

Supplemental Method

Externalizing behaviors (age 56). Externalizing behaviors were assessed in part with measures of tobacco use and alcohol consumption. Tobacco use was a categorical variable in which individuals were given a score of 1 if they answered yes to the question “Do you smoke cigarettes now?”. The wording was nearly identical for the same questions regarding cigar smoking, pipe tobacco, or chewing tobacco. Alcohol use was based on the total number of alcoholic beverages reported in the past two weeks (see main text for *ns*). Important to note, subjects were only asked about whether they currently smoke cigarettes if they answered “yes” to the question “have you smoked more than 100 cigarettes in your lifetime?”, and were only asked about alcohol use if they answered “yes” to the question “have you drunk more than 20 alcoholic beverages in your lifetime?”. Similar questions were asked for cigars, pipe tobacco, and chewing tobacco. If they responded “no” to any of these questions, they were assigned a score of zero for the corresponding measure. Thus, it is possible for subjects to be current tobacco smokers but not having yet smoked 100 cigarettes in their entire lifetime (or be a current drinker but drank less than 20 drinks in their lifetime). However, both possibilities are highly unlikely.

Data Analyses

Although not presented in the main text, we confirmed that all latent variable models fit the data well even when isolated in their own model (e.g., Internalizing Psychopathology at age 41 only). Model fit for each model is displayed below. Results were similar to those presented in the main text.

Internalizing Psychopathology at Age 41: $\chi^2(46)=47.04, p=.430, RMSEA=.008, CFI=.999$

Internalizing Symptoms at Age 56: $\chi^2(37)=42.49, p=.247, RMSEA=.021, CFI=.996$

Internalizing Symptoms at Age 62: $\chi^2(37)=50.48, p=.069, RMSEA=.034, CFI=.993$

Externalizing Psychopathology at Age 41: $\chi^2(80)=80.06, p=.477, RMSEA=.001, CFI=1.0$

Externalizing Behaviors at Age 56: $\chi^2(72)=77.42, p=.310, RMSEA=.015, CFI=.989$.

In the Data Analysis section, we note when 95% CIs disagreed with χ^2 difference tests, we only interpret the latter. This was only observed for the residual genetic associations between

tobacco/alcohol use disorder and GAD/MDD symptoms (both shown in Figure 1). One reason for this discrepancy is that the significance of z tests is sensitive to the parameterization (e.g., whether the A latent variable is modeled with a freed variance but a fixed loading of 1.0 on the phenotype, vs. a fixed variance of 1.0 but a freed loading), whereas the χ^2 difference test will be identical with these two parameterizations. Nevertheless, we note here that the primary conclusions of the study would not be affected if we had elected to remove these paths and focus only on 95% CIs.

Table S1

Descriptive Statistics for Symptom Counts of Psychopathology at Age 41 Before the Binning Procedure

Disorder	N	M	SD	Range	Skewness	Kurtosis	% diagnosed
<i>Internalizing (Age 41)</i>							
Generalized Anxiety Disorder	1482	1.41	3.33	0, 18	2.52	5.84	1.8
Major Depressive Disorder	1482	1.97	2.29	0, 9	1.31	0.94	0.8
Post-Traumatic Stress Disorder	1476	2.29	3.74	0, 17	1.76	2.33	7.3
<i>Externalizing (Age 41)</i>							
Antisocial Personality Disorder	1481	1.70	1.85	0, 12	1.70	3.77	2.4
Cannabis Use Disorder	1479	0.51	1.28	0, 9	3.23	11.58	7.8
Alcohol Use Disorder	1480	2.13	2.17	0, 9	0.99	0.40	55.3
Tobacco Use Disorder	1484	2.30	2.05	0, 7	0.28	-1.20	47.1

Note: Post-traumatic stress symptoms were based on the total symptoms reported across up to three traumatic events. The final column displays the percent of the sample who were diagnosed with the disorder based on DSM-III-R criteria (substance use measures include mild dependence, moderate dependence, severe dependence, and abuse).

Table S2

Binned Symptoms Counts for the Dependent Measures of Psychopathology at Age 41

Disorder	N	1	2	3	4	5	r_{MZ}	r_{DZ}
<i>Internalizing (Age 41)</i>								
Generalized Anxiety Disorder	1482	1199	132	151	-	-	0.33	0.09
Major Depressive Disorder	1482	507	331	213	218	213	0.30	0.13
Post-Traumatic Stress Disorder	1476	879	220	203	174	-	0.24	0.20
<i>Externalizing (Age 41)</i>								
Antisocial Personality Disorder	1481	438	399	293	351	-	0.48	0.37
Cannabis Use Disorder	1479	1166	131	182	-	-	0.71	0.55
Alcohol Use Disorder	1480	477	228	233	318	224	0.48	0.36
Tobacco Use Disorder	1484	513	263	234	215	259	0.64	0.32
<i>Externalizing (Age 56)</i>								
Tobacco Use (yes or no)	1291	906	385				0.61	0.32
Alcohol Use (past 2 weeks)	1291	437	172	234	215	233	0.44	0.25

