Supplemental Material

Supplemental Methods

Sensitivity of cross-sectional latent profile analysis to alternative specifications

It is important to test formally the sensitivity of results to alternative modeling specifications to avoid model misfit and biased conclusions (Johnson, 2021). Accordingly, the stability and robustness of the optimal number of profiles from the preliminary latent profile analysis (LPA) was evaluated across alternative specifications 1) of the within-profile covariance-variance matrix (Johnson, 2021; Masyn, 2013) and 2) to account for the nested structure of ABCD Study data (Saragosa-Harris et al., 2022). At each time point, the optimal solution was identified by comparing fit indices across models with k = 1–6 latent profiles for four different configurations of the variance–covariance matrix:

- Type 1, profile-invariant diagonal: equal variances for each indicator variable between profiles with no residual covariances
- Type 2, profile-varying diagonal: variances can be freely estimated for each indicator variable between the profiles with no residual covariances
- Type 3, profile-invariant unrestricted: equal variances for each indicator variable between profiles with equal residual covariances between indicator variables across profiles
- Type 4, profile-varying unrestricted: variances and residual covariances of the indicator variables are estimated freely for each profile.

Further, to ensure that results from the preliminary LPA presented in the main text were not affected by the decision to account for the nested structure of ABCD Study data (Saragosa-Harris et al., 2022) during the auxiliary variables (i.e., CBCL emotional and behavioral problems; stressful life events) analyses (Vermunt, 2010), these supplemental analyses were conducted using MPlus Version 8.10, which allowed us to specify stratification by ABCD Study research site using TYPE = COMPLEX in all models. Comparative fit was assessed using AIC, BIC, SABIC, entropy, and Lo–Mendell–Rubin likelihood ratio test (LMR-LRT).

Longitudinal measurement invariance testing for the LTA model

To evaluate whether assuming measurement invariance (MI) was appropriate when fitting the LTA model, a model with item-response probabilities freely estimated at each time point was compared to a model where the item-response probabilities were constrained to be equal across time points. While it is common to test for longitudinal MI between time points using nested model testing (e.g., chi-square difference testing), small differences in the estimates of item-response probabilities can show statistically significant differences in large samples (Collins & Lanza, 2010; Nylund-Gibson et al., 2022). Because our sample included 8,208 youth, we were not confident that nested model testing would provide results that could clarify decisions about assuming MI. As such, we focused on comparing the magnitude and overall pattern of the model parameters and item-response probabilities to inform our interpretation of the latent profiles across MI and non-MI models (Bray et al., 2021; Collins & Lanza, 2010). As above, to ensure that results from the LTA presented in the main text were not affected by the decision to account for the nested structure of ABCD Study data during the auxiliary variables analyses (Vermunt, 2010), the MI and non-MI LTA models were fit using MPlus Version 8.10, which allowed us to specify stratification by ABCD Study research site using TYPE = COMPLEX.

Classification accuracy and assignment error

To ensure estimates were not biased by assigning participants to the latent profiles for which their posterior probabilities were highest (Nylund-Gibson et al., 2019), three classification diagnostics were generated to evaluate latent profile-specific classification uncertainty and accuracy and examine whether there was high classification error in the smaller latent profiles (Masyn, 2013). First, average posterior probabilities (AvePP) were calculated as the mean of latent profile *k* posterior probabilities across all participants whose maximum posterior probability was for latent profile *k*. Next, odds of correct classification ratios (OCC) were calculated as the odds of correct classification based on maximum posterior probability assignment (AvePP/1-AvePP) divided by the odds of correct classification based on random assignment using the model-estimated marginal latent profile proportions, $\hat{\pi}k$, ($\hat{\pi}k$ /1-$\hat{\pi}k$). Last, modal class assignment proportion (mcaP) was measured as the proportion of individuals in the sample modally assigned to latent profile *k*. Using published guidelines (Nagin, 2005), AvePP > 0.70 was considered an indicator of well separated latent profiles and adequate assignment accuracy, OCC > 5.00 was considered an indicator of good latent profile separation and high assignment accuracy, and smaller discrepancies between mcaP*k* and $\hat{\pi}k$ were considered indicators of smaller assignment error.

Supplemental Results

The four-profile solution was stable across alternative specifications

Using LPA, six models (*k* = 1–6 profiles) with the default Type 1 within-profile covariance-variance matrix (i.e., equal variances for each indicator variable between profiles with no residual covariances) initially were considered at each time point to provide guidance during model selection with LTA. At T1, across models with 1–6 latent profiles (**Supplemental Table 2**), BLRT indicated that models with 2–6 profiles showed improved fit relative to those with one fewer profile. The five- and six-profile solutions were rejected because of low entropy (0.56 and 0.61, respectively) that suggested overlap among the profiles (Nylund-Gibson & Choi, 2018). The four-profile solution was selected as the best fitting model indicated by lower AIC

(66717.64), BIC (66843.87), and SABIC (66786.67). At T2, across models with 1–6 latent profiles, BLRT indicated that models with 2–4 profiles showed improved fit relative to those with one fewer class. The four-profile solution was selected as the best fitting model indicated by lower AIC (66588.48), BIC (66714.72), and SABIC (66657.52) and acceptable entropy (0.81). At T3, across models with 1–6 latent profiles, BLRT indicated that models with 2–5 profiles showed improved fit relative to those with one fewer profile. The five-profile solution was rejected because of low entropy (0.54) indicating overlap among the profiles. The four-profile solution was selected as the best fitting model indicated by lower AIC (67224.37), BIC (67350.60), and SABIC (67293.40) and acceptable entropy (0.79).

