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Further Analysis Details

Multiple Imputation. With the exception of SDQ peer subscale which had a high level of valid data, multiple imputation procedures were used to account for missing values within all the predictor variables detailed in Table 1. Imputation of independence/self-regulation and emotional dysregulation did not fill any missing data due to both a high level of valid data as well as insufficient valid data within the multiple imputation predictors.

The imputation model included all variables in the analysis models described below as well as naming vocabulary at age 3, the rDLD variable, and a variety of socioeconomic variables that were related to either the value of imputation variables or to the missingness of the imputation variable. Please see the below for the full list of variables included in the imputation for each imputed predictor variable. The imputation procedure was the “mi compute” command within Stata 14 (StataCorp., 2015). The method of imputation used was sequential imputation using chained equations, which allowed unique prediction equations for each imputed variable. The estimation used was predictive mean matching, which is a method of imputation where a predictive value is derived for all data, not simply the missing value. The individuals with missing values are then matched to close “neighbours” with a very similar prediction but no missing data. The real value from one of

the five possible “neighbours” was chosen randomly to replace the missing value. Twenty imputations were produced, allowing adequate variability in the missing value prediction.

Multiple Imputation Tables.

See the Table S1 for the variables used in the imputation model for the Mood Variable.

Additional tables for all other imputed variables will be provided upon request to the first author (m.c.st.clair@bath.ac.uk).

Table S1. Imputation for the Mood variable.

Variables in Multiple Imputation Model	Wave	Analysis Model	Correlates of Analysis Variables	Correlates of Missingness	% Non-Missing
Irritability (temperament)	1	Yes			91.0
Regularity (temperament)	1	Yes			89.6
Approach/withdrawal (temperament)	1	Yes			67.3
Adaptability (temperament)	1	Yes			78.5
Maternal Attachment	1	Yes			79.6
Naming Vocabulary (Age 3)	2	Yes			92.5
Self-regulation (Age 3)	2	Yes			77.1
Emotional Dysregulation (Age 3)	2	Yes			77.1
Parent-Child Relationship	2	Yes			70.8
Child gender	1&2	Yes			98.68
OECD Poverty Indicator	1&2	Yes			99.86
SDQ Emotional Subscale Age 3	2	Yes			94.50
SDQ Emotional Subscale Age 11	5	Yes			75.41
rDL	--	Yes			100
OECD Equivalised income	1&2			Yes	99.90
Respondent Gender	1			Yes	95.79
Respondent Age	1			Yes	95.78
SDQ Peer Subscale age 3	2		Yes		93.88
SDQ Conduct Subscale age 3	2		Yes		94.66
SDQ Hyperactivity Subscale age 3	2		Yes		93.75
SDQ Prosocial Subscale age 3	2		Yes		93.98
Self-Regulation (Age 5)	3		Yes		86.74
Emotional Dysregulation (Age 5)	3		Yes		86.75
Parental Self esteem	1		Yes		80.8
Languages spoken at home	1		Yes	Yes	95.79
Respondent Ethnicity	1		Yes	Yes	95.59
Respondent in work	1		Yes	Yes	95.69
Respondent general health	1		Yes	Yes	95.71
Respondent Relationship Status	1			Yes	95.47
Lived apart from baby (until 9 months)	1			Yes	95.67
Respondent relationship to child				Yes	95.79

[Additional information regarding regression analyses](#). For the variable regularity, the most frequent category was the highest response rather than the lowest response. To fit the distributional requirements for binomial regression, this variable was reversed only for the regression analysis.

[Correlation Table](#). For both the rDLN and GP groups, please see the correlations between all predictors and outcome variables in Table S2.

