10	96.70	95.50
	4		89.40	86.57		4	97.30	96.93	95.77
	5		89.80	87.03		5	97.50	97.17	96.03
13.5	6		90.20	87.50	13.5	6	97.70	97.40	96.30
	7		90.60	88.00		7	97.83	97.53	96.47
	8		91.00	88.50		8	97.97	97.67	96.63
	9		91.40	89.00		9	98.10	97.80	96.80
	10		91.83	89.50		10	98.17	97.87	96.93
	11		92.27	90.00		11	98.23	97.93	97.07
14	0		92.70	90.50	14	0	98.30	98.00	97.20
	1		93.07	90.93		1	98.40	98.10	97.37
	2		93.43	91.37		2	98.50	98.20	97.53
	3		93.80	91.80		3	98.60	98.30	97.70
	4		94.13	92.40		4	98.70	98.40	97.80
	5		94.47	93.00		5	98.80	98.50	97.90
14.5	6		94.80	93.60	14.5	6	98.90	98.60	98.00
	7		95.13	93.83		7	99.00	98.67	98.10
	8		95.47	94.07		8	99.10	98.73	98.20
	9		95.80	94.30		9	99.20	98.80	98.30
	10		96.13	94.80		10	99.27	98.87	98.40
	11		96.47	95.30		11	99.33	98.93	98.50
15	0		96.80	95.80	15	0	99.40	99.00	98.60
	1		96.97	96.10		1	99.43	99.03	98.67
	2		97.13	96.40		2	99.47	99.07	98.73
	3		97.30	96.70		3	99.50	99.10	98.80
	4		97.40	96.83		4	99.53	99.17	98.87

	5		97.50	96.97		5	99.57	99.23	98.93
15.5	6		97.60	97.10	15.5	6	99.60	99.30	99.00
	7		97.73	97.27		7	99.63	99.33	99.07
	8		97.87	97.43		8	99.67	99.37	99.13
	9		98.00	97.60		9	99.70	99.40	99.20
	10		98.07	97.73		10	99.73	99.47	99.23
	11		98.13	97.87		11	99.77	99.53	99.27
16	0		98.20	98.000	16	0	99.80	99.60	99.30
	1		98.30	98.100					
	2		98.40	98.200					
	3		98.50	98.300					
	4		98.57	98.367					
	5		98.63	98.433					
16.5	6		98.70	98.500					
	7		98.77	98.600					
	8		98.83	98.700					
	9		98.90	98.800					
	10		98.97	98.867					
	11		99.03	98.933					
17	0		99.10	99.000					
	1		99.17						
	2		99.23						
	3		99.30						
	4		99.33						
	5		99.37						
	6		99.40						
	7		99.43						
	8		99.47						
	9		99.50						
	10								
	11								
18	0								

**Table ii.** Adjusted multiplier table according to Sanders – Greulich and Pyle.<sup>2</sup>

Male			Female		
Years	Months	Multiplier	Years	Months	Multiplier
			10	0	1.179
				1	1.175
				2	1.171
				3	1.167
				4	1.163
				5	1.159
			10.5	6	1.155
				7	1.151
				8	1.147
				9	1.143
				10	1.139
				11	1.135
11	0	1.211	11	0	1.131
	1	1.207		1	1.128
	2	1.204		2	1.125
	3	1.200		3	1.122
	4	1.196		4	1.119
	5	1.193		5	1.116
11.5	6	1.189	11.5	6	1.113
	7	1.185		7	1.11
	8	1.180		8	1.107
	9	1.176		9	1.104
	10	1.171		10	1.101
	11	1.167		11	1.098
12	0	1.163	12	0	1.095
	1	1.158		1	1.091
	2	1.154		2	1.088
	3	1.149		3	1.084
	4	1.145		4	1.081
	5	1.140		5	1.077
12.5	6	1.136	12.5	6	1.074
	7	1.131		7	1.070
	8	1.126		8	1.066
	9	1.121		9	1.063
	10	1.115		10	1.059
	11	1.110		11	1.056
13	0	1.105	13	0	1.052
	1	1.100		1	1.048
	2	1.095		2	1.045
	3	1.090		3	1.041
	4	1.084		4	1.037
	5	1.079		5	1.034
13.5	6	1.074	13.5	6	1.030
	7	1.070		7	1.027
	8	1.065		8	1.025
	9	1.061		9	1.022