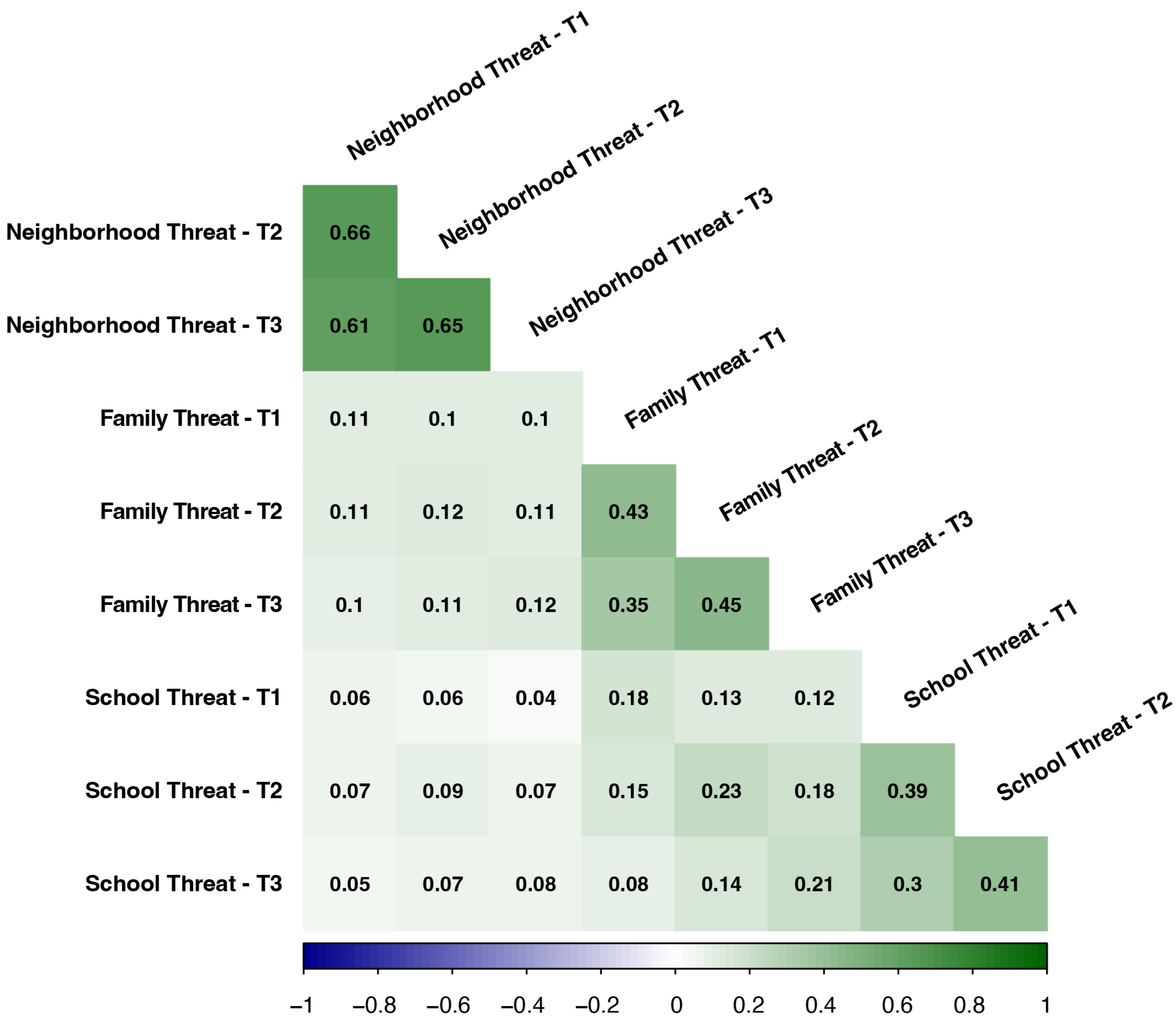
We focused on the Type 1 within-profile covariance-variance matrix given an overall goal of preserving model usefulness and conceptual clarity (Masyn, 2013). However, for the sake of completeness, additional LPA were conducted to examine the optimal number of profiles across alternative specifications of the within-profile covariance-variance matrix when accounting for the multilevel data structure (i.e., participants nested within different research sites) during the initial model building stage (**Supplemental Table 3a–c**). In brief, four-profile models from the Type 1, profile-invariant diagonal (i.e., equal variances for each indicator variable between profiles with no residual covariances), and Type 3, profile-invariant unrestricted (i.e., equal variances for each indicator variable between profiles with equal residual covariances between indicator variables across profiles) specifications fit the data best at each time point as indicated by significant LMR-LRT, AIC, BIC, SABIC, and acceptable entropy. Across the Type 2, profile-varying diagonal (i.e., variances can be freely estimated for each indicator variable between profiles with no residual covariances) and Type 4, profile-varying unrestricted (i.e., variances and residual covariances of the indicator variables are estimated freely for each profile) specifications, error messages indicated that model estimation did not terminate normally and should not be trusted for several models (e.g., k = 4 –6 profiles across each specification). Further, while entropy is not intended for use during model enumeration (Masyn, 2013), all models identified with Type 2 and Type 4 covariance specifications indicated overlap among the profiles (entropy values = 0.55–0.71; Nylund-Gibson & Choi, 2018).