Table S2. Correlation between emotional difficulties at age 3, 5, 7, 11 and all predictor variables by rDLD/GP group (GP in *italics* with rDLD in normal text)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Emotional problems age 3	1	.42***	.35***	.26***	-.09***	.11***	-.11***	.18***	.14***	.19***	-.06***	-.13***	.29***	-.30***	.31***
2. Emotional problems age 5	.35***	1	.51***	.38***	-.07***	.10***	-.10***	.15***	.12***	.21***	-.07***	-.09***	.22***	-.25***	.24***
3. Emotional problems age 7	.36***	.47***	1	.48***	-.06***	.08***	-.08***	.10***	.10***	.20***	-.05***	-.09***	.22***	-.24***	.23***
4. Emotional problems age 11	.29***	.39***	.49***	1	-.05***	.07***	-.06***	.08***	.06***	.21***	-.04***	-.06***	.21***	-.23***	.20***
5. Mood (9 months)	-.18***	-.15***	-.10*	-.09	1	-.25***	.12***	-.10***	-.18***	-.11***	.17***	.12***	-.09***	.14***	.08***
6. Irritability (9 months)	.11*	.15***	.18***	.11*	-.16***	1	-.10***	.17***	.31***	.19***	-.22***	-.07***	.15***	-.20***	.08***
7. Regularity (9 months)	-.22***	.08*	-.12**	-.12**	.17***	-.10*	1	-.05***	-.02	-.14***	.05***	.06***	-.11***	.12***	-.14***
8. Approach/Withdrawal (9 months)	.19***	.08	.08	-.01	-.09	.17***	-.06	1	.48***	.11***	-.05***	-.06***	.10***	-.10***	.13***
9. Adaptability (9 months)	.15**	.12**	.10*	.09	-.14**	.30***	-.02	.48***	1	.13***	-.09***	-.07***	.09***	-.11***	.08***
10. Parental Psych. Distress (9 months)	.18***	.22***	.26***	.22***	-.15***	.17***	-.11**	.16***	.18***	1	-.23***	-.05***	.20***	-.26***	.15***
11. Maternal Attachment (9 months)	-.11*	-.12**	-.11*	-.12*	.18***	-.20***	.08	.01	-.09*	-.27***	1	-.12***	-.08***	.24***	-.06***
12. Independence/Self-Reg. (3 years)	-.16***	-.13***	-.03	-.09*	.12**	-.09*	.09*	-.05	-.11*	-.07	.06	1	-.10***	.19***	-.17***

13. Emotional Dysreg. (3 years)	.24***	.24***	.20***	.22***	-.14**	.20***	-.10*	.12*	.14**	.21***	-.08	-.02	1	-.53***	.22***
14. Parent-Child Relationship (3 years)	-.35***	-.29***	-.27***	-.27***	.15**	-.20***	.15**	-.18***	-.20***	-.35***	.26***	.19***	-.50***	1	-.29***
15. SDQ peer problems (3 years)	.33***	.32***	.26***	.19***	-.13**	.09*	-.11**	.18***	.12*	.13**	-.13**	-.17***	.17***	-.32***	1

Results by rDLD Naming Vocabulary and DLD Parent Report. See Table S3 for the correlations between all variables for the rDLD by Naming Vocabulary and rDLD by Parent report classifications.

Table S3. Correlation between emotional difficulties at age 3, 5, 7, 11 and all predictor variables by rDLD Naming Vocab and rDLD Parent Report group (Naming Vocab in *italics* with Parent Report in normal text)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Emotional problems age 3	1	.31***	.37***	.24***	-.22***	.04	-.21***	.25***	.15*	.19***	-.10	-.19***	.23***	-.41***	.40***
2. Emotional problems age 5	.43***	1	.43***	.33***	-.11*	.14**	-.08	.07	.06	.18***	-.10	-.12*	.19***	-.30***	.31***
3. Emotional problems age 7	.38***	.52***	1	.47***	-.08	.13*	-.13*	.07	.11	.21***	-.11	.04	.12	-.24***	.27***
4. Emotional problems age 11	.35***	.45***	.50***	1	-.06	.12*	-.17**	.01	.05	.21***	-.09	-.06	.15*	-.19**	.20**
5. Mood (9 months)	-.12	-.13*	-.14*	-.11	1	-.16**	.26***	-.08	-.14*	-.23***	.23***	.20***	-.08	.19**	-.20**
6. Irritability (9 months)	.19**	.12*	.22***	.11	-.19***	1	-.12*	.13*	.21***	.18***	-.18***	-.04	.11	-.11	-.004
7. Regularity (9 months)	-.27***	-.04	-.10	-.09	.08	-.08	1	-.07	-.03	-.14**	.08	.13*	-.10	.14*	-.08
8. Approach/Withdrawal (9 months)	.06	.06	.12	-.03	-.11	.22***	-.01	1	.48***	.15*	-.01	-.03	.13	-.23**	.19**
9. Adaptability (9 months)	.15*	.14*	.12*	.14*	-.17**	.39***	-.06	.48***	1	.17**	-.08	-.11	.13	-.19**	.15*
10. Parental Psych. Distress (9 months)	.15*	.24***	.29***	.24***	-.05	.16**	-.10	.19**	.21***	1	-.35***	-.05	.20**	-.36***	.12*

