

## Supplementary Material

Provided for “Normative Data for the CERAD-NP for Healthy High-Agers (80 – 84 years) and Effects of Age-Typical Visual Impairment and Hearing Loss” by Fröhlich, Müller and Voelcker-Rehage

### Calculation of Percentile Ranks (PR) and percentiles:

Following the recommendations from Crawford, Garthwaite, and Slick (2009), PR were calculated according to the formula:

$$PR = 100 * \frac{m + 0.5k}{N}$$

Here, m is the number of individuals scoring below a given score, k is the number of individuals at the given score and N is the overall number of individuals in the normative sample. A linear interpolation was used for raw test scores that were not present in the sample (Woerner, Müller, & Hasselhorn, 2017):

$$PR_i = PR_{<} + [(S_i - S_{<}) * (PR_{>} - PR_{<})]$$

The  $PR_i$  of the missing test score  $S_i$  is calculated from the PR of the preceding ( $PR_{<}$ ) and following test score ( $PR_{>}$ ) and the values of the preceding ( $S_{<}$ ) and missing test score ( $S_i$ ). Afterwards, standard norm equivalents in the form of z-scores were calculated by area transformation (Lienert & Raatz, 1998).

Percentiles were calculated as weighted averages with the HAVERAGE command in SPSS for all continuous scores. The following percentiles were calculated for test scores, where larger scores mean better test performance: 2.28, 6.68, 10, 15.87, 25, 50, 75, 90. In analogy, the following percentiles were calculated for tests where smaller scores mean better performance: 97.72, 93.32, 90, 84.13, 75, 50, 25, 10.

Crawford, J., Garthwaite, P., & Slick, D. (2009). On percentile norms in neuropsychology: Proposed reporting standards and methods for quantifying the uncertainty over the percentile ranks of test scores. *The Clinical Neuropsychologist*, 23, 1173-1195. doi:10.1080/13854040902795018

Lienert, G. A., & Raatz, U. (1998). Die Testeichung. In *Testaufbau und Testanalyse* (6. Auflage). Weinheim: Psychologie Verlags Union.

Woerner, W., Müller, C., & Hasselhorn, M. (2017). Bedeutung und Berechnung der Prozentränge und T-Werte beim Erstellen von Testnormen: Anmerkungen und Empfehlungen. *Begabungen und Talente. Jahrbuch der pädagogisch-psychologischen Diagnostik, Tests & Trends*, 15, 245-263.

## Verbal Fluency – Fluency Animals

Points	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 24)		(n = 47)		(n = 55)	
	PR	z	PR	z	PR	z	PR	z
0								
...								
8					1.1	-2.30		
9					2.7	-1.93		
10					4.3	-1.72		
11	1.3	-2.22	2.1	-2.04	7.4	-1.44		
12	3.3	-1.83	8.3	-1.38	8.5	-1.37	0.9	-2.36
13	4.7	-1.68	14.6	-1.05	9.6	-1.31	3.6	-1.79
14	6.7	-1.50	20.8	-0.81	12.8	-1.14	7.3	-1.46
15	11.3	-1.21	33.3	-0.43	14.4	-1.06	16.4	-0.98
16	18.7	-0.89	39.6	-0.26	16.0	-1.00	24.5	-0.69
17	24.7	-0.69	43.8	-0.16	19.1	-0.87	30.0	-0.52
18	32.0	-0.47	47.9	-0.05	23.4	-0.73	38.2	-0.30
19	41.3	-0.22	54.2	0.10	29.8	-0.53	44.5	-0.14
20	52.0	0.05	60.4	0.26	35.1	-0.38	51.8	0.05
21	60.7	0.27	68.8	0.49	40.4	-0.24	61.8	0.30
22	66.0	0.41	77.1	0.74	48.9	-0.03	71.8	0.58
23	72.7	0.60	83.3	0.97	58.5	0.21	80.0	0.84
24	80.0	0.84	89.6	1.26	64.9	0.38	84.5	1.02
25	86.0	1.08	91.0	1.34	70.2	0.53	87.3	1.14
26	90.0	1.28	92.4	1.43	79.8	0.83	90.9	1.34
27	93.3	1.50	93.8	1.53	89.4	1.25	92.3	1.43
28	95.3	1.68	95.9	1.74	95.7	1.72	93.6	1.52
29	96.7	1.83	97.9	2.04	96.3	1.79	95.5	1.69
30	98.0	2.05			97.0	1.88	96.4	1.80
31	99.3	2.47			97.6	1.98	97.3	1.92
32					98.3	2.12	98.2	2.10
33					98.9	2.29	99.1	2.36