As a final step, information criteria were compared for the Type 1 and Type 3 specifications for the LPA models. Across T1–T3, AIC, BIC, and SABIC values were lower for the Type 3 specification (**Supplemental Table 3a–c**). However, interpreting and assigning labels to the profiles identified with the Type 3 specification requires accounting for not only differences in means, but also differences in residual covariances between indicator variables across latent profiles. Therefore, to preserve the goal of conceptual simplicity and clarity, the Type 1 covariance-variance specification ultimately was selected as the most useful (Masyn, 2013) for the final LTA model.

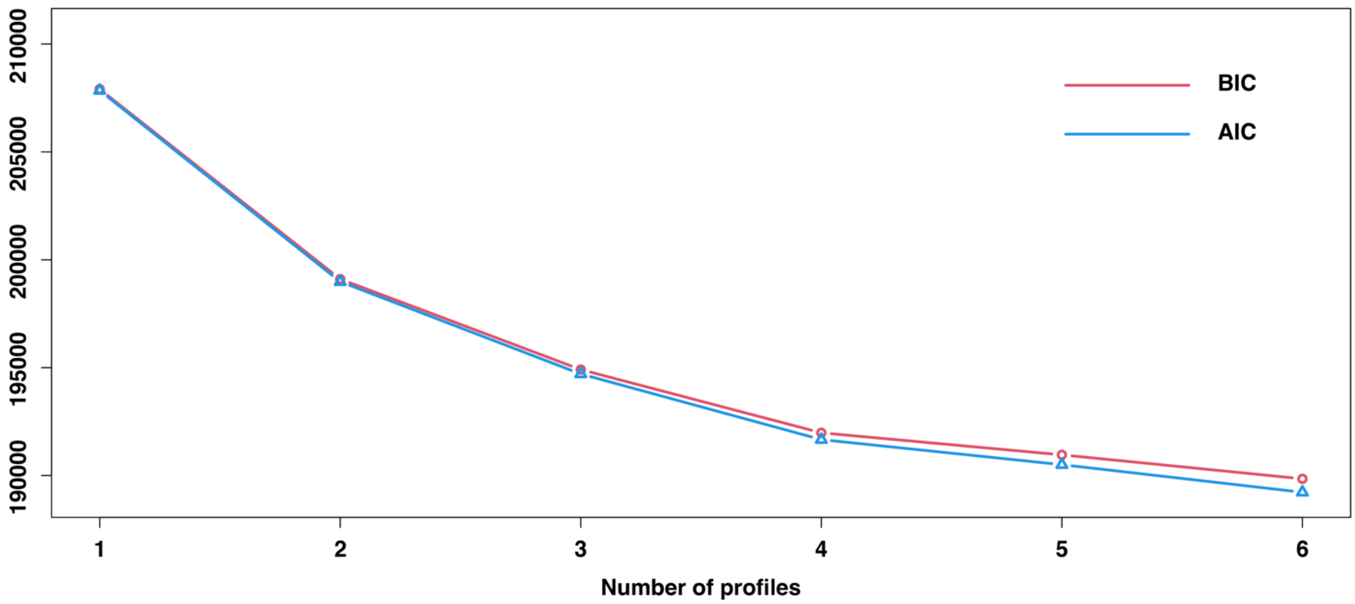
Longitudinal measurement invariance was deemed plausible for the final LTA model

The magnitude and overall pattern of model parameters and item-response probabilities was compared between MI (i.e., item-response probabilities constrained to be equal for the different latent profiles across T1–T3) and non-MI (i.e., item-response probabilities freely estimated for the different latent profiles across T1–T3) LTA models to determine whether it was plausible to assume longitudinal MI (Bray et al., 2021; Collins & Lanza, 2010). Visual inspection indicated that model parameters and item-response probabilities were essentially identical between the MI and non-MI LTA models (**Supplemental Table 4**). Thus, given the advantages of imposing longitudinal MI for model estimation, identification, and interpretation (Lanza & Bray, 2010), MI was considered plausible and item-response probabilities were constrained to be equal in the final LTA model.

Supplemental Figures



Supplemental Fig. 1. Pairwise Spearman correlations between the indicator variables included in the latent transition analysis. T1 = data collected from 2016–2018, ages 9–10; T2 = data collected from 2017–2019, ages 10–11; T3 = data collected from 2018–2020, ages 11–12.



Supplemental Fig. 2. The elbow method is represented with a line plot comparing Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) to number of latent profiles (*k*).

Supplemental Tables

Supplemental Table 1. Means, standard deviations, and reliability of the items for the different social environment threat measures across T1–T3.

