

SUPPLEMENTARY MATERIAL for
“Parental Income Moderates the Influence of Genetic
Dispositions on Political Interest in Adolescents”

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A Summary Statistics

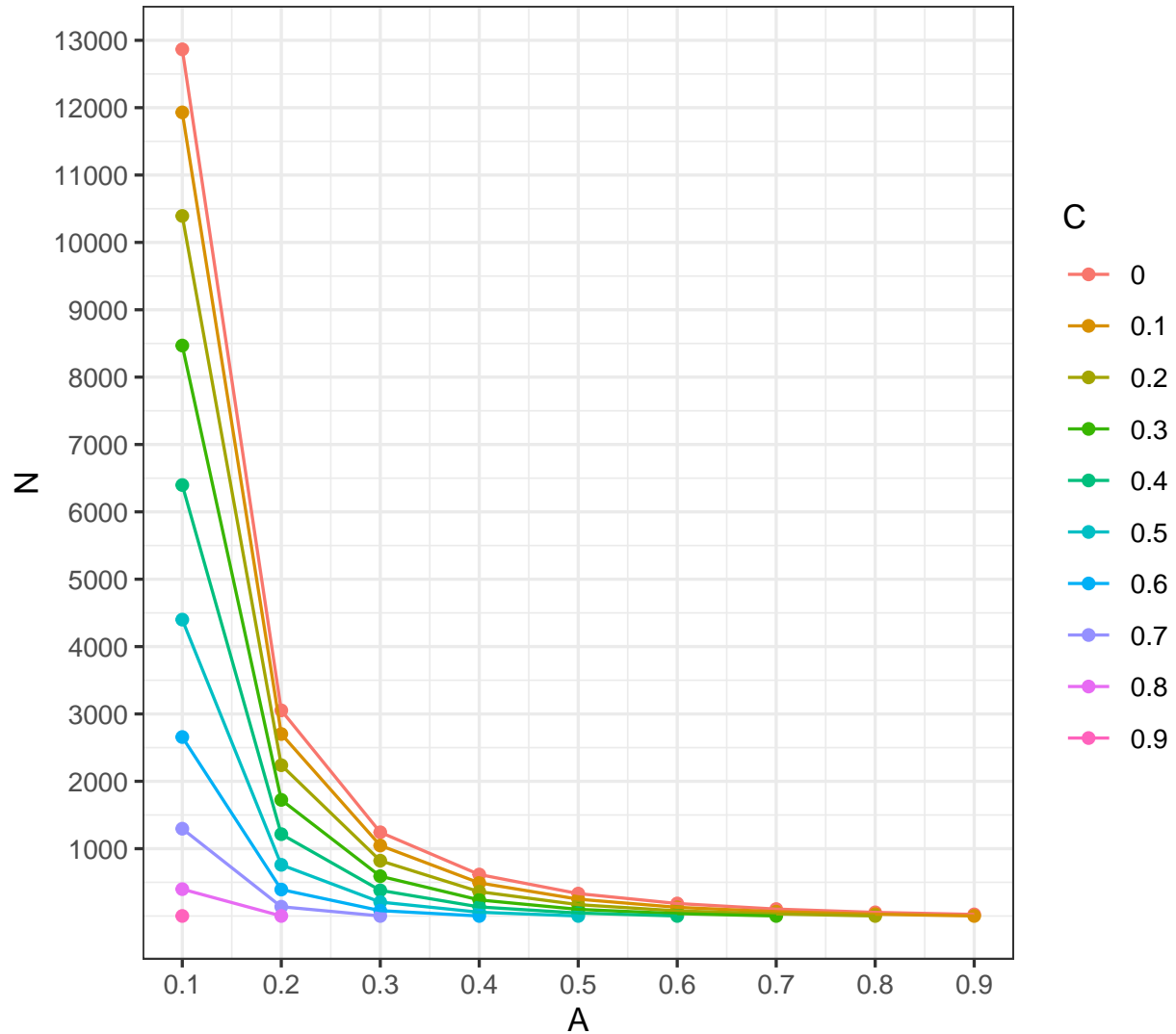
Table A.1: Summary Statistics

	<i>Cohort 2</i>		<i>Cohort 3</i>		<i>Cohort 4</i>	
	Mean	SD	Mean	SD	Mean	SD
Age	11.00	0.32	17.01	0.34	23.11	0.83
Female	0.52		0.57		0.58	
Migration background	0.15		0.26		0.19	
Political interest	1.80	0.74	2.15	0.74	2.03	0.71
Parental income	1784.19	1480.30	1511.52	963.62		
Personal income					1258.42	700.10
N_{DZ}	1579		1410		423	
N_{MZ}	1087		1277		480	
N_{siblings}					170	

Entries based on first wave. Cohort 4 is restricted to twins and siblings of twins with a personal income greater 450 euros and who are not in education. Parental income is measured in equivalized monthly household income in euros. Personal income is measured in equivalized monthly personal income in euros. MZ and DZ refers to monozygotic and dizygotic twins.

