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# **Genetic and Environmental Correlations between Subjective**

## **Wellbeing and Experience of Life Events in Adolescence**

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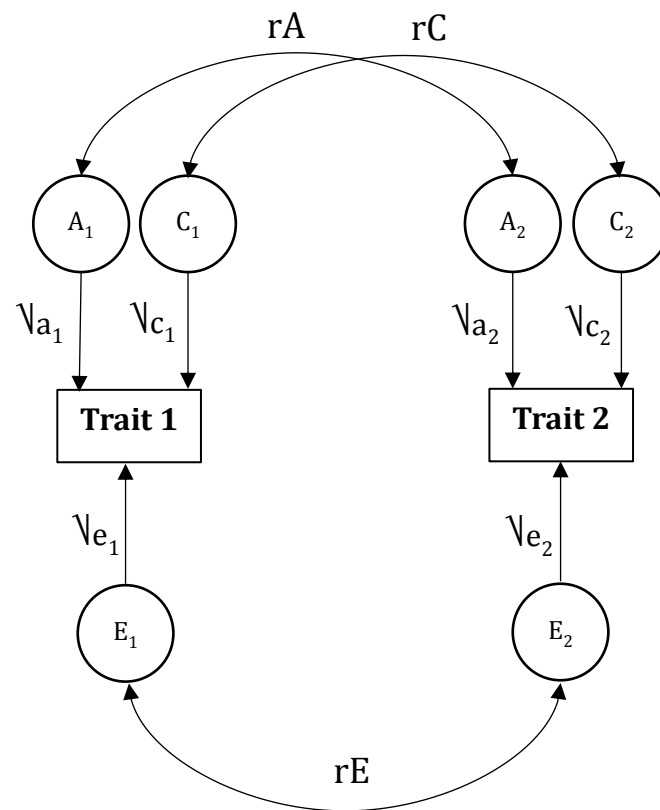
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## Supplementary Tables and Figures



**Figure S1:** Correlated factors solution for a bivariate twin model. This is converted from the mathematically equivalent Cholesky Decomposition but does not require an imposed order of the included variables.  $rA$ ,  $rC$  and  $rE$  represent the overlap between A, C and E respectively for trait 1 and trait 2.

*Table S1: Proportion of sex groups by zygosity.*

	<b>N</b>	<b>%</b>
<b>MZ Male</b>	1142	15
<b>MZ Female</b>	1640	21
<b>DZ Male</b>	1058	14
<b>DZ Female</b>	1418	19
<b>DZ Opposite Sex</b>	2370	31

*Note: N is the number individuals with complete life events data.*

*Table S2: Coddington Life events items administered and scores given to them.*

<b>Life event</b>	<b>Mean</b>	<b>Weight</b>	<b>Event</b>
	<b>Valence</b>		<b>Type</b>
Outstanding personal achievement	4.50	1.50	Positive
Beginning to date	4.27	1.27	Positive
Becoming a member of a church	4.16	1.16	Positive
Moving to a new school or college	3.85	.85	Positive
Becoming involved with drugs	3.33	.33	Positive
Being sent away from home	3.27	.27	Positive
Suspension from school	2.59	.41	Negative
Getting pregnant or fathering a pregnancy	2.21	.79	Negative
Breaking up with a boyfriend/girlfriend	1.98	1.02	Negative
Being hospitalised for illness or injury	1.97	1.03	Negative
Being responsible for a road accident	1.74	1.26	Negative
Failing an important exam	1.66	1.34	Negative

*Table S3: Measures of Subjective Wellbeing*

Trait	Reference	Chronbach's $\alpha$	N Items	Data Collection Type	Total N	N Complete Pairs	N Unpaired Individuals
<b>Subjective Happiness</b>	The Subjective Happiness Scale [1]	0.79	4	Online and Postal	10574	5287	325
<b>Life Satisfaction</b>	A composite of the multidimensional student life satisfaction scale [2] and the brief multidimensional student life satisfaction scale. [3]	0.86	MSLSS = 21 items; BMSLSS = 5 items.	Online Postal	10576	5288	323
<b>Meaning in Life</b>	The meaningful life measure [4]	0.82	5	Postal	7392	3696	67
<b>Relatedness</b>	The basic psychological needs satisfaction sale [5]	0.84	8	Postal	7424	3712	52
<b>Autonomy</b>		0.66	7	Postal	7424	3712	52