	T1		**T2**		**T3**		
Measures	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Reliability*
Neighborhood Safety/Crime Survey (Youth-report)	--	--	--	--	--	--	--
My neighborhood is safe from crime.	1.96	1.08	1.85	0.99	1.92	1.00	0.40
Neighborhood Safety/Crime Survey (Caregiver/Parent-report)	2.11	0.96	2.12	0.94	2.13	0.93	0.65
I feel safe walking in my neighborhood, day or night.	1.87	0.98	1.88	0.96	1.90	0.97	0.56
Violence is not a problem in my neighborhood.	2.03	1.10	2.04	1.08	2.05	1.06	0.57
My neighborhood is safe from crime.	2.42	1.12	2.43	1.11	2.45	1.10	0.60
Family Environment Scale-Family Conflict Subscale (Youth-report)	1.98	1.94	1.86	1.85	1.86	1.81	0.44
We fight a lot in our family.	0.23	0.42	0.18	0.38	0.15	0.36	0.33
Family members rarely become openly angry.	0.32	0.47	0.34	0.47	0.35	0.48	0.14
Family members sometimes get so angry they throw things.	0.12	0.32	0.10	0.30	0.09	0.28	0.27
Family members hardly ever lose their tempers.	0.36	0.48	0.38	0.49	0.36	0.48	0.23
Family members often criticize each other.	0.19	0.39	0.17	0.37	0.20	0.40	0.26
Family members sometimes hit each other.	0.21	0.41	0.16	0.36	0.12	0.33	0.35
If there's a disagreement in our family, we try hard to smooth things over and keep the peace.	0.09	0.29	0.08	0.27	0.09	0.29	0.15
Family members often try to one-up or outdo each other.	0.21	0.41	0.22	0.42	0.24	0.43	0.28
In our family, we believe you don't ever get anywhere by raising your voice.	0.24	0.43	0.23	0.42	0.26	0.44	0.20
School Risk and Protective Factors-School Environment Subscale (Youth-report)	5.10	2.84	4.60	2.71	5.39	2.80	0.40
In my school, students have lots of chances to help decide things like class activities and rules.	2.19	0.94	2.01	0.87	2.10	0.82	0.25
I get along with my teachers.	1.39	0.65	1.37	0.60	1.55	0.64	0.32
My teacher(s) notices when I am doing a good job and lets me know about it.	1.58	0.73	1.54	0.68	1.73	0.71	0.27
There are lots of chances for students in my school to get involved in sports, clubs, or other school activities outside of class.	1.78	0.93	1.56	0.80	1.56	0.75	0.22
I feel safe at my school.	1.39	0.68	1.32	0.60	1.47	0.63	0.31
The school lets my parents know when I have done something well.	1.77	0.88	1.80	0.86	1.99	0.86	0.30

Note: Reliability was calculated as the mean Spearman correlation across T1–T3. -- indicates that the overall measure did not differ from the single item.

Supplemental Table 2. Model fit of the latent profile analysis at T1–T3.

			T1			
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*BLRT p*
1	-34938.44	69888.88	69930.96	69911.90	1.00	NA
2	-33944.17	67908.34	67978.47	67946.69	0.81	<0.01
3	-33628.81	67285.61	67383.79	67339.30	0.80	<0.01
4	**-33340.82**	**66717.64**	**66843.87**	**66786.67**	**0.81**	**<0.01**
5	-33340.22	66724.45	66878.73	66808.82	0.56	<0.01
6	-33096.47	66244.94	66427.27	66344.65	0.61	<0.01
			T2			
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*BLRT p*
1	-34938.44	69888.88	69930.96	69911.90	1.00	*NA*
2	-33842.04	67704.09	67774.21	67742.44	0.82	<0.01
3	-33531.76	67091.52	67189.70	67145.22	0.80	<0.01
4	***-33276.24***	***66588.48***	***66714.72***	***66657.52***	***0.81***	***<0.01***
5	-33082.14	66208.29	66362.57	66292.66	0.78	0.11
6	-32869.31	65790.62	65972.95	65890.33	0.80	<0.01
			T3			
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*BLRT p*
1	-34938.44	69888.88	69930.96	69911.90	1.00	*NA*
2	-33980.80	67981.59	68051.72	68019.94	0.80	<0.01
3	-33694.15	67416.31	67514.49	67470.00	0.78	<0.01
4	***-33594.19***	***67224.37***	***67350.60***	***67293.40***	***0.79***	***<0.01***
5	-33598.56	67241.11	67395.39	67325.48	0.54	<0.01
6	-33315.92	66683.84	66866.17	66783.55	0.60	0.62

Note: Results derived using the tidylpa package in R. AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample size-adjusted Bayesian information criterion; BLRT = bootstrapped likelihood ratio test. The selected profile solution (4-class) is italicized and bolded.

Supplemental Table 3a. Model fit of the latent profile analysis across different specifications of the within-profile covariance-variance matrix at T1.

Profiles	Log-Likelihood	AIC	BIC	SABIC	Entropy	LMR-LRT p
Type 1: profile-invariant diagonal						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34934.15	69880.30	69922.38	69903.31	1.00	NA
2	-33939.57	67899.13	67969.26	67937.48	0.82	<0.01
3	-33555.59	67139.17	67237.35	67192.86	0.83	<0.01
4	***-33335.87***	***66707.74***	***66833.97***	***66776.77***	***0.81***	***<0.01***
5	-33091.44	66226.89	66381.17	66311.26	0.81	0.06
6	-32971.57	65995.15	66177.48	66094.86	0.82	0.45
Type 2: profile-varying diagonal						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34934.15	69880.30	69922.38	69903.31	1.00	NA
2	-33156.71	66339.41	66430.58	66389.27	0.67	<0.01
3	-32619.34	65278.69	65418.94	65355.39	0.55	<0.01
4	-32346.59	64747.17	64936.52	64850.72	0.59	0.33
5	--	--	--	--	--	--
6	--	--	--	--	--	--
Type 3: profile-invariant unrestricted						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34700.17	69418.34	69481.45	69452.85	1.00	NA
2	-33884.02	67794.05	67885.21	67843.90	0.82	<0.01
3	-33516.97	67067.95	67187.16	67133.14	0.83	<0.01
4	***-33302.97***	***66647.94***	***66795.21***	***66728.48***	***0.81***	***<0.01***
5	-33059.97	66169.94	66345.25	66265.81	0.81	0.15
6[a]	-32936.91	65931.82	66135.19	66043.03	0.82	0.03
Type 4: profile-varying unrestricted						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34700.17	69418.34	69481.45	69452.85	1.00	NA
2	-33097.34	66232.67	66365.91	66305.54	0.61	0.0000
3	-32483.31	65024.62	65227.99	65135.83	0.62	0.0000
4	--	--	--	--	--	--
5	--	--	--	--	--	--
6	--	--	--	--	--	--

