

Appendix .ONLINE APPENDIX

Appendix. Table 3.A1*Descriptive Statistics by Profiles for Children with Immigration Background*

	At Risk Profile	Med.-Low Profile	Medium Profile	High Profile
Number of Cases ¹	179	391	307	75
Intercept ²	25 ^{b,c,d}	41 ^{a,c,d}	57 ^{a,b,d}	72 ^{a,b,c}
Slope ²	34 ^{b,c,d}	53 ^{a,d}	58 ^{a,d}	67 ^{a,b,c}
Slope squared ²	1 ^{b,c,d}	-5 ^{a,d}	-6 ^{a,d}	-9 ^{a,b,c}
Vocabulary Age 3 Ø	23 ^{b,c,d} (12)	38 ^{a,c,d} (14)	54 ^{a,b,d} (14)	68 ^{a,b,c} (16)
Vocabulary Age 5 Ø	57 ^{b,c,d} (12)	84 ^{a,c,d} (12)	109 ^{a,b,d} (12)	131 ^{a,b,c} (13)
Vocabulary Age 7 Ø	94 ^{b,c,d} (13)	124 ^{a,c,d} (9)	147 ^{a,b,d} (9)	169 ^{a,b,c} (8)
Vocabulary Age 9 Ø	128 ^{b,c,d} (10)	153 ^{a,c,d} (9)	175 ^{a,b,d} (7)	190 ^{a,b,c} (6)
Baseline				
<i>Immigrant Background</i>	b,c,d	a,c,d	a,b,d	a,b,c
2 nd Generation	86%	56%	24%	25%
Interethnics	10%	20%	32%	21%
3 rd Generation	4%	24%	44%	54%
Female	43% ^d	57% ^d	52% ^d	22% ^{a,b,c}
SES -Correlates				
HISEI Age 7 Months Ø	37 ^{b,c,d} (18)	50 ^{a,c,d} (21)	60 ^{a,b,d} (20)	67 ^{a,b,c} (18)
<i>Number of Books Age 2</i>	b,c,d	a,c,d	a,b	a,b
0 - 25	66%	25%	8%	7%
26 - 200	33%	61%	54%	46%
> 200	1%	14%	38%	47%
<i>Mother's Education Age 7 Months</i>	b,c,d	a,c,d	a,b,d	a,b,c
Lower Secondary or None	31%	21%	11%	3%
Intermediate (Realschule)	44%	31%	30%	19%
Higher Secondary (Abitur)	25%	35%	32%	39%
Tertiary Degree	1%	13%	28%	39%
Exposure				
<i>Age of first ECEC Entry</i>	b,c,d	a,c	a,b	a
Younger than 2 Years	11%	31%	47%	51%
Age 2 Years	29%	38%	31%	26%
Age 3 Years or Older	60%	31%	22%	23%
Older Sibling in Household	56%	54%	46%	35%

	At Risk Profile	Med.-Low Profile	Medium Profile	High Profile
<i>Family Language</i>	b,c,d	a,c,d	a,b	a,b
Only German	12%	50%	70%	77%
Both Languages	6%	15%	23%	14%
Only other Language	82%	35%	7%	9%
<i>Reading Aloud Age 3</i>	c,d	c	a,b	a
Once a Week or Less	13%	8%	2%	1%
Multiple Times a Week	37%	29%	15%	25%
Once Daily	23%	34%	37%	29%
Multiple Times Daily	26%	29%	46%	45%
Efficiency				
Sensomotoric Dev. Age 7 Months Ø	-.41 ^{c,d} (1.60)	-.22 ^{c,d} (1.36)	.09 ^{a,c,d} (1.27)	.61 ^{a,c,d} (1.42)
Phon. Working Memory Age 3 Ø	2.74 ^{c,d} (1.20)	3.03 ^{c,d} (1.47)	3.47 ^{a,c,d} (1.86)	4.12 ^{a,b,c} (1.93)
Phon. Working Memory Age 6 Ø	7.02 ^{c,d,e} (1.52)	7.50 ^{a,c,d} (1.60)	8.59 ^{a,c} (1.71)	8.54 ^{a,b} (1.90)
Migration-related Exposure				
Native German Speaker in Household	26% ^{b,c,d}	63% ^{a,c,d}	85% ^{a,b}	92% ^{a,b}
<i>Share of Foreigners in Postal District</i>	b,c,d	a,c	a,b	a
Low	5%	11%	19%	18%
Medium	15%	26%	35%	34%
High	79%	64%	46%	47%
Share of Child's Friends with IB Age 5 Ø	4.23 ^{b,c,d} (1.53)	3.45 ^{a,c,d} (1.68)	2.93 ^{a,b,d} (1.39)	2.76 ^{a,b,c} (1.28)
<i>Reading Language Age 2</i>	b,c,d	a	a	a
Same Amounts	27%	20%	28%	31%
More in other Language	49%	28%	17%	6%
More in German	24%	52%	55%	63%