## Boston Naming Test

Points	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 24)		(n = 47)		(n = 55)	
	PR	z	PR	z	PR	z	PR	z
0								
...								
8	0.7	-2.47						
9	2.0	-2.05					0.9	-2.36
10	3.3	-1.83			1.1	-2.30	2.3	-2.00
11	6.0	-1.56	2.1	-2.04	2.2	-2.01	3.6	-1.79
12	8.7	-1.36	6.3	-1.53	3.2	-1.85	10.0	-1.28
13	18.0	-0.92	16.7	-0.97	11.7	-1.19	20.9	-0.81
14	34.0	-0.41	41.7	-0.21	36.2	-0.35	41.8	-0.21
15	72.7	0.60	79.2	0.81	76.6	0.73	78.2	0.78

### Mini Mental State Examination (MMSE)

Points	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 24)		(n = 47)		(n = 55)	
	PR	z	PR	z	PR	z	PR	z
0								
...								
23			2.1	-2.04	1.1	-2.30		
24	0.7	-2.47	5.2	-1.63	3.2	-1.85	3.6	-1.79
25	2.7	-1.93	8.3	-1.38	4.8	-1.67	12.7	-1.14
26	6.0	-1.55	25.0	-0.67	6.4	-1.52	23.6	-0.72
27	20.7	-0.82	47.9	-0.05	11.7	-1.19	38.2	-0.30
28	46.7	-0.08	62.5	0.32	26.6	-0.63	59.1	0.23
29	72.0	0.58	79.2	0.81	54.3	0.11	82.7	0.94
30	92.0	1.41	95.8	1.73	85.1	1.04	97.3	1.92

### Wordlist Learning – List 1

Points	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 23)		(n = 47)		(n = 55)	
	PR	z	PR	z	PR	z	PR	z
0								
1	0.7	-2.47						
2	4.7	-1.68			1.1	-2.30	4.5	-1.69
3	18.7	-0.89	8.7	-1.36	6.4	-1.52	14.5	-1.06
4	42.7	-0.18	37.0	-0.33	27.7	-0.59	31.8	-0.47
5	68.0	0.47	73.9	0.64	60.6	0.27	56.4	0.16
6	88.0	1.17	93.5	1.51	85.1	1.04	79.1	0.81
7	96.7	1.83	97.8	2.02	95.7	1.72	94.5	1.60
8	98.7	2.22			98.9	2.30		
9								
10								

### Wordlist Learning – List 2

Points	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 23)		(n = 47)		(n = 55)	
	PR	z	PR	z	PR	z	PR	z
0								
1								
2					1.1	-2.30		
3	0.7	-2.47			5.0	-1.65	2.7	-1.92
4	6.0	-1.55	4.3	-1.71	8.9	-1.35	7.3	-1.46
5	28.0	-0.58	32.6	-0.45	12.8	-1.14	16.4	-0.98
6	57.3	0.18	67.4	0.45	34.0	-0.41	38.2	-0.30
7	79.3	0.82	89.1	1.23	57.4	0.19	64.5	0.37
8	93.3	1.50			83.0	0.95	83.6	0.98
9	98.7	2.22			97.9	2.03	94.5	1.60
10							99.1	2.36



### Constructional Praxis Copying

	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 24)		(n = 47)		(n = 55)	
Points	PR	z	PR	z	PR	z	PR	z
<b>0</b>								
...								
<b>5</b>							0.9	-2.36
<b>6</b>							2.7	-1.93
<b>7</b>			2.1	-2.04	1.1	-2.30	4.5	-1.69
<b>8</b>			6.3	-1.53	4.3	-1.72	9.1	-1.34
<b>9</b>	1.3	-2.22	12.5	-1.15	8.5	-1.37	12.7	-1.14
<b>10</b>	6.7	-1.50	33.3	-0.43	13.8	-1.09	25.5	-0.66
<b>11</b>	55.3	0.13	75.0	0.67	58.5	0.21	68.2	0.47

### Wordlist Recall - Recall

	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 23)		(n = 47)		(n = 55)	
Points	PR	z	PR	z	PR	z	PR	z
<b>0</b>	0.7	-2.47					0.9	-2.36
<b>1</b>	2.0	-2.05			2.1	-2.03	2.1	-2.03
<b>2</b>	5.3	-1.61	6.5	-1.51	4.8	-1.67	3.3	-1.84
<b>3</b>	11.3	-1.21	14.1	-1.08	7.4	-1.44	4.5	-1.69
<b>4</b>	25.3	-0.66	21.7	-0.78	12.8	-1.14	15.5	-1.02
<b>5</b>	48.0	-0.05	45.7	-0.11	24.5	-0.69	33.6	-0.42
<b>6</b>	68.7	0.49	69.6	0.51	42.6	-0.19	51.8	0.05
<b>7</b>	84.7	1.02	84.8	1.03	59.6	0.24	68.2	0.47
<b>8</b>	94.7	1.61	93.5	1.51	75.5	0.69	83.6	0.98
<b>9</b>	98.7	2.22	97.8	2.02	89.4	1.25	94.5	1.60
<b>10</b>					97.9	2.03	99.1	2.36