Note: Results derived using MPlus Version 8.10 to account for the nested structure of ABCD Study data using TYPE = COMPLEX to specify stratification by research site. AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample size-adjusted Bayesian information criterion; LMR-LRT = Lo-Mendell-Rubin likelihood ratio test.
-- indicates that the model did not terminate normally
[a] Smallest profile contained <2% of the sample

Supplemental Table 3b. Model fit of the latent profile analysis across different specifications of the within-profile covariance-variance matrix at T2.

Type 1: profile-invariant diagonal						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34932.34	69876.67	69918.75	69899.68	1.00	NA
2	-33835.69	67691.37	67761.50	67729.72	0.83	<0.01
3	-33434.74	66897.48	66995.66	66951.17	0.83	<0.01
4	***-33232.83***	***66501.66***	***66627.89***	***66570.69***	***0.83***	**<0.01**
5	-33020.97	66085.94	66240.22	66170.31	0.80	0.05
6	-32862.77	65777.54	65959.87	65877.25	0.80	0.09
Type 2: profile-varying diagonal						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34932.34	69876.67	69918.75	69899.68	1.00	NA
2	-32943.56	65913.11	66004.28	65962.97	0.59	<0.01
3	-32509.27	65058.54	65198.79	65135.24	0.71	<0.01
4	--	--	--	--	--	--
5	--	--	--	--	--	--
6	--	--	--	--	--	--
Type 3: profile-invariant unrestricted						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34555.70	69129.39	69192.50	69163.90	1.00	NA
2	-33747.51	67521.01	67612.18	67570.86	0.83	<0.01
3	-33374.70	66783.40	66902.61	66848.59	0.83	<0.01
4	***-33213.15***	***66468.31***	***66615.57***	***66548.84***	***0.81***	***<0.01***
5[a]	-32950.22	65950.45	66125.76	66046.32	0.89	0.02
6	-32814.53	65687.06	65890.43	65798.28	0.81	0.27
Type 4: profile-varying unrestricted						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34555.70	69129.39	69192.50	69163.90	1.00	NA
2	-32896.61	65831.22	65964.47	65904.09	0.60	<0.01
3	-32294.52	64647.04	64850.41	64758.25	0.62	<0.01
4	--	--	--	--	--	--
5	--	--	--	--	--	--
6	--	--	--	--	--	--

Note: Results derived using MPlus Version 8.10 to account for the nested structure of ABCD Study data using TYPE = COMPLEX to specify stratification by research site. AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample size-adjusted Bayesian information criterion; LMR-LRT = Lo-Mendell-Rubin likelihood ratio test.
-- indicates that the model did not terminate normally
[a] Smallest profile contained <2% of the sample

Supplemental Table 3c. Model fit of the latent profile analysis across different specifications of the within-profile covariance-variance matrix at T3.

Type 1: profile-invariant diagonal						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34933.12	69878.24	69920.31	69901.24	1.00	NA
2	-33975.26	67970.52	68040.65	68008.87	0.81	<0.01
3	-33599.83	67227.66	67325.84	67281.35	0.82	<0.01
4	***-33399.47***	***66834.93***	***66961.16***	***66903.96***	***0.80***	***<0.01***
5[a]	-33234.08	66512.17	66666.45	66596.54	0.80	0.012
6	-33122.70	66297.40	66479.73	66397.10	0.88	0.39
Type 2: profile-varying diagonal						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34933.12	69878.24	69920.31	69901.25	1.00	NA
2	-33293.44	66612.88	66704.05	66662.74	0.65	<0.01
3	-32881.91	65803.83	65944.08	65880.53	0.71	<0.01
4	--	--	--	--	--	--
5	--	--	--	--	--	--
6	--	--	--	--	--	--
Type 3: profile-invariant unrestricted						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34631.94	69281.89	69345.00	69316.40	1.00	NA
2	-33896.64	67819.29	67910.45	67869.14	0.81	<0.01
3	-33549.84	67133.69	67252.91	67198.88	0.83	<0.01
4	***-33249.74***	***66541.47***	***66688.74***	***66622.01***	***0.90***	***<0.01***
5[a]	-33184.00	66417.99	66593.31	66513.87	0.81	0.02
6[a]	-32982.80	66023.60	66226.97	66134.81	0.86	<0.01
Type 4: profile-varying unrestricted						
Profiles	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*Entropy*	*LMR-LRT p*
1	-34631.94	69281.89	69345.00	69316.40	1.00	NA
2	-33213.13	66464.27	66597.51	66537.13	0.65	<0.01
3	-32762.59	65583.19	65786.56	65694.40	0.59	<0.01
4	-32392.51	64863.01	65136.51	65012.57	0.64	<0.01
5	--	--	--	--	--	--
6	--	--	--	--	--	--