Note: For Generalized Anxiety Disorder, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 was assigned for reporting 1 through 6 symptoms, and a score of 3 was assigned for reporting 7 or more symptoms. For Major Depressive Disorder, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 for 1 symptoms, a score of 3 for 2 symptoms, a score of 4 for reporting 3 or 4 symptoms, and a score of 5 for reporting 5 or more symptoms. For Post-Traumatic Stress Disorder, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 for reporting 1 through 3 symptoms, a score of 3 for reporting 4 through 7 symptoms, and a score of 4 for reporting 8 or more symptoms. For tobacco use disorder, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 for endorsing 1 or 2 symptoms, a score of 3 for 3 symptoms, a score of 4 for 4 symptoms, and a score of 5 for 5 or more symptoms. For alcohol use disorder, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 for 1 symptom, a score of 3 for 2 symptoms, a score of 4 for reporting 3 or 4 symptoms, and a score of 5 for reporting 5 or more symptoms. For cannabis use disorder, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 was assigned for reporting 1 symptom, and a score of 3 was assigned for a score of 2 or more symptoms. For ASPD, a score of 1 was assigned to subjects who endorsed no symptoms, a score of 2 for 1 symptom, a score of 3 for 2 symptoms, and a score of 4 for reporting 3 or more symptoms. r_{MZ} and r_{DZ} are polychoric correlations between twin 1 and twin 2 for monozygotic (MZ) and dizygotic (DZ) twins. All correlations $p < .05$.

Table S3

Phenotypic Correlations Among All Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<i>Binned Psychopathology Symptom Counts (Age 41)</i>																
1. Generalized Anxiety Disorder	1															
2. Major Depressive Disorder	.65	1														
3. Post-Traumatic Stress Disorder	.37	.42	1													
4. Antisocial Personality Disorder	.27	.36	.26	1												
5. Cannabis Use Disorder	.21	.31	.21	.54	1											
6. Alcohol Use Disorder	.24	.31	.25	.47	.44	1										
7. Tobacco Use Disorder	.21	.30	.24	.32	.37	.47	1									
<i>Internalizing Symptoms (Age 56 and 62)</i>																
8. CES-Depression	.26	.28	.24	.21	.17	.21	.20	1								
9. SF-36 Anxiety Item	.27	.22	.18	.08	.06	.10	.13	.45	1							
10. MPQ - Stress Reaction	.24	.30	.21	.13	.12	.18	.18	.61	.54	1						
11. CES-Depression	.24	.29	.20	.22	.15	.18	.13	.58	.34	.51	1					
12. State-Trait Anxiety Inventory	.24	.28	.19	.20	.16	.15	.17	.57	.42	.62	.73	1				
13. PTSD Checklist	.24	.29	.31	.21	.13	.19	.15	.53	.40	.56	.70	.72	1			
<i>Externalizing Behaviors (Age 56)</i>																
14. MPQ - Aggression	.11	.14	.13	.27	.12	.24	.18	.29	.15	.35	.22	.25	.26	1		
15. MPQ - Constraint	.16	.17	.16	.26	.27	.20	.16	.21	.08	.17	.18	.14	.14	.34	1	
16. Tobacco Use (yes or no)	.10	.17	.14	.21	.14	.26	.53	.15	.12	.08	.19	.17	.11	.10	.07	1
17. Alcohol Use (past 2 weeks)	.01	-.02	.02	.05	.11	.13	.09	-.04	-.01	.00	.02	-.02	-.01	.10	.13	.13

Note: Significant correlations are displayed in bold ($p < .05$). CES = Center for Epidemiologic Studies; SF-36 = Short-Form Health Survey; MPQ = Multidimensional Personality Questionnaire; PTSD = Post-traumatic stress disorder.