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: Weighted data was used. ¹Unweighted number of cases are reported. ²Weighting in Growth Mixture Model not available, therefore values of Intercept and Slopes are unweighted. ^{a-d} Significant difference ($p \leq 0.05$) to (a) Risk-Profile, (b) Medium-Low Profile, (c) Medium Profile, (d) High Profile. Standard deviations in parentheses. Tests for significant differences: Weighted logistic regressions were used for binary variables. Weighted ordinal logistic regressions for categorical variables and weighted linear regressions for metric variables. Imputed values from N = 50 data sets were used. Percentages are rounded.

Appendix. Table 3.A2

Model Fit Statistics of Profile Solutions.

	Entropy	AIC	BIC	Sample-size adjusted BIC
Full Sample				
2 Profiles	.804	84225	84288	84254
3 Profiles	.811	83100	83187	83139
4 Profiles	.781	82647	82757	82697
5 Profiles	.786	82424	82557	82484
Subsample – Children with Immigrant Background				
2 Profiles	.822	33426	33479	33444
3 Profiles	.819	33933	33006	33958
4 Profiles	.816	32732	32825	32764
5 Profiles	.797	32645	32756	32683
Subsample – Children without Immigrant Background				
2 Profiles	.758	50309	50367	50332
3 Profiles	.748	49894	49974	49926
4 Profiles	.777	49633	49733	49673
5 Profiles	.774	49535	49657	49584

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: Means for N = 50 imputed data sets. Some fit statistics of Growth Mixture Models are not available for imputed data (e.g. Lo-Mendell-Rubin likelihood ratio test).

Appendix. Table 3. A3

Average Marginal Effects from the Logistic Regression of Membership in a Below-average Group (At Risk + Med.-Low Profiles).

	Full Sample Model 1	Without IB Model 2	With IB Model 3	With IB Model 4
Immigrant Background				
Non-Immigrant Student	.0258	-	-	-
2 nd Generation	.1197 ⁺	-	.1145 ⁺	.1237 [*]
Interethnics	.0552	-	.0468	.0580
3 rd Generation (<i>reference category</i>)	-	-	-	-
Female	.0846 ^{***}	.0774 [*]	.0979 [*]	.0875 [*]
Highest ISEI in Family at Age 7 Months	-.0026 ^{**}	-.0037 ^{**}	-.0009	-.0009
Mother's Education at Age 7 Months				
Lower Sec. or None (<i>reference category</i>)	-	-	-	-
Intermediate ("Realschule")	-.0310	-.0485	.0106	.0232
Higher Secondary ("Abitur")	-.0924	-.1384	-.0287	-.0262
Tertiary Degree	-.0528	-.0764	.0018	.0082
Number of Books in Household				
Less than 25 (<i>reference category</i>)	-	-	-	-
26-200	-.1205 ⁺	-.1698 ⁺	-.0654	-.0706
More than 200	-.2199 ^{***}	-.2586 [*]	-.1728 [*]	-.1831 [*]
Age of first ECEC Entry				
Younger than 2 Years (<i>reference category</i>)	-	-	-	-
Age 2 Years	.0375	.0131	.0913 ⁺	.0898 ⁺
Age 3 Years or Older	.0163	-.0270	.0890 ⁺	.0812 ⁺
Older Sibling in Household	.0426	.0597	.0229	.0334
Family Language				
Only German (<i>reference category</i>)	-	-	-	-
Both Languages	.0262	-	.0114	.0274
Only other Language	.3657 ^{***}	-	.3416 ^{***}	.2655 ^{***}
Reading Aloud Age 3				
Once a Week or Less (<i>reference category</i>)	-	-	-	-
Multiple Times a Week	-.1469 ⁺	-.1024	-.1489	-.1333
Once Daily	-.1565 ⁺	-.0773	-.2060 ⁺	-.1942 ⁺
Multiple Times Daily	-.1946 [*]	-.1411	-.2066 ⁺	-.1855 ⁺