11. Maternal Attachment (9 months)	-.11	-.10	-.11	-.18**	.16**	-.26***	.09	.03	-.10	-.20***	1	.11	-.10	.31***	-.12*
12. Independence/ Self-Reg. (3 years)	-.13*	-.14**	-.11	-.10	.07	-.13*	.07	-.03	-.12	-.09	.02	1	-.003	.18**	-.09
13. Emotional Dysreg. (3 years)	.22***	.26***	.22***	.25***	-.16*	.25***	-.14*	.07	.11	.20**	-.04	-.05	1	-.46***	.14*
14. Parent-Child Relationship (3 years)	-.26***	-.25***	-.28***	-.30***	.13*	-.27***	.21***	-.12	-.22**	-.34***	.18**	.23***	-.51***	1	-.36***
15. SDQ peer problems (3 years)	.24***	.33***	.28***	.19**	-.07	.16**	-.16**	.17*	.09	.16**	-.14*	-.23***	.20***	-.25***	1

Additional Analysis Details about Growth Mixture Modelling.

See Table S4 for model fit statistics regarding the GMM trajectory subgroup outcomes evaluated for the entire sample.

The model fit statistics overall indicate the best fitting model was six classes which were allowed to vary on intercept, slope and quadratic age functions. The six class solution based only on intercept and slope did not converge, even with large increases in the number of random starts allowed. However, as all the intercept and slope models were poorer fit when compared to models which added the quadratic function, this model was never a possible final solution. It was noted that the entropy, or classification accuracy, for the final model (and the majority of comparison model) was relatively low. This led us to further evaluate the average posterior classification probability for the final solution. These averages are as follows: Low and Age 7 Increasing = .52; Stable Very Low = .57; Low and age 11 increasing = .56; Stable Average = .59; Average and Increasing = .74; Very High and Decreasing = .60. Upon closer examination of the posterior probabilities across all subgroups, it was found that the degree of separability between the subgroups was most difficult between the three increasing subgroups as well as between the subgroups with low levels of emotional problems early in development, which can be seen in Figure 1 below. This lower degree of separability was due to within class variation overlapping substantially across the classes, as can be seen in Figure 1. As mentioned in Muthén (2004), a low entropy does not necessarily indicate a misspecified model and can be indicative of an overlap of the within class variability between the differing subgroups. As can be seen in Figure 1, this is the case for the subgroups mentioned above, particularly during the earlier timepoints. Although the official statistic (entropy) detailing the degree of separability is below ideal levels, the individual trajectories detailed in Figure 1 indicate clearly differing patterns of trajectories across all subgroups evaluated, although with a high degree of within class variability which is not unexpected.

Table S4. Model Fit and Sample Size information for each GMMs evaluated.

Model	AIC	BIC	BIC SSA	Entropy	VLMR Test	LMR Test	Sample Size per subgroup[±]
Intercept							
One Subgroup	158677	158722.4	158703.3	--	--	--	14219
Two Subgroups	158253.9	158314.4	158289	0.559	< .001	<.001	2637/11582
Three Subgroups	158186.5	158262.1	158230.3	0.492	< .001	<.001	5152/1129/7938
Four Subgroups	158181.1	158271.9	158233.7	0.497	0.0093	0.0117	1324/6515/1129/5251
Five subgroups	158184.4	158290.3	158245.8	0.526	0.1972	0.2079	0/6519/4928/1624/1148
Intercept & Slope							
One Subgroup	157831.4	157884.4	157862.1	--	--	--	14219
Two Subgroups	157144.2	157219.8	157188	0.755	< .001	<.001	12527/1692
Three Subgroups	156840.5	156938.8	156897.5	0.589	< .001	<.001	2818/10472/929
Four Subgroups	156664.5	156785.5	156734.7	0.468	0.0001	0.0002	1899/6885/1638/3797
Five subgroups	156603.1	156746.7	156686.4	0.504	< .001	<.001	134/1521/1540/4779/6245
Six Subgroups	No Convergence						
Seven Subgroups	156543.9	156733	156653.5	0.474	1	1	406/3413/1311/221/6587/1621/660
Intercept, Slope & Quadratic							
One Subgroup	157778.1	157838.6	157813.2	--	--	--	14219
Two Subgroups	156929.9	157020.7	156982.5	0.52	<.001	<.001	4039/10180
Three Subgroups	156707.4	156828.4	156777.5	0.517	0.0048	0.0053	925/9712/3582
Four Subgroups	156492.2	156643.4	156579.9	0.419	0.0007	0.0008	4950/4663/2510/2096
Five Subgroups	156425.3	156606.8	156530.5	0.412	0.0587	0.061	5037/4889/1821/446/2026

Six Subgroups	156372.7	156584.5	156495.5	0.498	0.0001	0.0001	5244/1224/150/2004/ 164/5433
Seven Subgroups	156359.4	156601.4	156499.7	0.493	0.0027	0.0031	4950/68/5487/137/134 5/156/2076
Eight Subgroups	156329.1	156601.3	156486.9	0.5	<.001	<.001	2004/4375/190/459/11 70/133/4940/948

± based on most likely subgroup membership

Individualised trajectories for the final GMMs.