Table S4: 95% Confidence Intervals for Residual Genetic and Environmental Influences on Individual Measures from Figures 1-3

	Figure 1			Figure 2a			Figure 2b			Figure 3		
	A	C	E	A	C	E	A	C	E	A	C	E
<i>Age 41</i>												
ASPD	[.00,1.0]	[.00,.68]	[.51,.67]	-	-	-	-	-	-	[.00,1.0]	[.00,.69]	[.50,.67]
CAN	[.00,.99]	[.27,.82]	[.26,.52]	-	-	-	-	-	-	[.00,1.0]	[.29,.83]	[.27,.52]
ALC	[.00,.83]	[.13,.67]	[.57,.70]	-	-	-	-	-	-	[.00,.74]	[.02,.65]	[.56,.69]
TOB	[.00,1.0]	[.00,1.0]	[.47,.60]	-	-	-	-	-	-	[.00,1.0]	[.00,1.0]	[.48,.61]
GAD	[.00,.97]	[.00,1.0]	[.59,.84]	[.15,.53]	-	[.52,.82]	[.16,.53]	-	[.50,.80]	-	-	-
MDD	[.00,1.0]	[.00,1.0]	[.45,.66]	[.06,.42]	-	[.50,.68]	[.00,.42]	-	[.47,.68]	-	-	-
PTSD	[.00,1.0]	[.00,.78]	[.67,.84]	[.00,1.0]	[.00,.82]	[.66,.84]	[.00,1.0]	[.00,.81]	[.67,.85]	-	-	-
<i>Age 56</i>												
CES-D	-	-	-	[.00,.73]	[.00,.66]	[.53,.66]	-	-	-	-	-	-
SF36 - Anxiety	-	-	-	[.00,.85]	[.00,1.0]	[.71,.82]	-	-	-	-	-	-
MPQ - Stress	-	-	-	[.00,.72]	[.00,1.0]	[.38,.57]	-	-	-	-	-	-
Tobacco Use	-	-	-	-	-	-	-	-	-	[.00,1.0]	[.00,1.0]	[.46,.69]
Alcohol Use	-	-	-	-	-	-	-	-	-	[.35,.86]	[.00,.85]	[.66,.80]
MPQ - Aggression	-	-	-	-	-	-	-	-	-	[.18,.80]	[.00,1.0]	[.64,.79]
MPQ - Constraint	-	-	-	-	-	-	-	-	-	[.14,.77]	[.00,1.0]	[.66,.79]
<i>Age 62</i>												
CES-D	-	-	-	-	-	-	[.00,1.0]	[.00,.73]	[.46,.62]	-	-	-
STAI	-	-	-	-	-	-	[.00,.65]	[.00,1.0]	[.38,.54]	-	-	-
PCL	-	-	-	-	-	-	[.00,.71]	[.00,1.0]	[.37,.55]	-	-	-
<i>Additional Paths</i>												
MDD on GAD			[.16,.41]			[.08,.41]			[.00,.40]			
TOB on ALC			[-1.0,1.0]								[-.37,1.0]	
PCL on PTSD									[.09,.20]			
Tobacco Use (62) on TOB (41)											[-1.0,1.0]	[.04,.35]

Note: These standard-error based 95% confidence intervals (CIs) correspond to the residual genetic (A), shared environmental (C), and nonshared environmental influences (E) on polychotomized symptom counts (age 41) or symptom/behavioral measures (ages 56 and 62) at the bottom of Figures 1, 2a, 2b, and 3. 95% CIs in other models (Figure 3c, supplemental figures) were similar to those displayed here. In the few cases where χ^2 tests did not agree with 95% CIs, we used the χ^2 tests and corresponding p values to determine significance (because 95% CIs are sensitive to model parameterization and χ^2 tests are not).

Table S5: Unstandardized and Standardized Parameter Estimates for the Model of Internalizing and Externalizing Psychopathology at Age 41 (Figure 1)

Parameter Estimate	Unstand.	Standard	Parameter Estimate	Unstand.	Standard
<i>On Common Factors</i>			<i>Residual A</i>		
1. ASPD	1.00	0.73	16. ASPD	0.00	0.00
2. CAN	0.97	0.71	17. CAN	0.23	0.23
3. ALC	0.86	0.63	18. ALC	0.20	0.20
4. TOB	0.74	0.54	19. TOB (on ALC)	0.65	0.65
5. GAD	1.00	0.58	20. TOB	0.06	0.06
6. MDD	1.33	0.77	21. GAD	0.40	0.40
7. PTSD	0.99	0.58	22. MDD	0.14	0.14
			23. PTSD	0.00	0.00
<i>Latent Factor A</i>			<i>Residual C</i>		
8. Externalizing	0.54	0.75	24. ASPD	0.34	0.34
9. Internalizing (on Ext)	0.27	0.47	25. CAN	0.55	0.55
10. Internalizing	0.28	0.48	26. ALC	0.40	0.40
			27. TOB	0.00	0.00
<i>Latent Factor C</i>			<i>Residual E</i>		
11. Externalizing	0.30	0.41	28. GAD	0.00	0.00
12. Internalizing	0.00	0.00	29. MDD	0.00	0.00
			30. PTSD	0.32	0.32
<i>Latent Factor E</i>					
13. Externalizing	0.39	0.53	31. ASPD	0.59	0.59
14. Internalizing (on Ext)	0.33	0.57	32. CAN	0.39	0.39
15. Internalizing	0.27	0.47	33. ALC	0.64	0.64
			34. TOB	0.53	0.53
			35. GAD	0.71	0.71
			36. MDD (on GAD)	0.29	0.29
			37. MDD	0.55	0.55
			38. PTSD	0.75	0.75