Note: Results derived using MPlus Version 8.10 to account for the nested structure of ABCD Study data using TYPE = COMPLEX to specify stratification by research site. AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample size-adjusted Bayesian information criterion; LMR-LRT = Lo-Mendell-Rubin likelihood ratio test.
-- indicates that the model did not terminate normally
[a] Solution generated redundant profiles
[b] Smallest profile contained <2% of the sample

Supplemental Table 4. Comparison of model parameters and item-response probabilities for the measurement invariant and measurement noninvariant four-profile LTA models.

Measurement Invariant								**Measurement Noninvariant**							
T1															
Profile	*Item-Response Probabilities*						*n*[b]	*Profile*	*Item-Response Probabilities*						*n*[b]
	FES	SRPF	NSC	FESz[a]	SRPFz[a]	NSCz[a]			FES	SRPF	NSC	FESz[a]	SRPFz[a]	NSCz[a]	
1	1.06	4.56	1.68	-0.47	-0.19	-0.46	4,654	1	1.09	4.69	1.67	-0.46	-0.14	-0.47	4,728
2	4.99	7.07	3.28	1.55	0.69	1.45	538	2	4.94	7.04	3.32	1.52	0.68	1.49	543
3	4.51	6.07	1.77	1.30	0.34	-0.35	1,376	3	4.73	5.91	1.77	1.41	0.29	-0.36	1,306
4	1.44	4.94	3.02	-0.28	-0.06	1.14	1,638	4	1.39	4.98	3.04	-0.31	-0.04	1.16	1,630
T1 Classification Quality–Entropy: 0.81								*T1 Classification Quality–Entropy:* 0.82							
T2															
Profile	*Item-Response Probabilities*						*n*[b]	*Profile*	*Item-Response Probabilities*						*n*[b]
	FES	SRPF	NSC	FESz[a]	SRPFz[a]	NSCz[a]			FES	SRPF	NSC	FESz[a]	SRPFz[a]	NSCz[a]	
1	1.06	4.56	1.68	-0.43	-0.01	-0.44	4,876	1	1.05	4.07	1.66	-0.43	-0.19	-0.47	4,806
2	4.99	7.07	3.28	1.70	0.91	1.50	460	2	4.88	6.91	3.30	1.64	0.85	1.52	487
3	4.51	6.07	1.77	1.44	0.54	-0.34	1,159	3	4.47	5.80	1.76	1.41	0.44	-0.35	1,198
4	1.44	4.94	3.02	-0.23	0.13	1.18	1,712	4	1.42	4.57	2.98	-0.23	-0.01	1.13	1,716
T2 Classification Quality–Entropy: 0.85								*T2 Classification Quality–Entropy:* 0.84							
T3															
Profile	*Item-Response Probabilities*						*n*[b]	*Profile*	*Item-Response Probabilities*						*n*[b]
	FES	*SRPF*	*NSC*	*FESz*[a]	*SRPFz*[a]	*NSCz*[a]			*FES*	*SRPF*	*NSC*	*FESz*[a]	*SRPFz*[a]	*NSCz*[a]	
1	1.06	4.56	1.68	-0.44	-0.30	-0.49	4,821	1	1.04	4.96	1.71	-0.46	-0.16	-0.45	4,817
2	4.99	7.07	3.28	1.73	0.60	1.47	466	2	5.18	7.37	3.20	1.84	0.70	1.37	432
3	4.51	6.07	1.77	1.47	0.24	-0.37	1,234	3	4.30	6.51	1.80	1.35	0.40	-0.35	1,282
4	1.44	4.94	3.02	-0.24	-0.16	1.15	1,687	4	1.51	5.29	3.06	-0.20	-0.04	1.20	1,676
T3 Classification Quality–Entropy: 0.82								*T3 Classification Quality–Entropy:* 0.82							
AIC: 264072.705 **BIC:** 264409.316 **SABIC:** 264256.781 **Classification Quality–Entropy:** 0.86								**AIC:** 263650.349 **BIC:** 264155.266 **SABIC:** 263926.464 **Classification Quality–Entropy:** 0.86							

Note: Results derived using MPlus Version 8.10 to account for the nested structure of ABCD Study data using TYPE = COMPLEX to specify stratification by research site. AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample-size adjusted BIC

a Item-response probabilities were converted to z-scores within time point to aid in interpretation

b Reflects the number of participants modally-assigned to each latent profile

Supplemental Table 5. Classification diagnostics from Masyn (2013) were used to assess latent-profile specific classification uncertainty and accuracy.