Please see Figure S1 for a graph of the final subgroups with individual trajectories around the average growth line.

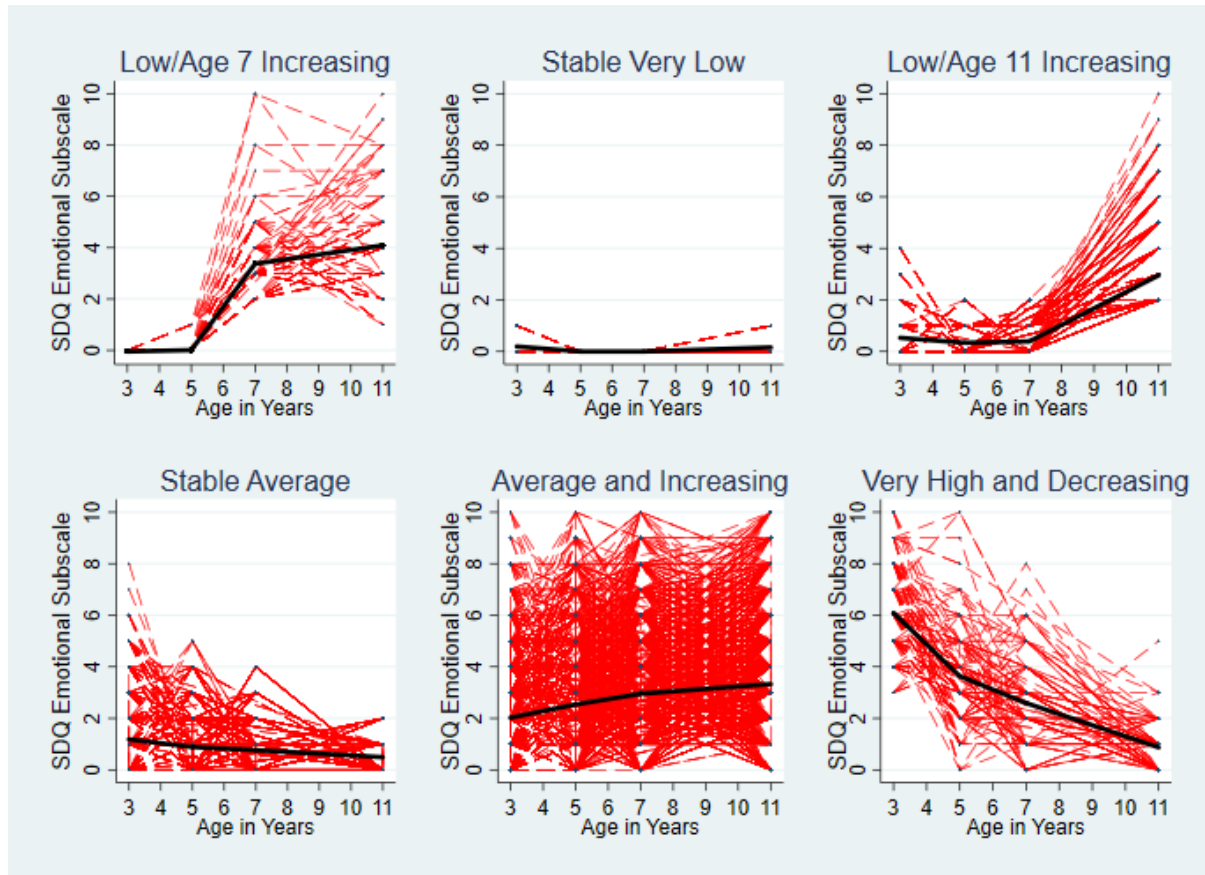


Figure S1. Individual trajectories and subgroup average trajectories for each emotional difficulty trajectory subgroup.

[Full statistics for GMM subgroup comparisons.](#)

See Table S5 for full statistics on the comparisons within each subgroup on the demographics, early risk factors and emotional symptoms.