<b>Competence</b>		0.69	6	Postal	7416	3708	56
<b>Trust</b>	Single social trust item [6]	-	1	Postal			
<b>Hopefulness</b>	The children's hope scale [7]	0.75	6	Online	4780	2390	533
<b>Gratitude</b>	The gratitude questionnaire-6 [8]	0.75	6	Online	4782	2391	532
<b>Optimism</b>	The life orientation test – revised [9]	0.76	6	Online	4174	2087	467
<b>Ambition</b>	The ambition scale [10]	0.75	5	Online	4170	2085	469
<b>Curiosity</b>	The curiosity and exploration inventory [11]	0.74	7	Online	4764	2382	538
<b>Grit</b>	The short grit scale [12]	0.72	8	Online	4176	2088	466
<b>Subjective Health</b>	General health single item from the KIDSCREEN-52 generic health-related quality of life questionnaire for children and adolescents [13]	-	1	Online	4796	2398	525



**Table S4: Representativeness of the TEDS Sample Respondents to Online and Postal Questionnaires**

	<b>Returned data (N families)</b>	<b>% Response rate</b>	<b>% White</b>	<b>% A-levels or higher</b>	<b>% Mother employed</b>	<b>% Father employed</b>	<b>% Female</b>	<b>% MZ</b>
<b>Online Data Collection</b>	2996	50.6%	92.4%	56.4%	94.6%	96.7%	57.8%	36.9%
<b>Postal Data Collection</b>	4852	52.6%	93.5%	57.0%	94.8%	96.7%	55.7%	36.2%

*Note: % A-levels refers to the mothers' education qualifications. % Mother and father employed refers to employment status at the time of the year 16 study. MZ = monozygotic twins. All measures are calculated on a family wide basis apart from % female.*

*Table S5: Frequencies of the number of life events experienced by individuals.*

<b>N Life events</b>	<b>Positive</b>		<b>Negative</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>0</b>	2116	28	4722	62
<b>1</b>	3282	43	2264	30
<b>2</b>	1728	23	529	7
<b>3</b>	431	6	94	1
<b>4</b>	60	1	11	<1
<b>5</b>	8	<1	1	<1
<b>6</b>	3	<1	7	<1

*Table S6: Additive Genetic (A) correlation and Non-shared Environmental (E) correlation from a correlated factors solution between positive and negative life events and each of the wellbeing traits (95% confidence intervals in brackets).*

	Positive Life Events		Negative Life Events	
	Genetic Correlation	Environment Correlation	Genetic Correlation	Environment Correlation
<b>Subjective Happiness</b>	0.17 (-0.04, 0.38)	0.08 (0.04, 0.13)	-0.13 (-0.24, 0.00)	-0.08 (-0.12, -0.04)
<b>Life Satisfaction</b>	0.10 (-0.12, 0.31)	0.08 (0.04, 0.13)	-0.35 (-0.53, -0.35)	-0.02 (-0.07, 0.02)
<b>Subjective Health</b>	0.07 (-0.25, 0.47)	0.06 (-0.01, 0.13)	-0.16 (-0.38, 0.09)	-0.08 (-0.14, -0.02)
<b>Hopefulness</b>	0.45 (0.45, 0.88)	0.11 (0.05, 0.18)	-0.16 (-0.40, 0.10)	-0.07 (-0.13, -0.01)
<b>Gratitude</b>	-0.03 (-0.34, 0.32)	0.12 (0.05, 0.18)	-0.02 (-0.23, 0.20)	-0.09 (-0.15, -0.02)
<b>Curiosity</b>	0.29 (-0.02, 0.52)	0.07 (0, 0.14)	0.04 (-0.24, 0.24)	-0.04 (-0.10, 0.03)
<b>Grit</b>	0.34 (0.34, 0.79)	0.05 (-0.02, 0.13)	-0.24 (-0.34, -0.07)	-0.04 (-0.11, 0.02)
<b>Ambition</b>	0.33 (0.03, 0.66)	0.14 (0.07, 0.21)	-0.16 (-0.40, 0.00)	-0.07 (-0.13, -0.01)
<b>Optimism</b>	0.04 (-0.37, 0.39)	0.09 (0.02, 0.16)	-0.21 (-0.37, 0.03)	-0.06 (-0.12, 0.01)

<b>Relatedness</b>	0.17 (-0.03, 0.37)	0.08 (0.03, 0.13)	-0.15 (-0.34, -0.03)	-0.02 (-0.07, 0.02)
<b>Autonomy</b>	0.10 (0.10, 0.36)	0.06 (0.01, 0.11)	-0.14 (-0.28, 0.04)	-0.08 (-0.12, -0.03)
<b>Competence</b>	0.33 (0.33, 0.56)	0.15 (0.1, 0.19)	-0.21 (-0.39, -0.11)	-0.11 (-0.15, -0.06)
<b>Meaning in Life</b>	0.34 (0.34, 0.55)	0.17 (0.12, 0.22)	-0.08 (-0.21, 0.05)	-0.10 (-0.14, -0.05)
<b>Trust</b>	0.34 (0.03-0.76)	-0.01 (-0.10, 0.08)	-0.20 (-0.36, 0.06)	-0.12 (-0.20, -0.04)