### Wordlist Recall – Savings

		Male		Female	
		> 12 years education	≤ 12 years education	> 12 years education	≤ 12 years education
		(n = 75)	(n = 23)	(n = 47)	(n = 55)
PCTL	z	%	%	%	%
<b>2.28</b>	-2.00	14.7	28.6	12.9	11.9
<b>6.68</b>	-1.50	40.0	31.4	38.6	50.0
<b>10</b>	-1.28	41.7	33.3	48.6	50.0
<b>15.87</b>	-1.00	50.0	56.9	60.5	57.1
<b>25</b>	-0.67	60.0	71.4	66.7	66.6
<b>50</b>	0.00	71.4	80.0	83.3	80.0
<b>75</b>	0.67	88.9	87.5	100.0	100.0
<b>90</b>	1.28	100.0	100.0	112.5	112.5

### Wordlist Recall – Intrusions

	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 23)		(n = 47)		(n = 55)	
Intrusions	PR	z	PR	z	PR	z	PR	z
9							0.9	-2.36
8							1.5	-2.17
7							2.1	-2.03
6	0.7	-2.47					2.7	-1.92
5	2.7	-1.93			2.1	-2.03	3.9	-1.76
4	4.7	-1.68	2.2	-2.02	5.3	-1.61	5.2	-1.63
3	6.7	-1.50	8.7	-1.36	8.5	-1.37	6.4	-1.52
2	8.7	-1.36	17.4	-0.94	11.7	-1.19	13.6	-1.10
1	18.7	-0.89	32.6	-0.45	22.3	-0.76	30.0	-0.52
0	62.7	0.32	71.7	0.58	63.8	0.35	70.9	0.55

### Wordlist Recognition

		Male		Female	
		> 12 years education	≤ 12 years education	> 12 years education	≤ 12 years education
		(n = 75)	(n = 23)	(n = 47)	(n = 55)
PCTL	z	%	%	%	%
2.28	-2.00	73.7	50.0	65.9	60.5
6.68	-1.50	85.0	65.1	81.0	78.7
10	-1.28	85.0	79.0	85.0	85.0
15.87	-1.00	85.0	89.0	90.0	85.0
25	-0.67	90.0	90.0	90.0	90.0
50	0.00	95.0	95.0	100.0	95.0
75	0.67	100.0	95.0	100.0	100.0
90	1.28	100.0	100.0	100.0	100.0

### Constructional Praxis Recall – Recall

	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 24)		(n = 47)		(n = 55)	
Points	PR	z	PR	z	PR	z	PR	z
0								
1								
2	1.3	-2.22			2.1	-2.03	1.8	-2.09
3	2.3	-2.00			3.2	-1.85	4.5	-1.69
4	3.3	-1.83	4.2	-1.73	4.2	-1.73	8.2	-1.39
5	5.0	-1.65	12.5	-1.15	5.3	-1.61	12.7	-1.14
6	6.7	-1.50	18.8	-0.89	11.7	-1.19	21.8	-0.78
7	13.3	-1.11	27.1	-0.61	21.3	-0.80	35.5	-0.37
8	28.7	-0.56	50.0	0.00	34.0	-0.41	51.8	0.05
9	44.0	-0.15	68.8	0.49	48.9	-0.03	65.5	0.40
10	52.7	0.07	75.0	0.67	58.5	0.21	76.4	0.72
11	78.7	0.79	89.6	1.26	80.9	0.87	91.8	1.39

### Constructional Praxis Recall – Savings

		Male		Female	
		> 12 years education	≤ 12 years education	> 12 years education	≤ 12 years education
		(n = 75)	(n = 24)	(n = 47)	(n = 55)
PCTL	z	%	%	%	%
<b>2.28</b>	-2.00	19.5	40.0	22.8	22.0
<b>6.68</b>	-1.50	54.5	40.0	47.3	36.4
<b>10</b>	-1.28	62.2	45.0	54.5	43.3
<b>15.87</b>	-1.00	70.2	55.4	57.9	54.5
<b>25</b>	-0.67	72.7	65.2	72.7	63.6
<b>50</b>	0.00	90.9	72.7	81.8	75.0
<b>75</b>	0.67	100.0	97.7	100.0	100.0
<b>90</b>	1.28	100.0	100.0	100.0	100.0

### Trail Making Test – TMT A

		Male		Female	
		> 12 years education	≤ 12 years education	> 12 years education	≤ 12 years education
		(n = 75)	(n = 24)	(n = 46)	(n = 55)
PCTL	z	Time in s	Time in s	Time in s	Time in s
<b>97.72</b>	2.00	121	*	106	147
<b>93.32</b>	1.50	89	140	93	91
<b>90</b>	1.28	88	107	88	85
<b>84.13</b>	1.00	78	91	77	76
<b>75</b>	0.67	65	76	68	63
<b>50</b>	0.00	52	66	57	53
<b>25</b>	-0.67	43	57	45	40
<b>10</b>	-1.28	36	44	34	33

Note. \* This percentile cannot be calculated due to the small sample size.