	10	1.057		10	1.019
	11	1.052		11	1.017
14	0	1.048	14	0	1.014
	1	1.046		1	1.013
	2	1.044		2	1.013
	3	1.042		3	1.012
	4	1.040		4	1.012
	5	1.038		5	1.011
14.5	6	1.036	14.5	6	1.011
	7	1.034		7	1.010
	8	1.032		8	1.009
	9	1.030		9	1.009
	10	1.028		10	1.008
	11	1.026		11	1.008
15	0	1.024	15	0	1.007
	1	1.022		1	1.007
	2	1.021		2	1.006
	3	1.019		3	1.006
	4	1.017		4	1.005
	5	1.016		5	1.005
15.5	6	1.014	15.5	6	1.004
	7	1.013		7	1.004
	8	1.012		8	1.003
	9	1.011		9	1.003
	10	1.009		10	1.002
	11	1.008		11	1.002
16	0	1.007	16	0	1.001
	1	1.007			
	2	1.006			
	3	1.006			
	4	1.006			
	5	1.005			
16.5	6	1.005			
	7	1.005			
	8	1.004			
	9	1.004			
	10	1.004			
	11	1.003			
17	0	1.003			

**Table iii.** Adjusted multiplier table according to Sanders – peak height velocity.<sup>3</sup>

Male			Female		
Years	Month	Multiplier	Years	Month	Multiplier
			9	0	1.233
				1	1.229
				2	1.224
				3	1.220
				4	1.216
				5	1.212
			9.5	6	1.208
				7	1.204
				8	1.199
				9	1.195
				10	1.191
				11	1.187
			10	0	1.183
				1	1.179
				2	1.174
				3	1.170
				4	1.166
				5	1.162
			10.5	6	1.157
				7	1.153
				8	1.148
				9	1.144
				10	1.139
				11	1.134
11	0	1.215	11	0	1.130
	1	1.212		1	1.125
	2	1.208		2	1.120
	3	1.205		3	1.116
	4	1.202		4	1.111
	5	1.200		5	1.106
11.5	6	1.197	11.5	6	1.102
	7	1.194		7	1.097
	8	1.191		8	1.092
	9	1.187		9	1.088
	10	1.183		10	1.083
	11	1.179		11	1.079
12	0	1.174	12	0	1.075
	1	1.170		1	1.071
	2	1.166		2	1.066
	3	1.162		3	1.062
	4	1.157		4	1.058
	5	1.153		5	1.055
12.5	6	1.149	12.5	6	1.052
	7	1.144		7	1.049
	8	1.140		8	1.045
	9	1.135		9	1.042

	10	1.130		10	1.039
	11	1.126		11	1.037
13	0	1.121	13	0	1.035
	1	1.116		1	1.033
	2	1.111		2	1.031
	3	1.106		3	1.029
	4	1.101		4	1.027
	5	1.096		5	1.026
13.5	6	1.091	13.5	6	1.024
	7	1.086		7	1.023
	8	1.081		8	1.022
	9	1.077		9	1.020
	10	1.072		10	1.019
	11	1.068		11	1.018
14	0	1.064	14	0	1.017
	1	1.059		1	1.016
	2	1.055		2	1.015
	3	1.052		3	1.014
	4	1.050		4	1.013
	5	1.047		5	1.012
14.5	6	1.044	14.5	6	1.012
	7	1.042		7	1.011
	8	1.039		8	1.010
	9	1.036		9	1.010
	10	1.034		10	1.009
	11	1.031		11	1.009
15	0	1.028	15	0	1.008
	1	1.026			
	2	1.023			
	3	1.022			
	4	1.020			
	5	1.019			
15.5	6	1.018			
	7	1.016			
	8	1.015			
	9	1.014			
	10	1.013			
	11	1.013			
16	0	1.012			
	1	1.011			
	2	1.010			
	3	1.010			
	4	1.009			
	5	1.009			
16.5	6	1.008			
	7	1.008			
	8	1.007			
	9	1.007			
	10	1.006			
	11	1.006			

17	0	1.005			
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## References

1. **Bayley N, Pinneau SR.** Tables for predicting adult height from skeletal age: revised for use with the Greulich-Pyle hand standards. *J Pediatr.* 1952;40(4):423-441.
2. **Sanders JO, Qiu X, Lu X, et al.** The uniform pattern of growth and skeletal maturation during the human adolescent growth spurt. *Sci Rep.* 2017;7(1):16705.
3. **Sanders JO, Karbach LE, Cai X, Gao S, Liu RW, Cooperman DR.** Height and extremity-length prediction for healthy children using age-based versus peak height velocity timing-based multipliers. *J Bone Joint Surg Am.* 2021;103-A(4):335-342.