B ACE Variance Decomposition Models

Figure B.1: Power Analysis Simulation for ACE Models



The y-axis indicates the number of necessary twins to obtain a power of 80% for various combinations of A (genetic influences) and C (influences of the shared environment) estimates. For instance, to detect $A=0.3$ with 80% power given $C=0.1$, one needs at least 524 MZ and 524 DZ pairs ($n=1048$).

B.1 Additional ACE Models by Wave and Cohort

Table B.1: ACE Models for Political Interest (Pooled Waves)

	Pooled		Cohort 2		Cohort 3	
A	0.385	(0.277; 0.494)	0.387	(0.257; 0.519)	0.379	(0.185; 0.581)
C	0.136	(0.046; 0.225)	0.137	(0.030; 0.243)	0.121	(0.000; 0.286)
E	0.479	(0.446; 0.515)	0.475	(0.434; 0.520)	0.500	(0.445; 0.565)
r(MZ)	0.525		0.520		0.522	
r(DZ)	0.331		0.337		0.305	
N _{MZ}	1493		995		498	
N _{DZ}	1991		1429		562	

ACE models of political interest corrected for assortative mating. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Entries for A, C, and E refer to the percent of variance as part of the total variance of political interest. r(MZ) and r(DZ) indicate the correlation in political interest among monozygotic and dizygotic twins. N refers to the respective number of twin pairs. Pooled results based on respondents under the age of 18, i.e. cohort 2 from all waves (starting age 11) and cohort 3 from the first wave (starting age 17). “Cohort 2” includes results from cohort 2 in all waves, “Cohort 3” refers to the results of cohort 3 from the first wave.

Table B.2: ACE Model Comparisons (Pooled Waves)

Model	Pooled						Cohort 2						Cohort 3							
	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC
ACE	4				14451.67	0.00	ACE	4				9950.62	0.00	ACE	4				4474.57	0.00
CE	3	48.26	1	< 0.001	14497.93	46.26	CE	3	32.75	1	< 0.001	9981.37	30.75	CE	3	14.66	1	< 0.001	4487.23	12.66
AE	3	8.62	1	0.003	14458.30	6.62	AE	3	6.24	1	0.012	9954.87	4.24	AE	3	1.919	1	0.166	4474.49	-0.08
E	2	662.05	2	< 0.001	15109.72	658.05	E	2	442.36	2	< 0.001	10388.99	438.36	E	2	206.04	2	< 0.001	4676.61	202.04

ACE model comparisons. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Pooled results based on respondents under the age of 18, i.e. cohort 2 from all waves (starting age 11) and cohort 3 from the first wave (starting age 17).

Table B.3: ACE Models for Political Interest (Wave 1)

	Pooled		Cohort 2		Cohort 3	
A	0.379	(0.241; 0.520)	0.375	(0.158; 0.593)	0.379	(0.185; 0.581)
C	0.137	(0.019; 0.251)	0.094	(0.000; 0.263)	0.121	(0.000; 0.286)
E	0.484	(0.443; 0.531)	0.531	(0.462; 0.613)	0.500	(0.445; 0.565)
r(MZ)	0.526		0.462		0.522	
r(DZ)	0.327		0.295		0.305	
N _{MZ}	919		421		498	
N _{DZ}	1182		620		562	

ACE models of political interest corrected for assortative mating. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Entries for A, C, and E refer to the percent of variance as part of the total variance of political interest. r(MZ) and r(DZ) indicate the correlation in political interest among monozygotic and dizygotic twins. N refers to the respective number of twin pairs. Results based on respondents from cohort 2 (starting age 11) and cohort 3 (starting age 17) from the first wave.