Table S5. Full statistics for the rates of demographic, 9 month and 3 year risk factors and emotional symptoms and percentages above cutoff within each subgroup (in comparison to the combined remaining subgroups).

	<i>Overall</i>	<i>Low and age 7 increase (n=164; 1.2%)</i>	<i>Stable very low (n=2,004; 14.1%)</i>	<i>Low and age 11 increase (n=1,224; 8.6%)</i>	<i>Stable Average (n=5,244; 36.9%)</i>	<i>Average and Increasing (n=5,433; 38.2%)</i>	<i>Very High and Decreasing (n=150; 1.1%)</i>
Demographic variables							
DLD	6.2%	n.s.	OR=.52, 95%CI (.39,.68), <i>p</i> <.001	n.s.	OR=.66, 95%CI (.54,.80), <i>p</i> <.001	OR=2.06, 95%CI (1.74,2.43), <i>p</i> <.001	n.s.
GP only	--	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
DLD only	--	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Average age (Years, Months)	3;1.5	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Premature birth (< 37 week gestation)	6.4%	n.s.	n.s.	n.s.	OR=.83, 95%CI (.69,.99), <i>p</i> <.05	OR=1.29, 95%CI (1.10,1.52), <i>p</i> <.005	n.s.
Female (%)	49.4%	n.s.	OR=.84, 95%CI (.75,.94), <i>p</i> <.005	n.s.	OR=.88, 95%CI (.81,.95), <i>p</i> <.005	OR=1.26, 95%CI (1.16,1.36), <i>p</i> <.001	n.s.
Poverty Indicator (%) ⁺	29.9%	n.s.	OR=.59, 95%CI (.51,.69), <i>p</i> <.001	OR=.83, 95%CI (.69,.98), <i>p</i> <.05	OR=.73, 95%CI (.67,.80), <i>p</i> <.001	OR=1.73, 95%CI (1.59,1.89), <i>p</i> <.001	OR=3.08, 95%CI (2.10,4.52), <i>p</i> <.001
9 Month Predictors							

Mood	3.85 (.01)	n.s.	$\beta = .16$, 95%CI (.10;.23), $p < .001$	n.s.	n.s.	$\beta = -.14$, 95%CI (-.19;-.10), $p < .001$	n.s.
Irritability	2.07 (.01)	n.s.	$\beta = -.22$, 95%CI (-.28;-.16), $p < .001$	n.s.	n.s.	$\beta = .20$, 95%CI (.16;.24), $p < .001$	$\beta = .43$, 95%CI (.22;.65), $p < .001$
Regularity ^a	4.31 (.01)	n.s.	$B = -.06$, 95%CI (-.08;-.04), $p < .001$	n.s.	$B = -.02$, 95%CI (-.04;-.01), $p < .01$	$\beta = -.06$, 95%CI (-.07;-.04), $p < .001$	$\beta = .10$, 95%CI (.02;.18), $p < .05$
Approach/withdrawal	1.77 (.01)	$B = -.12$, 95%CI (-.21;-.04), $p < .01$	$B = -.10$, 95%CI (-.13;-.07), $p < .001$	n.s.	n.s.	$\beta = .08$, 95%CI (.06;.10), $p < .001$	$\beta = .13$, 95%CI (.04;.22), $p < .01$
Adaptability	2.18 (.01)	$B = -.22$, 95%CI (-.39;-.05), $p < .05$	$\beta = -.22$, 95%CI (-.27;-.16), $p < .001$	$\beta = -.11$, 95%CI (-.18;-.04), $p < .01$	n.s.	$\beta = .18$, 95%CI (.14;.23), $p < .001$	$\beta = .41$, 95%CI (.19;.62), $p < .001$
Parental psychological distress	1.61 (.02)	n.s.	$B = -.44$, 95%CI (-.51;-.37), $p < .001$	n.s.	$B = -.22$, 95%CI (-.27;-.18), $p < .001$	$B = .39$, 95%CI (.34;.43), $p < .001$	$B = .24$, 95%CI (.08;.41), $p < .01$
Maternal Attachment	18.59 (.03)	$\beta = .22$, 95%CI (.03;.42), $p < .05$	$\beta = .15$, 95%CI (.10;.21), $p < .001$	n.s.	$\beta = .04$, 95%CI (-.21;-.05), $p < .01$	$\beta = -.14$, 95%CI (-.19;-.10), $p < .001$	n.s.
3 Year Predictors							
Independence/Self-Regulation ^a	2.47 (.004)	$\beta = .26$, 95%CI (.08;.44), $p < .01$	$\beta = .21$, 95%CI (.16;.26), $p < .001$	$\beta = .08$, 95%CI (.01;.14), $p < .05$	$\beta = .06$, 95%CI (.02;.10), $p < .01$	$\beta = -.21$, 95%CI (-.25;-.17), $p < .001$	n.s.
Emotional Dysregulation	1.87 (.01)	n.s.	$\beta = -.43$, 95%CI (-.49;-.36), $p < .001$	n.s.	$\beta = -.19$, 95%CI (-.23;-.15), $p < .001$	$\beta = .40$, 95%CI (.36;.45), $p < .001$	$\beta = .76$, 95%CI (.58;.94), $p < .001$