Note: The figure below displays the correspondence of these unstandardized (unstand.) and standardized (standard) estimates to those displayed in Figure 1. A = genetic influences, C = shared environment, E = nonshared environment, ASPD = antisocial personality disorder, CAN = Cannabis use disorder, ALC = Alcohol use disorder, TOB = Tobacco use disorder, GAD = Generalized anxiety disorder, MDD = Major depressive disorder, PTSD = Post-traumatic stress disorder.

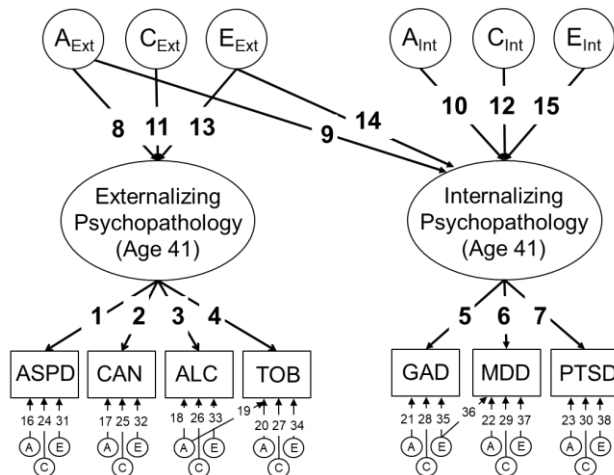


Table S6: Unstandardized and Standardized Parameter Estimates for the Model of Internalizing Psychopathology at Age 41 and Internalizing Symptoms at Age 56 (Figure 2a)

Parameter Estimate	Unstand.	Standard	Parameter Estimate	Unstand.	Standard
<i>On Common Factors</i>			<i>Residual A</i>		
GAD	1.00	0.67	GAD	0.34	0.34
MDD	1.09	0.73	MDD	0.24	0.24
PTSD	0.86	0.58	PTSD	0.00	0.00
CES-D	1.00	0.73	CES-D	0.30	0.25
SF36 - Anxiety	0.67	0.62	SF36 - Anxiety	0.18	0.18
MPQ - Stress	1.53	0.82	MPQ - Stress	0.54	0.32
<i>Latent Factor A</i>			<i>Residual C</i>		
Internalizing Age 41	0.44	0.66	PTSD	0.32	0.32
Internalizing Age 56 (on 41)	0.42	0.47	CES-D	0.28	0.23
Internalizing Age 56	0.49	0.54	SF36 - Anxiety	0.00	0.00
<i>Latent Factor C</i>			MPQ - Stress	0.00	0.00
Internalizing Age 56	0.29	0.32	<i>Residual E</i>		
<i>Latent Factor E</i>			GAD	0.66	0.66
Internalizing Age 41	0.50	0.75	MDD (on GAD)	0.25	0.25
Internalizing 56 (on 41)	0.24	0.26	MDD	0.60	0.59
Internalizing Age 56	0.50	0.56	PTSD	0.75	0.75
			CES-D	0.73	0.60
			SF36 - Anxiety	0.76	0.77
			MPQ - Stress	0.80	0.47

Note: These unstandardized (unstand.) and standardized (standard) parameter estimates correspond to those displayed in Figure 2a. Internalizing refers to internalizing *psychopathology* at age 41 but internalizing *symptoms* at age 56. Unstandardized estimates do not correspond directly to the values displayed in the descriptive statistics (Table 2) because continuous variables were scaled so that their variances were near 1.0 to aid in model convergence (log-transformed CES-D multiplied by 5, log-transformed SF36-Anxiety multiplied by 3, MPQ – Stress multiplied by .45). A = genetic influences, C = shared environment, E = nonshared environment, GAD = Generalized anxiety disorder, MDD = Major depressive disorder, PTSD = Post-traumatic stress disorder, CES-D = Center for Epidemiologic Studies – Depression, SF36 = Short-Form Health Survey, MPQ = Multidimensional Personality Questionnaire.