Table B.4: ACE Model Comparisons (Wave 1)

Model	Pooled					Cohort 2					Cohort 3									
	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC
ACE	4				8846.48	0.00	ACE	4				4222.40	0.00	ACE	4				4474.57	0.00
CE	3	28.5	1	< 0.001	8872.98	26.50	CE	3	11.13	1	< 0.001	4231.54	9.13	CE	3	14.66	1	< 0.001	4487.23	12.66
AE	3	5.138	1	0.023	8849.62	3.14	AE	3	1.15	1	0.284	4221.55	-0.85	AE	3	1.919	1	0.166	4474.49	-0.08
E	2	402.55	2	< 0.001	9245.03	398.55	E	2	138.25	2	< 0.001	4356.65	134.25	E	2	206.04	2	< 0.001	4676.61	202.04

ACE model comparisons. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Results based on respondents from cohort 2 (starting age 11) and cohort 3 (starting age 17) from the first wave.

Table B.5: ACE Models for Political Interest (Wave 2)

	Pooled		Cohort 2		Cohort 3	
A	0.321	(0.146; 0.498)	0.413	(0.174; 0.656)	0.247	(0.000; 0.526)
C	0.174	(0.027; 0.317)	0.081	(0.000; 0.273)	0.215	(0.000; 0.439)
E	0.505	(0.452; 0.567)	0.507	(0.435; 0.594)	0.538	(0.458; 0.637)
r(MZ)	0.492		0.497		0.455	
r(DZ)	0.336		0.296		0.334	
N _{MZ}	607		307		300	
N _{DZ}	775		439		336	

ACE models of political interest corrected for assortative mating. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Entries for A, C, and E refer to the percent of variance as part of the total variance of political interest. r(MZ) and r(DZ) indicate the correlation in political interest among monozygotic and dizygotic twins. N refers to the respective number of twin pairs. Results based on respondents from cohort 2 (mean age: 13 years) and cohort 3 (mean age: 19 years) from the second wave. Estimates for cohort 3 may overestimate the influence of the shared environment as some respondents may have moved out of the parental household.

Table B.6: ACE Model Comparisons (Wave 2)

Model	Pooled						Cohort 2						Cohort 3							
	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC
ACE	4				5798.52	0.00	ACE	4				3109.00	0.00	ACE	4				2626.12	0.00
CE	3	12.83	1	< 0.001	5809.35	10.83	CE	3	11.216	1	< 0.001	3118.22	9.22	CE	3	3.18	1	0.075	2627.30	1.18
AE	3	5.37	1	0.020	5801.89	3.37	AE	3	0.667	1	0.414	3107.67	-1.33	AE	3	3.27	1	0.071	2627.39	1.27
E	2	243.14	2	< 0.001	6037.66	239.14	E	2	122.66	2	< 0.001	3227.66	118.66	E	2	97.22	2	< 0.001	2719.34	93.22

ACE model comparisons. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Results based on respondents from cohort 2 (mean age: 13 years) and cohort 3 (mean age: 19 years) from the second wave.

Table B.7: ACE Models for Political Interest (Wave 3)

	Pooled		Cohort 2		Cohort 3	
A	0.357	(0.144; 0.571)	0.456	(0.178; 0.744)	0.248	(0.000; 0.584)
C	0.132	(0.000; 0.299)	0.040	(0.000; 0.262)	0.224	(0.000; 0.482)
E	0.512	(0.446; 0.590)	0.504	(0.423; 0.605)	0.528	(0.425; 0.664)
r(MZ)	0.464		0.483		0.437	
r(DZ)	0.326		0.277		0.376	
N _{MZ}	510		267		220	
N _{DZ}	659		370		252	

ACE models of political interest corrected for assortative mating. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Entries for A, C, and E refer to the percent of variance as part of the total variance of political interest. r(MZ) and r(DZ) indicate the correlation in political interest among monozygotic and dizygotic twins. N refers to the respective number of twin pairs. Results based on respondents from cohort 2 (mean age: 15 years) and cohort 3 (mean age: 21 years) from the third wave. Estimates for cohort 3 may overestimate the influence of the shared environment as some respondents may have moved out of the parental household.

Table B.8: ACE Model Comparisons (Wave 3)

Model	Pooled						Cohort 2						Cohort 3							
	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC	Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC
ACE	4				4191.08	0.00	ACE	4				9950.62	0.00	ACE	4				4474.57	0.00
CE	3	10.54	1	0.001	4199.62	8.54	CE	3	32.75	1	< 0.001	9981.37	30.75	CE	3	14.66	1	< 0.001	4487.23	12.66
AE	3	2.30	1	0.129	4191.38	0.30	AE	3	6.244	1	0.012	9954.87	4.24	AE	3	1.919	1	0.166	4474.49	-0.08
E	2	153.82	2	< 0.001	4340.89	149.82	E	2	442.36	2	< 0.001	10388.99	438.36	E	2	206.04	2	< 0.001	4676.61	202.04

ACE model comparisons. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Results based on respondents from cohort 2 (mean age: 15 years) and cohort 3 (mean age: 21 years) from the third wave.