	Full Sample Model 1	Without IB Model 2	With IB Model 3	With IB Model 4
Sensomotoric Development at 7 Months	-.0215*	-.0087	-.0400**	-.0380**
Phonological Working Memory Age 3	-.0200*	-.0196 ⁺	-.0188 ⁺	-.0204 ⁺
Phonological Working Memory Age 6	-.0445***	-.0458***	-.0422***	-.0451***
Native German Speaker in Household				-.0676
Share of Foreigners in Postal District				
Low (<i>reference category</i>)				-
Medium				.0194
High				.1059 ⁺
Share of Child's Friends with IB Age 5				-.0132
Reading Language at Age 2				
Same amounts (<i>reference category</i>)				-
More in German				-.0142
More in other Language				-.0547
Average Pseudo-R ²	.31	.23	.36	.38
N	2422	1469	953	953

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: Weighted data was used. Dependent variable coded as 0 = Not below average / 1 = below average.

N of Below-average group in full Sample = 788. N of Below-average group in Subsample of Children without Immigrant Background (IB) = 354. N of Below-average group in Subsample of Children with IB = 434. ⁺p ≤ .1, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001

Appendix. Table 3.A4*Descriptive Statistics of Panel Dropouts from Wave 1 to Wave 4 (Age 3)*

	All Respondents in Wave 1	All Panel Dropouts	Dropouts: Non- Immigrants	Dropouts: Children with IB
Number of Cases	3481	1059	439	620
<i>Immigrant Background</i>		^a		^c
Non-Immigrants	55%	41%	100%	-
2 nd Generation	21%	34%	-	58%
Interethnics	11%	12%	-	21%
3 rd Generation	13%	12%	-	21%
Female	49%	48%	46%	50%
HISEI Age 7 Months Ø	60	51 ^a	54 ^b	50 ^c
<i>Mother's Education Age 7 Months</i>		^a	^b	^c
Lower Secondary or None	13%	23%	22%	24%
Intermediate (Realschule)	25%	31%	31%	31%
Higher Secondary (Abitur)	28%	28%	21%	33%
Tertiary Degree	34%	18%	26%	11%
Older Sibling in Household	50%	55% ^a	50%	58% ^c
Family Language:		^a		^c
Only German	76%	61%	99%	35%
Both Languages	10%	13%	0	21%
Only other Language	15%	26%	0	44%
Native German Speaker in Household	85%	73% ^a	100%	54% ^c
Sensomotoric Dev. Age 7 Months Ø	-.04	-.16 ^a	-.21 ^b	-.11 ^c

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: All variables were measured at Wave 1. ^{a-c}Significant difference ($p \leq 0.05$) to (a) full analysis sample at first wave, (b) children without immigrant background in sample at first wave, (c) children with immigrant background in sample at first wave. t-Test was used for metric variables, Fisher's Exact Test for binary variables and Chi²-Test for categorical variables. Percentages are rounded.

Appendix. Table 3.A5

Shares of Missing Values and Measurement Points of Variables

	% of Missing Values in Full Data Set (N = 3 481)	% of Missing Values in Analysis Sample (N = 2 422)	Measurement Point	Age of Child in Years
Vocabulary Age 3	56	37	4	3
Vocabulary Age 5	41	15	6	5
Vocabulary Age 7	45	21	8	7
Vocabulary Age 9	55	36	10	9
Baseline				
Immigrant Background	0	0	1	< 1
Female	0	0	1	< 1
SES -Correlates				
HISEI	3	2	1	< 1
Mother's Education	1	1	1	< 1
Number of Books	25	7	3	2
Exposure				
Age of first ECEC Entry	21	1	1-8	< 1 - 7
Older Sibling in Household	0	0	1	< 1
Family Language	0	0	1	< 1
Reading Aloud	29	5	4	3
Efficiency				
Sensomotoric Dev.	15	11	1	< 1
Phon. Working Memory	64	50	4	3
Phon. Working Memory	44	20	7	6
Migration-related Exposure				
Native German Speaker in Household	0	0	1	< 1
Share of Foreigners in Postal District	0	0	1	< 1
Share of Child's Friends with IB	37	11	1	< 1
Reading Language ¹	68	62	3	2

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: Percentages of missing values are rounded. ¹Questions for Reading Language were only asked if at least one parent speaks another language than German.