Table S7: Unstandardized and Standardized Parameter Estimates for the Model of Internalizing Psychopathology at Age 41 and Internalizing Symptoms at Age 62 (Figure 2b)

Parameter Estimate	Unstand.	Standard	Parameter Estimate	Unstand.	Standard
<i>On Common Factors</i>			<i>Residual A</i>		
GAD	1.00	0.67	GAD	0.34	0.34
MDD	1.14	0.77	MDD	0.19	0.19
PTSD	0.82	0.55	PTSD	0.00	0.00
STAI	1.00	0.84	STAI	0.24	0.28
CES-D	1.12	0.83	CES-D	0.00	0.00
PCL	1.17	0.85	PCL	0.19	0.19
<i>Latent Factor A</i>			<i>Residual C</i>		
Internalizing Age 41	0.44	0.65	PTSD	0.34	0.34
Internalizing Age 62 (on 41)	0.34	0.46	STAI	0.00	0.00
Internalizing Age 62	0.35	0.48	CES-D	0.15	0.15
<i>Latent Factor C</i>			PCL	0.01	0.01
Internalizing Age 62	0.13	0.18	<i>Residual E</i>		
<i>Latent Factor E</i>			GAD	0.65	0.65
Internalizing Age 41	0.51	0.76	MDD (on GAD)	0.20	0.20
Internalizing 62 (on 41)	0.13	0.17	MDD	0.58	0.58
Internalizing Age 62	0.51	0.70	PTSD	0.76	0.76
			STAI	0.40	0.46
			CES-D	0.53	0.54
			PCL (on PTSD)	0.15	0.15
			PCL	0.46	0.46

Note: These unstandardized (unstand.) and standardized (standard) parameter estimates correspond to those displayed in Figure 2b. Internalizing refers to internalizing *psychopathology* at age 41 but internalizing *symptoms* at age 62. Unstandardized estimates do not correspond directly to the values displayed in the descriptive statistics (Table 2) because some continuous variables were scaled so that their variances were near 1.0 to aid in model convergence (log-transformed STAI and PCL multiplied by 3). A = genetic influences, C = shared environment, E = nonshared environment, GAD = Generalized anxiety disorder, MDD = Major depressive disorder, PTSD = Post-traumatic stress disorder, CES-D = Center for Epidemiologic Studies – Depression, STAI = State-Trait Anxiety Inventory, PCL = PTSD Checklist.

Table S8: Unstandardized and Standardized Parameter Estimates for the Model of Internalizing Symptoms at Age 56 and 62 (Figure 2c)

Parameter Estimate	Unstand .	Standar d	Parameter Estimate	Unstand .	Standar d
<i>On Common Factors</i>			<i>Residual A</i>		
CES-D (Age 56)	1.00	0.82	CES-D (Age 56)	0.26	0.26
SF36 - Anxiety	1.32	0.84	SF36 - Anxiety	0.14	0.10
MPQ - Stress	1.05	0.77	MPQ - Stress	0.39	0.34
STAI	1.00	0.88	STAI	0.00	0.00
CES-D (Age 62)	3.23	0.83	CES-D	0.17	0.17
PCL	1.08	0.82	PCL	0.07	0.19
<i>Latent Factor A</i>			<i>Residual C</i>		
Internalizing Age 56	0.60	0.72	CES-D (Age 56)	0.00	0.00
Internalizing Age 62 (on 56)	0.16	0.64	SF36 - Anxiety	0.00	0.00
Internalizing Age 62	0.00	0.00	MPQ - Stress	0.00	0.00
<i>Latent Factor C</i>			STAI	0.05	0.16
Internalizing Age 56	0.18	0.21	CES-D (Age 62)	0.00	0.00
Internalizing Age 62 (on 56)	0.06	0.24	PCL	0.04	0.11
Internalizing Age 62	0.00	0.00	<i>Residual E</i>		
<i>Latent Factor E</i>			CES-D (Age 56)	0.51	0.51
Internalizing Age 56	0.55	0.66	SF36 - Anxiety	0.70	0.54
Internalizing Age 62 (on 56)	0.10	0.40	MPQ - Stress	0.61	0.54
Internalizing Age 62	0.16	0.61	STAI	0.13	0.44
			CES-D 62 (on CES-D 56)	0.13	0.13
			CES-D (Age 62)	0.51	0.52
			PCL	0.17	0.52

Note: These unstandardized (unstand.) and standardized (standard) parameter estimates correspond to those displayed in Figure 2c. Unstandardized estimates do not correspond directly to the values displayed in the descriptive statistics (Table 2) because some continuous variables were scaled so that their variances were near 1.0 to aid in model convergence (log-transformed CES-D age 56 multiplied by 4, log-transformed SF36-Anxiety multiplied by 3, MPQ – Stress multiplied by .03). A = genetic influences, C = shared environment, E = nonshared environment, GAD = Generalized anxiety disorder, MDD = Major depressive disorder, PTSD = Post-traumatic stress disorder, CES-D = Center for Epidemiologic Studies – Depression, STAI = State-Trait Anxiety Inventory, PCL = PTSD Checklist.