B.2 Additional Gene-Environment Interaction Models (GxE)

Table B.9: Estimates of GxE ACE Decomposition Model by Parental Income (all waves)

	Estimate	SE	95%-CI	90%-CI
A	0.446	0.039	(0.369; 0.523)	(0.381; 0.510)
C	-0.258	0.058	(-0.372; -0.143)	(-0.354; -0.162)
E	0.524	0.011	(0.502; 0.546)	(0.506; 0.543)
Moderator: A	0.085	0.032	(0.022; 0.148)	(0.032; 0.137)
Moderator: C	0.108	0.047	(0.015; 0.200)	(0.030; 0.185)
Moderator: E	-0.024	0.012	(-0.048; -0.001)	(-0.044; -0.005)
Mean	2.069	0.016	(2.037; 2.100)	(2.042; 2.095)
β_{linear}	0.104	0.016	(0.073; 0.135)	(0.078; 0.130)
$\beta_{\text{quadratic}}$	-0.013	0.016	(-0.045; 0.019)	(-0.039; 0.014)
N_{MZ}	1111			
N_{DZ}	1512			

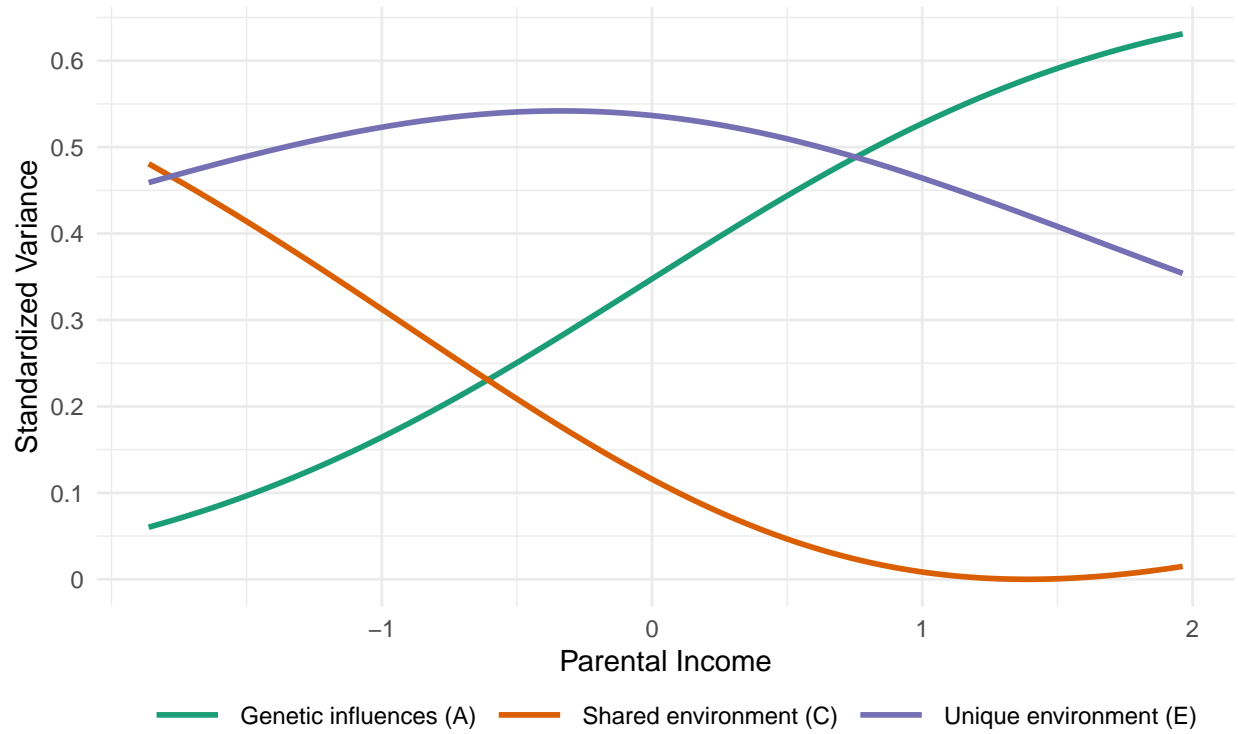
Estimates from GxE model (Figure 1). Corrected for assortative mating. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. N refers to the respective number of twin pairs. Pooled results based on respondents under the age of 18, i.e. cohort 2 from all waves (starting age 11) and cohort 3 from the first wave (starting age 17).