Parent-Child Relationship ^a	64.23 (.09)	n.s.	$\beta=.47$, 95%CI (.41;.52), $p<.001$	n.s.	$\beta=.21$, 95%CI (.17;.25), $p<.001$	$\beta=-.47$, 95%CI (-.51;-.42), $p<.001$	$\beta=-.64$, 95%CI (-.87;-.42), $p<.001$
SDQ Peer Problems Age 3	1.48 (.02)	n.s.	$B=-.56$, 95%CI (-.63;-.49), $p<.001$	$\beta=-.13$, 95%CI (-.21;-.05), $p<.01$	$B=-.19$, 95%CI (-.23;-.15), $p<.001$	$B=.42$, 95%CI (.38;.46), $p<.001$	$B=.58$, 95%CI (.43;.74), $p<.001$
SDQ Emotional Problems							
Age 3	1.32 (.02)	--	$B=-1.97$, 95%CI (-2.09;-1.85), $p<.001$	$B=-.91$, 95%CI (-1.01;-.81), $p<.001$	$B=-.16$, 95%CI (-.21;-.11), $p<.001$	$B=.76$, 95%CI (.72;.80), $p<.001$	$B=1.48$, 95%CI (1.41;1.55), $p<.001$
Age 5	1.34 (.02)	$B=-3.16$, 95%CI (-4.02;-2.31), $p<.001$	--	$B=-1.46$, 95%CI (-1.57;-1.35), $p<.001$	$B=-.57$, 95%CI (-.62;-.53), $p<.001$	$B=1.38$, 95%CI (1.34;1.42), $p<.001$	$B=.96$, 95%CI (.85;1.08), $p<.001$
Age 7	1.52 (.02)	$B=.83$, 95%CI (.73;.93), $p<.001$	--	$B=-1.41$, 95%CI (-1.51;-1.31), $p<.001$	$B=-.90$, 95%CI (-.95;-.85), $p<.001$	$B=1.55$, 95%CI (1.50;1.60), $p<.001$	$B=.47$, 95%CI (.33;.60), $p<.001$
Age 11	1.88 (.03)	$B=.85$, 95%CI (.71;.99), $p<.001$	$B=-2.55$, 95%CI (-2.68;-2.42), $p<.001$	$B=.55$, 95%CI (.51;.59), $p<.001$	$B=-1.65$, 95%CI (-1.70;-1.60), $p<.001$	$B=1.28$, 95%CI (1.23;1.33), $p<.001$	$B=-.90$, 95%CI (-1.09;-.70), $p<.001$
Age 3 % High/Very High	7.8%	--	--	$OR=.10$, 95%CI (.05,.22), $p<.001$	$OR=.24$, 95%CI (.19,.30), $p<.001$	$OR=4.87$, 95%CI (4.12,5.76), $p<.001$	$OR=184.87$, 95%CI (74.72,457.37), $p<.001$
Age 5 % High/Very High	5.0%	--	--	--	$OR=.01$, 95%CI (.003,.03), $p<.001$	$OR=25.95$, 95%CI (18.38,36.63), $p<.001$	$OR=7.19$, 95%CI (4.48,11.54), $p<.001$

Age 7 % High/Very High	7.3%	OR=2.63, 95%CI (1.40,4.95), $p<.01$	--	--	--	OR=33.34, 95%CI (23.10,48.11), $p<.001$	OR=1.77, 95%CI (1.03,3.05), $p<.05$
Age 11 % High/Very High	11.3%	OR=5.00, 95%CI (3.12,8.01), $p<.001$	--	n.s.	--	OR=11.34, 95%CI (9.29,13.84), $p<.001$	OR=.02, 95%CI (.003,.11), $p<.001$

$*p<.05$; $**p<.01$; $***p<.001$

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