Appendix. Table 3.A6

Correlation Matrix for unimputed values.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Vocabulary Age 3	-																			
2. Vocabulary Age 5	.44	-																		
3. Vocabulary Age 7	.41	.68	-																	
4. Vocabulary Age 9	.37	.62	.70	-																
5. Immigrant Background	-.08	-.09	-.07	-.06	-															
6. Female	.03	-.08	-.16	-.11	.02	-														
7. HISEI	.19	.35	.34	.34	-.03	.01	-													
8. Mother's Education	.22	.30	.31	.32	-.06	.03	.67	-												
9. Number of Books	.22	.34	.35	.39	-.07	.02	.51	.50	-											
10. Age of first ECEC Entry	-.07	-.13	-.14	-.09	.02	.00	-.17	-.21	-.12	-										
11. Older Sibling in HH	-.01	-.06	-.11	-.12	.01	.01	-.06	-.10	-.06	.07	-									
12. Family Language: Only German	.21	.36	.32	.30	-.29	.01	.18	.14	.21	-.11	-.04	-								
13. Reading Aloud	.19	.26	.26	.24	-.07	.03	.28	.28	.31	.02	-.17	.20	-							
14. Sensomotoric Dev.	.08	.09	.13	.06	.04	-.02	.09	.06	.07	-.03	-.04	-.02	.04	-						
15. Phon. Working Memory	.24	.23	.22	.20	.02	-.02	.12	.15	.13	-.02	.03	.05	.12	.08	-					
16. Phon. Working Memory	.20	.27	.27	.28	.02	.00	.20	.20	.18	-.02	-.01	.06	.12	.05	.37	-				
17. Native German Speaker in Household	.19	.36	.35	.32	-.12	-.02	.24	.19	.26	-.15	-.06	.57	.22	-.03	.01	.06	-			
18. Share of Foreigners in Postal District	-.03	-.05	-.07	-.01	.18	.03	-.06	-.04	-.03	.02	-.04	-.27	-.03	.02	.06	.05	-.20	-		
19. Share of Child's Friends with IB	-.12	-.18	-.17	-.16	.15	-.03	-.14	-.12	-.12	.08	-.03	-.39	-.10	.06	.04	-.02	-.31	.33	-	
20. Reading Language: More in German ¹	.13	.20	.16	.16	-.54	-.02	.02	.04	.08	-.05	-.01	.49	-.06	-.00	-.00	-.04	.34	-.17	-.22	-

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: ¹Questions for Reading Language were only asked if at least one parent speaks another language than German.

Significant correlations ($p < 0.05$) in bold characters.

Appendix. Table 3.A7*Results from the OLS Regression on the Probability of Membership in Risk Profile.*

	Full Sample Model 1	Without IB Model 2	With IB Model 3	With IB Model 4
Immigrant Background				
Non-Immigrant Student	.0001	-	-	-
2 nd Generation	.0470	-	.0172	.0085
Interethnics	.0250	-	.0154	.0309
3 rd Generation (<i>reference category</i>)	-	-	-	-
Female	.0010	-.0046	.0091	-.0006
Highest ISEI in Family at Age 7 Months	-.0008 ⁺	-.0001	-.0015	-.0014
Mother's Education at Age 7 Months				
Lower Sec. or None (<i>reference category</i>)	-	-	-	-
Intermediate ("Realschule")	-.0018	-.0520 ^{***}	.0386	.0314
Higher Secondary ("Abitur")	-.0238	-.0603 ^{***}	-.0113	-.0260
Tertiary Degree	.0015	-.0573 ⁺	.0370	.0232
Number of Books in Household				
Less than 25 (<i>reference category</i>)	-	-	-	-
26-200	-.1163 ^{***}	-.0543	-.1454 ^{**}	-.1548 ^{***}
More than 200	-.1240 ^{***}	-.0575	-.1743 ^{***}	-.1814 ^{***}
Age of first ECEC Entry				
Younger than 2 Years (<i>reference category</i>)	-	-	-	-
Age 2 Years	.0097	-.0088	.0379	.0427
Age 3 Years or Older	.0525 ^{**}	.0013	.1058 ^{**}	.0932 ^{**}
Older Sibling in Household	-.0002	-.0004	-.0068	-.0087
Family Language				
Only German (<i>reference category</i>)	-	-	-	-
Both Languages	.0037	-	.0139	.0082
Only other Language	.3281 ^{***}	-	.3231 ^{***}	.2500 ^{***}
Reading Aloud Age 3				
Once a Week or Less (<i>reference category</i>)	-	-	-	-
Multiple Times a Week	-.0551	-.0697 ⁺	-.0546	-.0706
Once Daily	-.0503	-.0509	-.0734	-.0810
Multiple Times Daily	-.0493	-.0598	-.0520	-.0558