Table S9: Unstandardized and Standardized Parameter Estimates for the Model of Externalizing Psychopathology at Age 41 and Externalizing Behaviors at Age 56 (Figure 2a)

Parameter Estimate	Unstand.	Standard	Parameter Estimate	Unstand.	Standard
<i>On Common Factors</i>			<i>Residual A</i>		
ASPD	1.00	0.74	ASPD	0.00	0.00
CAN	0.96	0.70	CAN	0.19	0.19
ALC	0.88	0.65	ALC	0.27	0.27
TOB	0.68	0.50	TOB (on ALC)	0.52	0.52
MPQ - Aggression	1.00	0.50	TOB	0.43	0.43
MPQ - Constraint	1.08	0.52	MPQ - Aggression	0.48	0.49
Alcohol Use	0.52	0.25	MPQ - Constraint	0.45	0.45
Tobacco Use	0.72	0.35	Alcohol Use	0.60	0.60
			Tobacco Use (on TOB)	0.71	0.71
			Tobacco Use	0.02	0.02
<i>Latent Factor A</i>			<i>Residual C</i>		
Externalizing Age 41	0.57	0.77	ASPD	0.33	0.33
Externalizing Age 56 (on 41)	0.41	0.85	CAN	0.56	0.56
Externalizing Age 56	0.00	0.00	ALC	0.34	0.34
			MPQ - Aggression	0.00	0.00
<i>Latent Factor C</i>			MPQ - Constraint	0.00	0.00
Externalizing Age 41	0.28	0.37	Alcohol Use	0.21	0.21
Externalizing Age 56 (on 41)	-0.05	-0.11	Tobacco Use	0.11	0.11
Externalizing Age 56	0.00	0.00			
			<i>Residual E</i>		
<i>Latent Factor E</i>			ASPD	0.59	0.59
Externalizing Age 41	0.38	0.52	CAN	0.39	0.39
Externalizing Age 56 (on 41)	0.05	0.10	ALC	0.63	0.63
Externalizing Age 56	0.24	0.50	TOB	0.55	0.55
			MPQ - Aggression	0.69	0.71
			MPQ - Constraint	0.73	0.72
			Alcohol Use	0.73	0.73
			Tobacco Use (on TOB)	0.20	0.20
			Tobacco Use	0.57	0.57

Note: These unstandardized (unstand.) and standardized (standard) parameter estimates correspond to those displayed in Figure 3. Externalizing refers to externalizing *psychopathology* at age 41 but externalizing *behaviors* at age 56. A = genetic influences, C = shared environment, E = nonshared environment, ASPD = antisocial personality disorder, CAN = Cannabis use disorder, ALC = Alcohol use disorder, TOB = Tobacco use disorder, MPQ = Multidimensional Personality Questionnaire.