Average posterior probabilities (AvePP)			
Calculation: Mean of latent profile *k* posterior probabilities across all individuals whose maximum posterior probability was for latent profile *k* Interpretation: Values > 0.70 indicate well separated latent profiles with adequate assignment accuracy			
Latent profile	***T1***	***T2***	***T3***
Low Threat	0.93	0.94	0.93
Elevated Neighborhood	0.86	0.87	0.86
Elevated Family	0.83	0.86	0.85
Elevated All	0.85	0.87	0.84
Odds of correction classification ratio (OCC)			
Calculation: Ratio of AvePP*k*/(1-AvePP*k*)/($\hat{\pi}k$/1-$\hat{\pi}k$) where $\hat{\pi}k$ = model-estimated proportion for latent profile *k* Interpretation: Values > 5.00 indicate a model with good latent profile separation and high assignment accuracy			
Latent profile	***T1***	***T2***	***T3***
Low Threat	10.44	11.07	9.88
Elevated Neighborhood	23.35	25.52	23.66
Elevated Family	26.87	36.60	32.72
Elevated All	85.12	100.58	80.36
Discrepancy between modal class assignment proportion (mcaP) and πk			
Calculation: Difference between the model-estimated proportion for latent profile *k* ($\hat{\pi}k$) and the proportion of individuals modally assigned to latent profile *k* (mcaP*k*). Interpretation: Larger discrepancies between mcaP*k* and $\hat{\pi}k$ reflect larger assignment errors. If individuals were assigned to latent profile *k* with perfect certainty, then mcaP*k* = $\hat{\pi}k$.			
Latent profile	***T1***	***T2***	***T3***
Low Threat	-0.0005342	-0.0053627	-0.0066999
Elevated Neighborhood	0.00023315	-0.0007062	0.00165197
Elevated Family	-0.0033454	0.00202094	0.00194643
Elevated All	0.00364647	0.00404789	0.00310152

Supplemental Table 6a. Frequency of transitions between T1–T2 latent profiles.

	LT at T2	**EN at T2**	**EF at T2**	**EA at T2**
LT at T1	4,329 (91.1%)	99 (2.1%)	325 (6.8%)	0 (0.0%)
EN at T1	93 (5.5%)	1,430 (84.8%)	21 (1.2%)	142 (8.4%)
EF at T1	410 (31.6%)	36 (2.8%)	823 (63.4%)	30 (2.3%)
EA at T1	5 (1.1%)	150 (31.9%)	16 (3.4%)	299 (63.6%)

Note: Values reflect modal assignment to latent profiles at T1 and T2

Supplemental Table 6b. Frequency of transitions between T2–T3 latent profiles.

	LT at T3	**EN at T3**	**EF at T3**	**EA at T3**
LT at T2	4,440 (91.8%)	56 (1.2%)	328 (6.8%)	13 (<0.1%)
EN at T2	112 (6.5%)	1,398 (81.5%)	39 (2.3%)	166 (9.7%)
EF at T2	320 (27.0%)	22 (1.9%)	831 (70.1%)	12 (1.0%)
EA at T2	5 (1.1%)	169 (35.9%)	25 (5.3%)	272 (57.7%)

Note: Values reflect modal assignment to latent profiles at T2 and T3

Supplemental Table 7: Results from the supplemental analysis using mixed effect models to examine associations between posterior probability of membership in the different latent profiles at T1–T3 and emotional and behavioral problems at T3.

Internalizing				
Posterior probabilities	*Estimates (SE)*	*95% CI*	*β (SE)*	*p*
Low Threat T1	-2.09 (0.33)	-2.75, -1.43	-0.09 (0.01)	**<0.001**
Elevated Neighborhood T1	1.47 (0.42)	0.65, 2.30	0.05 (0.01)	**<0.001**
Elevated Family T1	0.78 (0.44)	-0.08, 1.65	0.02 (0.01)	0.077
Elevated All T1	3.34 (0.73)	1.91, 4.78	0.06 (0.01)	**<0.001**
Low Threat T2	-2.54 (0.33)	-3.19, -1.89	-0.11 (0.01)	**<0.001**
Elevated Neighborhood T2	1.38 (0.42)	0.56, 2.19	0.05 (0.01)	**0.001**
Elevated Family T2	1.47 (0.44)	0.60, 2.33	0.04 (0.01)	**0.001**
Elevated All T2	3.93 (0.72)	2.51, 5.34	0.07 (0.01)	**<0.001**
Low Threat T3	-2.46 (0.33)	-3.11, -1.80	-0.10 (0.01)	**<0.001**
Elevated Neighborhood T3	1.38 (0.43)	0.54, 2.22	0.04 (0.01)	**0.001**
Elevated Family T3	1.43 (0.44)	0.58, 2.29	0.04 (0.01)	**0.001**
Elevated All T3	3.75 (0.74)	2.30, 5.20	0.07 (0.01)	**<0.001**
Anxious/Depression				
Posterior probabilities	*Estimates (SE)*	*95% CI*	*β (SE)*	*p*
Low Threat T1	-0.78 (0.19)	-1.15, -0.42	-0.06 (0.01)	**<0.001**
Elevated Neighborhood T1	0.55 (0.23)	0.09, 1.01	0.03 (0.01)	**0.018**
Elevated Family T1	0.27 (0.25)	-0.21, 0.76	0.01 (0.01)	0.264
Elevated All T1	1.30 (0.41)	0.50, 2.10	0.04 (0.01)	**0.001**
Low Threat T2	-1.04 (0.18)	-1.40, -0.68	-0.08 (0.01)	**<0.001**
Elevated Neighborhood T2	0.29 (0.23)	-0.16, 0.75	0.02 (0.01)	0.206
Elevated Family T2	0.68 (0.24)	0.20, 1.16	0.04 (0.01)	**0.005**
Elevated All T2	2.23 (0.40)	1.45, 3.02	0.07 (0.01)	**<0.001**
Low Threat T3	-1.02 (0.19)	-1.38, -0.65	-0.08 (0.01)	**<0.001**
Elevated Neighborhood T3	0.21 (0.24)	-0.26, 0.67	0.01 (0.01)	0.386
Elevated Family T3	0.81 (0.24)	0.33, 1.28	0.04 (0.01)	**0.001**