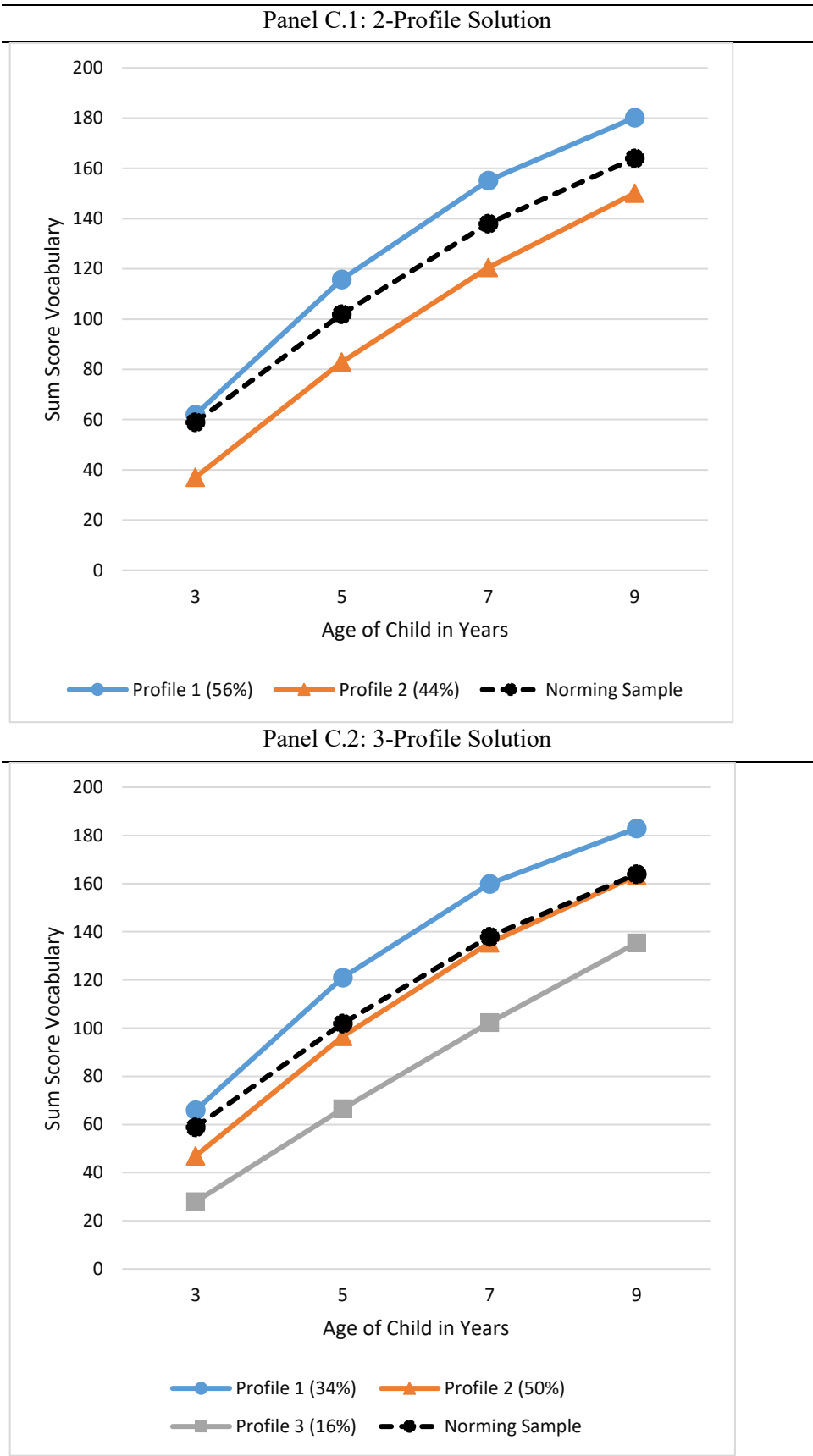
	Full Sample Model 1	Without IB Model 2	With IB Model 3	With IB Model 4
Sensomotoric Development at 7 Months	-.1173*	-.0089 ⁺	-.0150	-.0155
Phonological Working Memory Age 3	-.0029	-.0006	-.0078	-.0092
Phonological Working Memory Age 6	-.0148***	-.0153***	-.0142 ⁺	-.0160 ⁺
Native German Speaker in Household				-.0905 ⁺
Share of Foreigners in Postal District				
Low (<i>reference category</i>)				-
Medium				-.0406
High				.0081
Share of Child's Friends with IB Age 5				.0032
Reading Language at Age 2				
Same amounts (<i>reference category</i>)				-
More in German				-.0632
More in other Language				-.0912**
Average Pseudo-R ²	.45	.18	.46	.49
N	2422	1469	953	953

Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

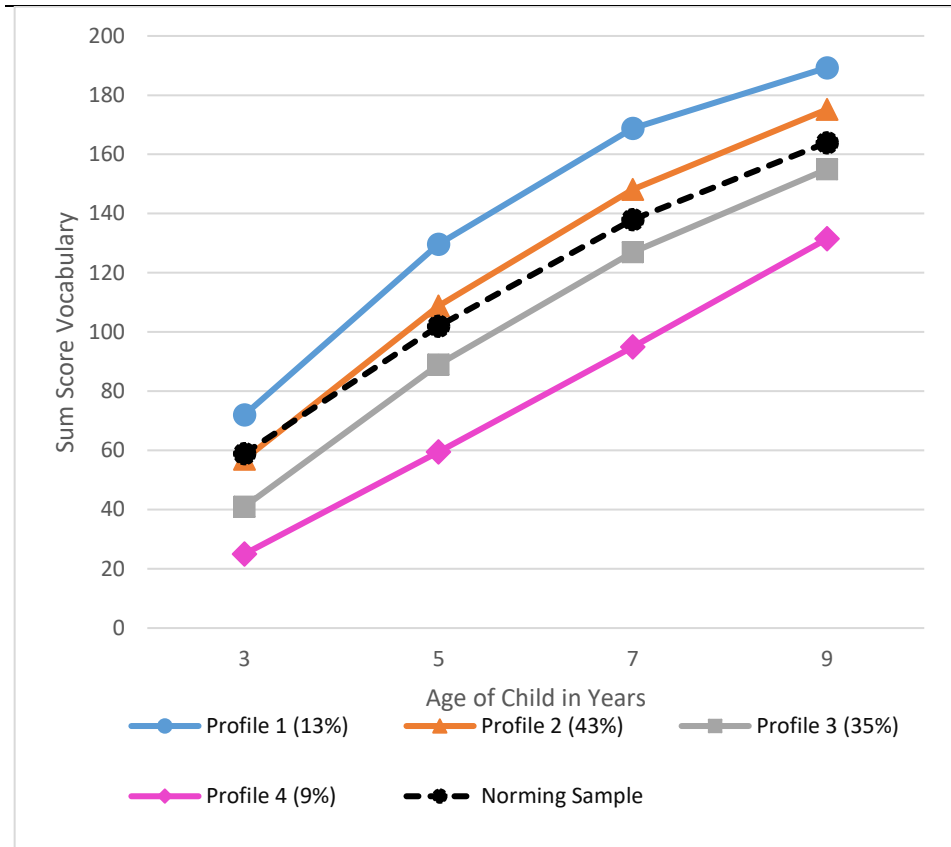
Notes: Weighted data was used. Dependent variable is the probability of belonging to the Risk Profile (instead of fixed membership by highest probability of belonging to a certain profile). ⁺p ≤ .1, * p ≤ 0.05, ** p ≤ 0.01, *** p ≤ 0.001

Appendix. Figure 3.A1

Profile Solutions of the Full Sample (Panel C)



Panel C.3:4-Profile Solution



Source: National Educational Panel Study (NEPS) Newborn Cohort, own calculations.

Notes: Share of each profile (with weighting) is shown in parentheses (rounded).