Table B.10: Model Comparisons of GxE Models (all waves)

Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC
GxE Model	9				10803.33	0.000
No moderator on A	8	4.559	1	0.033	10805.89	2.559
No moderator on C	8	3.716	1	0.054	10805.05	1.716
No moderator on E	8	3.986	1	0.046	10805.32	1.986

Comparisons of full GxE model (Table B.9) with GxE models excluding moderators on A, C, or E. Corrected for assortative mating. P-values based on 95% significance levels. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Pooled results based on respondents under the age of 18, i.e. cohort 2 from all waves (starting age 11) and cohort 3 from the first wave (starting age 17).

Figure B.2: GxE ACE Decomposition Model by Parental Income (wave 1)



Share of variance in twins' political interest that is explained by genetic (green), common environmental (orange) and unique environmental (purple) factors. Corrected for assortative mating. Pooled results from the first wave based on cohorts 2 (starting age 11) and 3 (starting age 17).

Table B.11: Estimates of GxE ACE Decomposition Model by Parental Income (wave 1)

	Estimate	SE	95%-CI	90%-CI
A	0.424	0.061	(0.304; 0.544)	(0.324; 0.524)
C	-0.259	0.088	(-0.431; -0.087)	(-0.403; -0.115)
E	0.538	0.015	(0.508; 0.568)	(0.513; 0.563)
Moderator: A	0.129	0.050	(0.031; 0.228)	(0.047; 0.212)
Moderator: C	0.176	0.061	(0.057; 0.296)	(0.077; 0.276)
Moderator: E	-0.021	0.016	(-0.052; 0.011)	(-0.047; 0.006)
Mean	1.980	0.022	(1.936; 2.023)	(1.944; 2.016)
β_{linear}	0.087	0.022	(0.043; 0.131)	(0.050; 0.124)
$\beta_{\text{quadratic}}$	0.013	0.024	(-0.033; 0.059)	(-0.025; 0.052)
N_{MZ}	635			
N_{DZ}	847			

Estimates from GxE model (Figure B.2). Corrected for assortative mating. N refers to the respective number of twin pairs. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Pooled results from the first wave based on cohorts 2 (starting age 11) and 3 (starting age 17).

Table B.12: Model Comparisons of GxE Models (wave 1)

Model	EP	Δ Fit	Δ df	p	AIC	Δ AIC
GxE Model	9				6230.413	0.000
No moderator on A	8	5.916	1	0.015	6234.329	3.916
No moderator on C	8	5.880	1	0.015	6234.294	3.880
No moderator on E	8	1.574	1	0.210	6229.988	-0.426

Comparisons of full GxE model (Table B.11) with GxE models excluding moderators on A, C, or E. Corrected for assortative mating. P-values based on 95% significance levels. A indicates genetic influences, C influences of the shared environment, and E unique environmental experiences. Pooled results from the first wave based on cohorts 2 (starting age 11) and 3 (starting age 17).

C Family Fixed-Effects Models

Table C.1: Within- and Between Variance of Income by Wave

	Pooled			Wave 1			Wave 2			Wave 3		
	All	DZ	MZ	All	DZ	MZ	All	DZ	MZ	All	DZ	MZ
Mean _{overall}	1689.88	1675.56	1685.86	1258.42	1193.36	1293.65	1821.99	1854.74	1798.60	2155.53	2166.07	2154.66
SD _{between}	922.17	951.15	893.08	673.68	586.50	685.73	871.56	835.82	914.54	1001.14	1137.93	863.31
SD _{within}	359.20	336.70	292.90	258.65	206.55	262.04	364.60	334.54	322.51	460.04	463.93	306.22

Income is measured as equivalized gross monthly household income in Euro. “All” includes siblings and all twin forms, “DZ” includes only dizygotic twins, and “MZ” includes only monozygotic twins. Entries are based on respondents from cohort 4 (average starting age 23 years). The sample is restricted to respondents where both twins were employed and none of them was currently in education or vocational training.