*Table S7. The proportion of the phenotypic correlation explained by bivariate additive genetic variance (A) and bivariate non-shared environmental variance (E) for positive life events and each of the wellbeing traits (95% confidence intervals in brackets).*

<b>Positive Life Events</b>			
	<b>Phenotypic</b>		
	<b>Correlation</b>	<b>Proportion A</b>	<b>Proportion E</b>
<b>Subjective</b>			
<b>Happiness</b>	0.12 (0.10, 0.15)	0.42 (0.00, 0.79)	0.43 (0.32, 0.45)
<b>Life Satisfaction</b>	0.04 (0.01, 0.07)	0.33 (0.00, 0.42)	0.46 (0.29, 0.68)
<b>Subjective Health</b>	0.09 (0.04, 0.13)	0.26 (0.00, 1.00)	0.55 (0.00, 0.81)
<b>Hopefulness</b>	0.17 (0.13, 0.22)	0.58 (0.20, 0.77)	0.34 (0.14, 0.64)
<b>Gratitude</b>	0.14 (0.09, 0.18)	0.05 (0.00, 0.27)	0.49 (0.27, 0.73)
<b>Curiosity</b>	0.15 (0.11, 0.20)	0.59 (0.06, 0.87)	0.31 (0.06, 0.35)
<b>Grit</b>	0.15 (0.11, 0.20)	0.70 (0.39, 1.00)	0.23 (0.00, 0.51)
<b>Ambition</b>	0.19 (0.14, 0.23)	0.50 (0.31, 0.79)	0.44 (0.31, 0.61)
<b>Optimism</b>	0.12 (0.07, 0.17)	0.10 (0.00, 0.23)	0.50 (0.17, 0.72)
<b>Relatedness</b>	0.16 (0.12, 0.19)	0.40 (0.08, 0.84)	0.35 (0.19, 0.56)
<b>Autonomy</b>	0.09 (0.06, 0.13)	0.36 (0.00, 0.93)	0.41 (0.15, 0.44)
<b>Competence</b>	0.22 (0.18, 0.25)	0.48 (0.18, 0.77)	0.41 (0.27, 0.55)
<b>Meaning in Life</b>	0.23 (0.20, 0.26)	0.46 (0.17, 0.69)	0.43 (0.39, 0.44)
<b>Trust</b>	0.06 (0.03, 0.10)	0.66 (0.56, 0.96)	0.07 (0.00, 0.28)

*Note: Proportions for gratitude and trust were calculated using absolute values because the correlations had different signs.*

*Table S8: The proportion of the phenotypic correlation explained by bivariate additive genetic variance (A) and bivariate non-shared environmental variance (E) for negative life events and each of the wellbeing traits (95% confidence intervals in brackets).*

<b>Negative Life Events</b>			
	<b>Phenotypic</b>		
	<b>Correlation</b>	<b>Proportion A</b>	<b>Proportion E</b>
<b>Subjective</b>			
<b>Happiness</b>	-0.08 (-0.11, -0.06)	0.49 (0.04, 0.74)	0.51 (0.28, 0.71)
<b>Life Satisfaction</b>	-0.13 (-0.16, -0.10)	0.89 (0.46, 1.00)	0.09 (0.02, 0.19)
<b>Subjective Health</b>	-0.12 (-0.16, -0.07)	0.37 (0.00, 0.39)	0.42 (0.34, 0.73)
<b>Hopefulness</b>	-0.06 (-0.10, -0.01)	0.52 (0.00, 0.94)	0.44 (0.42, 0.79)
<b>Gratitude</b>	-0.08 (-0.13, -0.04)	0.09 (0.00, 0.76)	0.58 (0.28, 1.00)
<b>Curiosity</b>	0.03 (-0.02, 0.08)	-	-
<b>Grit</b>	-0.08 (-0.13, -0.04)	0.74 (0.51, 1.00)	0.24 (0.00, 0.62)
<b>Ambition</b>	-0.07 (-0.11, -0.02)	0.57 (0.06, 0.95)	0.43 (0.42, 0.78)
<b>Optimism</b>	-0.08 (-0.12, -0.03)	0.55 (0.40, 0.88)	0.31 (0.26, 0.40)
<b>Relatedness</b>	-0.06 (-0.09, -0.02)	0.70 (0.20, 1.00)	0.18 (0.13, 0.25)
<b>Autonomy</b>	-0.10 (-0.13, -0.07)	0.51 (0.04, 0.82)	0.45 (0.18, 0.74)
<b>Competence</b>	-0.14 (-0.17, -0.11)	0.56 (0.36, 0.59)	0.45 (0.41, 0.64)
<b>Meaning in Life</b>	-0.08 (-0.11, -0.05)	0.36 (0.00, 0.60)	0.64 (0.50, 0.91)
<b>Trust</b>	-0.16 (-0.19, -0.13)	0.44 (0.00, 0.72)	0.44 (0.14, 0.73)

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