### Trail Making Test – TMT B

		Male		Female	
		> 12 years education	≤ 12 years education	> 12 years education	≤ 12 years education
		(n = 75)	(n = 24)	(n = 46)	(n = 55)
PCTL	z	Time in s	Time in s	Time in s	Time in s
<b>97.72</b>	2.00	300	*	300	300
<b>93.32</b>	1.50	259	262	284	258
<b>90</b>	1.28	231	242	174	205
<b>84.13</b>	1.00	209	238	150	177
<b>75</b>	0.67	158	226	133	145
<b>50</b>	0.00	114	170	110	109
<b>25</b>	-0.67	94	100	88	92
<b>10</b>	-1.28	78	77	75	75

Note. \* This percentile cannot be calculated due to the smaller sample size.

### Trail Making Test – TMT B/A

	z	Male		Female	
		> 12 years education	≤ 12 years education	> 12 years education	≤ 12 years education
		(n = 75)	(n = 24)	(n = 46)	(n = 55)
PCTL		a.u.	a.u.	a.u.	a.u.
<b>97.72</b>	2.00	6.0	*	5.0	4.6
<b>93.32</b>	1.50	5.5	4.4	3.8	3.9
<b>90</b>	1.28	4.1	4.0	3.3	3.7
<b>84.13</b>	1.00	3.7	3.2	2.9	3.3
<b>75</b>	0.67	3.1	2.6	2.4	2.8
<b>50</b>	0.00	2.2	2.2	2.0	2.3
<b>25</b>	-0.67	1.7	1.7	1.7	1.7
<b>10</b>	-1.28	1.4	1.5	1.3	1.4

Note. \* This percentile cannot be calculated due to the smaller sample size.

a.u. = arbitrary unit.

### Verbal Fluency – Fluency S-Words

Points	Male				Female			
	> 12 years education		≤ 12 years education		> 12 years education		≤ 12 years education	
	(n = 75)		(n = 24)		(n = 47)		(n = 55)	
	PR	z	PR	z	PR	z	PR	z
<b>0</b>								
<b>1</b>								
<b>2</b>								
<b>3</b>	1.3	-2.22	2.1	-2.04				
<b>4</b>	1.8	-2.10	3.2	-1.85			0.9	-2.36
<b>5</b>	2.3	-1.93	4.2	-1.73			1.8	-2.10
<b>6</b>	2.8	-1.91	5.3	-1.62	1.1	-2.30	2.7	-1.93
<b>7</b>	3.3	-1.83	6.3	-1.53	3.2	-1.85	3.6	-1.79
<b>8</b>	6.7	-1.50	9.8	-1.29	5.3	-1.62	7.3	-1.46
<b>9</b>	12.7	-1.14	13.2	-1.12	7.4	-1.44	9.1	-1.34
<b>10</b>	20.7	-0.82	16.7	-0.97	12.8	-1.14	10.9	-1.23
<b>11</b>	30.7	-0.51	39.6	-0.26	20.2	-0.83	20.0	-0.84
<b>12</b>	40.0	-0.25	52.1	0.05	28.7	-0.56	29.1	-0.55
<b>13</b>	46.7	-0.08	64.6	0.37	36.2	-0.35	35.5	-0.37
<b>14</b>	56.0	0.15	77.1	0.74	42.6	-0.19	44.5	-0.14
<b>15</b>	66.7	0.43	81.3	0.89	50.0	0.00	53.6	0.09
<b>16</b>	74.7	0.66	85.4	1.05	58.5	0.21	60.9	0.28
<b>17</b>	83.3	0.97	89.6	1.26	64.9	0.38	67.3	0.45
<b>18</b>	90.7	1.32	95.8	1.73	74.5	0.66	74.5	0.66
<b>19</b>	95.3	1.68			83.0	0.95	80.0	0.84
<b>20</b>	96.2	1.77			86.2	1.09	86.4	1.10
<b>21</b>	97.1	1.90			88.3	1.19	91.8	1.39
<b>22</b>	98.0	2.05			90.4	1.31	93.6	1.52
<b>23</b>	98.7	2.23			92.6	1.44	96.4	1.79
<b>24</b>	99.3	2.47			95.7	1.72	99.1	2.36
<b>25</b>					96.8	1.85		
<b>26</b>					97.8	2.01		
<b>27</b>					98.9	2.30		