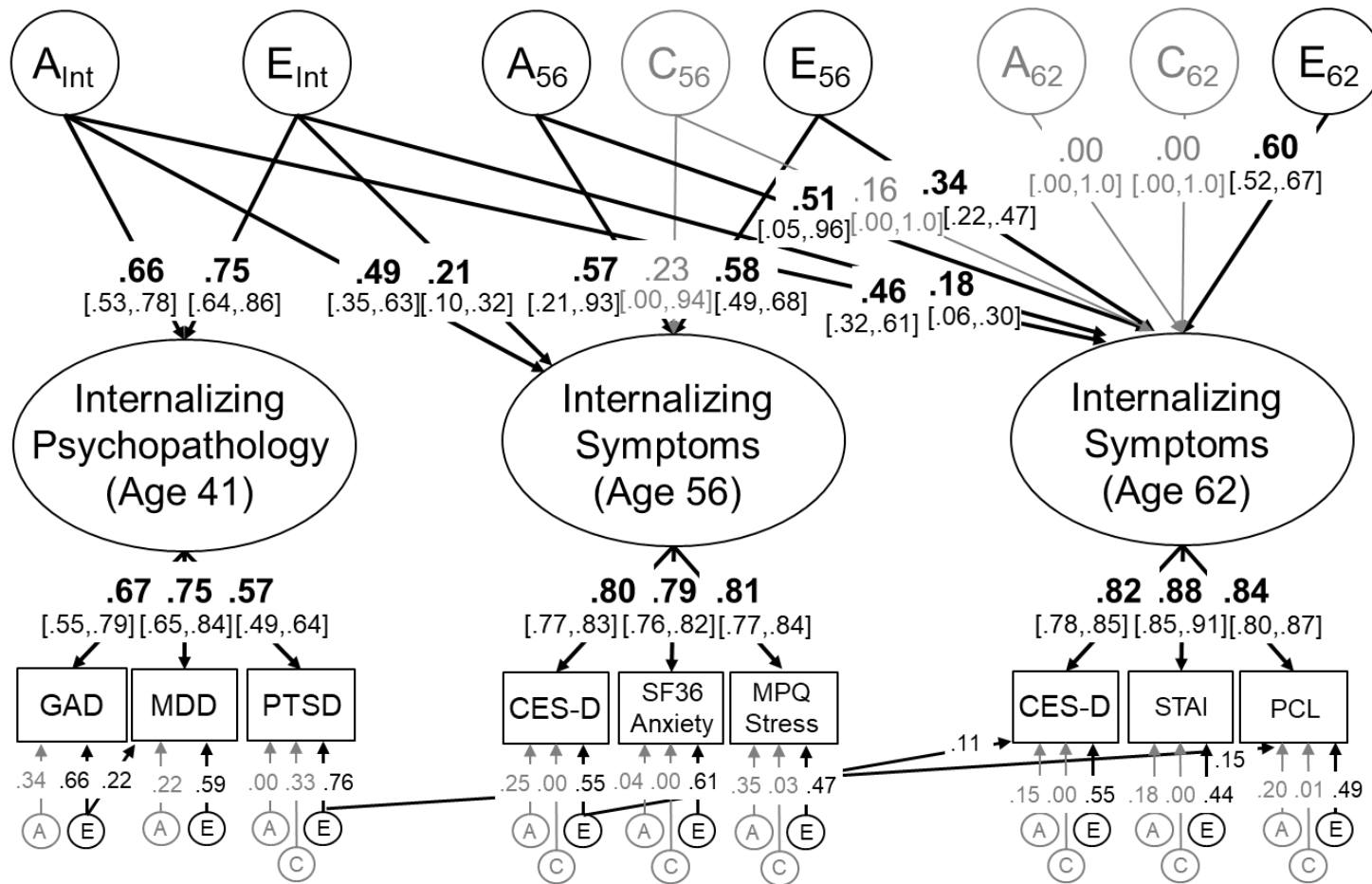


Figure S1: Trivariate model of the genetic (A), shared environmental (C), and non-shared environmental (E) overlap between internalizing psychopathology at age 42 and internalizing symptoms at age 56 (Figure S2a) and age 62 (Figure S2b). Variance explained by latent variables (ovals) can be computed by squaring the factor loadings. Measured variables are displayed in rectangles. Significant factor loadings are displayed in bold with black lines ($p < .05$). GAD = Generalized anxiety disorder, MDD = Major depressive disorder, PTSD = Post-traumatic stress disorder, CES-D = Center for Epidemiologic Studies – Depression, SF36 = Short-Form Health Survey, MPQ = Multidimensional Personality Questionnaire, STAI = State-Trait Anxiety Inventory, PCL = PTSD Checklist.