Table C.2: Family Fixed-Effects Models of Income on Political Interest (robustness check)

	OLS	Family Fixed-Effects		
	All	All	DZ	MZ
Income	0.113*** (0.018)	−0.001 (0.039)	−0.018 (0.069)	0.068 (0.063)
Constant	2.045*** (0.035)	2.237*** (0.068)	2.278*** (0.117)	2.073*** (0.107)
<i>N</i>	1825	1825	773	876

Family fixed-effects models indicating the effect of income on political interest with standard errors in parentheses. Income is measured as equivalized gross household income in 1000 EUR. Models also include respondents with very low reported incomes (personal gross income below 450 euros). Models “All” include siblings and all forms of twins, “DZ” models include only dizygotic twins, and “MZ” models include only monozygotic twins. Results based on cohort 4 (early adulthood) and pooled waves one to three. Respondents are nested in families and waves * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table C.3: Family Fixed-Effects Models of Satisfaction with Income on Political Interest

	OLS	Family Fixed-Effects		
	All	All	DZ	MZ
Satisfaction with income	0.003 (0.007)	0.005 (0.010)	-0.010 (0.018)	0.024 (0.014)
Constant	2.132*** (0.049)	2.117*** (0.066)	2.198*** (0.109)	1.980*** (0.087)
<i>N</i>	1470	1470	627	703

Family fixed-effects models indicating the effect of satisfaction with income on political interest with standard errors in parentheses. Satisfaction with income ranges from zero (completely dissatisfied) to ten (completely satisfied). Models “All” include siblings and all forms of twins, “DZ” models include only dizygotic twins, and “MZ” models include only monozygotic twins. Results based on cohort 4 (early adulthood) and pooled waves one to three. Respondents are nested in families and waves. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table C.4: Family Fixed-Effects Models of Being Employed on Political Interest

	OLS	Family Fixed-Effects		
	All	All	DZ	MZ
Employed	0.107* (0.049)	0.022 (0.075)	-0.089 (0.129)	0.184 (0.115)
Constant	2.066*** (0.045)	2.137*** (0.064)	2.225*** (0.111)	1.973*** (0.099)
<i>N</i>	1634	1634	680	776

Family fixed-effects models indicating the effect of being employed on political interest with standard errors in parentheses. Being employed is a dummy that differentiates between being employed based on ILO concept (one) and not employed (zero). Models “All” include siblings and all forms of twins, “DZ” models include only dizygotic twins, and “MZ” models include only monozygotic twins. Results based on cohort 4 (early adulthood) and pooled waves one to three. Respondents are nested in families and waves. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

D Question Wording and Coding of Indicators

Table D.1: Question Wording and Coding of Indicators

Indicator	Question wording	Coding
Political interest	pop0100: Generally speaking, how interested are you in politics? 1–not at all, 2–not so strong, 3–strongly, 4–very strongly	
Parental income	inc0411: pre-generated variable by TwinLife team Monthly net equivalent household income in euros (modified OECD scheme) using inc0401 inc0403 age0200 (gen)	recoded into income variable measured in 1000 euro (divided by 1000) and a variable measuring income quintiles
Personal income	inc0110: pre-generated variable by TwinLife team Monthly personal gross income (≥ 15 yr) (inc0100 manip.) (gen)	created equivalized household income by dividing personal income by the square root of the household size
Satisfaction with personal income	sat0103: Satisfaction: personal income We are interested in how satisfied you are with different areas of your life. How satisfied are you currently with the following areas of your life? How satisfied are you with your personal income? 0–Completely dissatisfied, 10–Completely satisfied	
Employed	emp0100: employed (based on ILO concept) 1–yes, 2–no	recoded to 0–no, 1–yes
Household size	hpc: pre-generated variable by TwinLife team Number of persons belonging to the household (gen)	recoded household size greater ten to ten
Zygosity	zyg0102: pre-generated variable by TwinLife team final zygosity: result zygosity questionnaire corrected by DNA-test result (gen)	removed respondents with missings

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Table D.1: Question Wording and Coding of Indicators

Indicator	Question wording	Coding
Migration background	Created based on variables conborn and gercit conborn: Country of birth, Dummy (1–Germany, 0–other) gercit: German citizenship, Dummy (0–at least one parent has no German citizenship, 1–German citizenship)	Migration background is 1 if child, mother or father has a value of 0 on conborn, or if either parent has value of 0 on gercit; otherwise migration background is zero
Female	sext: Sex of the twins 1–male, 0–female	recoded to 0–male, 1–female