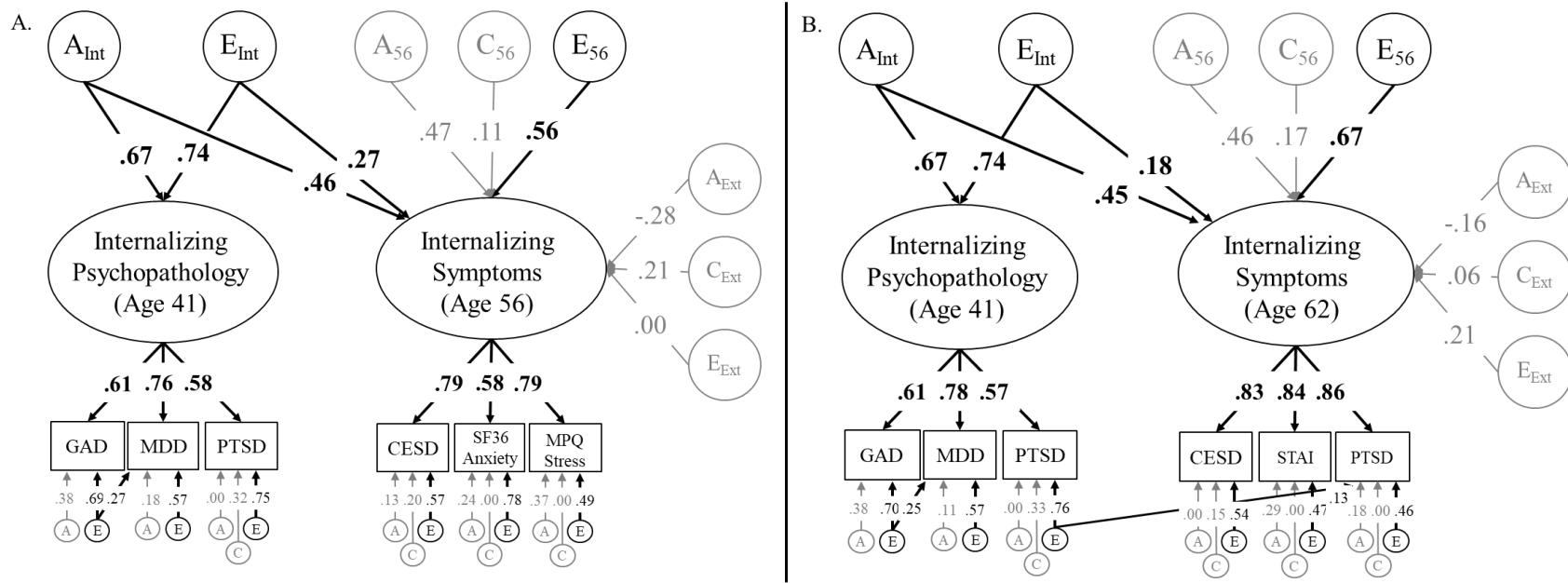


Figure S2: These analyses correspond to Figure 2a and Figure 2b of the main text, but also include the externalizing psychopathology factor (age 41) in the Cholesky model as the second term in the model. Cholesky paths on the externalizing psychopathology factor itself are not shown, just the cross-paths from the externalizing factor to internalizing symptoms at age 56 (A) or age 62 (B). Variance explained by latent variables (ovals) can be computed by squaring the factor loadings. Measured variables are displayed in rectangles. Significant factor loadings are displayed in bold with black lines ($p < .05$). Model fit (A): $\chi^2(439)=471.49$, $p=.137$, RMSEA=.014, CFI=.991. Model Fit (B): $\chi^2(441)=451.64$, $p=.353$, RMSEA=.008, CFI=.997.

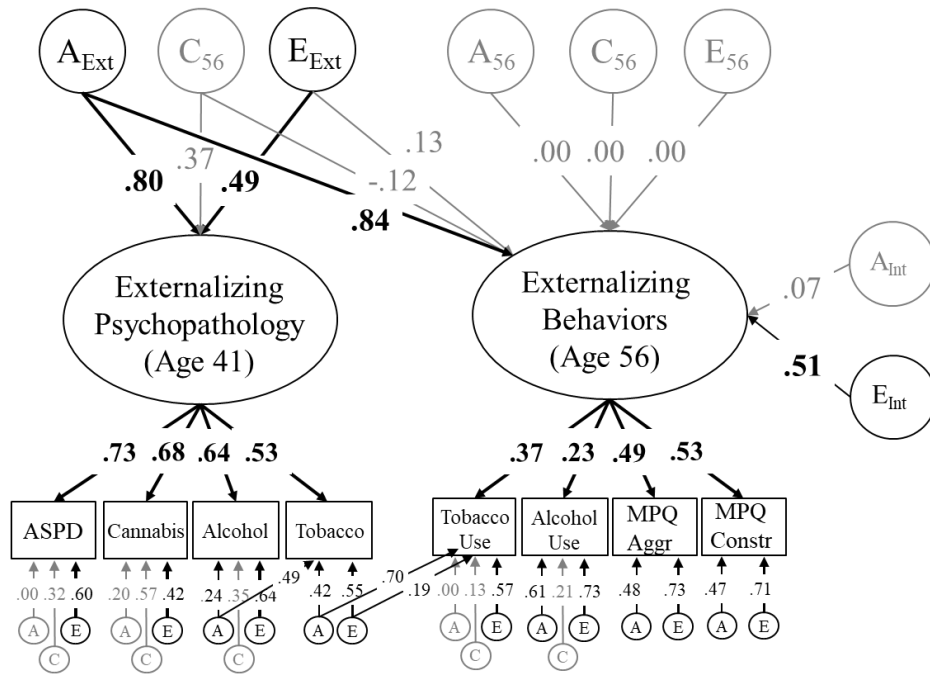


Figure S3: These analyses correspond to Figure 3 of the main text, but also include the internalizing psychopathology factor (age 41) in the Cholesky model as the second term in the model. Cholesky paths on the internalizing psychopathology factor itself are not shown, just the cross-paths from the internalizing factor to externalizing behaviors at age 56. Variance explained by latent variables (ovals) can be computed by squaring the factor loadings. Measured variables are displayed in rectangles. Significant factor loadings are displayed in bold with black lines ($p < .05$). Model fit: $\chi^2(536)=592.38$, $p=.046$, RMSEA=.017, CFI=.986.