Elevated All T3	2.03 (0.41)	1.23, 2.84	0.07 (0.01)	**<0.001**
		Withdrawn/Depression		
Posterior probabilities	*Estimates (SE)*	*95% CI*	*β (SE)*	*p*
Low Threat T1	-1.26 (0.19)	-1.62, -0.89	-0.09 (0.01)	**<0.001**
Elevated Neighborhood T1	0.70 (0.23)	0.24, 1.16	0.04 (0.01)	**0.003**
Elevated Family T1	0.51 (0.25)	0.03, 1.00	0.03 (0.01)	0.51
Elevated All T1	2.46 (0.41)	1.66, 3.26	0.08 (0.01)	**<0.001**
Low Threat T2	-1.41 (0.18)	-1.77, -1.05	-0.11 (0.01)	**<0.001**
Elevated Neighborhood T2	0.44 (0.23)	-0.01, 0.90	0.03 (0.01)	0.056
Elevated Family T2	0.84 (0.25)	0.36, 1.32	0.04 (0.01)	**0.001**
Elevated All T2	3.12 (0.40)	2.33, 3.91	0.10 (0.01)	**<0.001**
Low Threat T3	-1.38 (0.19)	-1.74, -1.01	-0.10 (0.01)	**<0.001**
Elevated Neighborhood T3	0.54 (0.24)	0.07, 1.01	0.03 (0.01)	**0.023**
Elevated Family T3	0.92 (0.24)	0.44, 1.40	0.05 (0.01)	**<0.001**
Elevated All T3	2.49 (0.41)	1.68, 3.30	0.08 (0.01)	**<0.001**
		Externalizing		
Posterior probabilities	*Estimates (SE)*	*95% CI*	*β (SE)*	*p*
Low Threat T1	-3.30 (0.31)	-3.90, -2.70	-0.15 (0.01)	**<0.001**
Elevated Neighborhood T1	1.07 (0.39)	0.31, 1.83	0.04 (0.01)	**0.006**
Elevated Family T1	2.76 (0.41)	1.96, 3.56	0.09 (0.01)	**<0.001**
Elevated All T1	4.93 (0.68)	3.61, 6.26	0.10 (0.01)	**<0.001**
Low Threat T2	-4.02 (0.30)	-4.61, -3.43	-0.18 (0.01)	**<0.001**
Elevated Neighborhood T2	1.03 (0.38)	0.28, 1.79	0.04 (0.01)	**0.007**
Elevated Family T2	3.90 (0.41)	3.10, 4.69	0.12 (0.01)	**<0.001**
Elevated All T2	5.52 (0.67)	4.21, 6.82	0.11 (0.01)	**<0.001**
Low Threat T3	-4.21 (0.31)	-4.81, -3.61	-0.19 (0.01)	**<0.001**
Elevated Neighborhood T3	0.84 (0.40)	0.07, 1.62	0.03 (0.01)	**0.033**
Elevated Family T3	3.84 (0.40)	3.05, 4.63	0.12 (0.01)	**<0.001**

Elevated All T3	7.09 (0.68)	5.75, 8.42	0.14 (0.01)	**<0.001**
		Aggression		
Posterior probabilities	*Estimates (SE)*	*95% CI*	*β (SE)*	*p*
Low Threat T1	-1.40 (0.16)	-1.71, -1.09	-0.12 (0.01)	**<0.001**
Elevated Neighborhood T1	0.45 (0.20)	0.06, 0.83	0.03 (0.01)	**0.024**
Elevated Family T1	1.17 (0.21)	0.77, 1.58	0.07 (0.01)	**<0.001**
Elevated All T1	2.11 (0.34)	1.43, 2.78	0.08 (0.01)	**<0.001**
Low Threat T2	-1.73 (0.15)	-2.03, -1.43	-0.15 (0.01)	**<0.001**
Elevated Neighborhood T2	0.20 (0.19)	-0.19, 0.58	0.01 (0.01)	0.315
Elevated Family T2	1.75 (0.21)	1.35, 2.16	0.11 (0.01)	**<0.001**
Elevated All T2	2.93 (0.34)	2.27, 3.59	0.12 (0.01)	**<0.001**
Low Threat T3	-1.78 (0.16)	-2.08, -1.47	-0.16 (0.01)	**<0.001**
Elevated Neighborhood T3	0.09 (0.20)	-0.31, 0.48	0.01 (0.01)	0.665
Elevated Family T3	1.67 (0.20)	1.27, 2.07	0.11 (0.01)	**<0.001**
Elevated All T3	3.68 (0.35)	3.00, 4.36	0.14 (0.01)	**<0.001**
		Rule-breaking behavior		
Posterior probabilities	*Estimates (SE)*	*95% CI*	*β (SE)*	*p*
Low Threat T1	-1.04 (0.13)	-1.29, -0.78	-0.11 (0.01)	**<0.001**
Elevated Neighborhood T1	0.36 (0.16)	0.04, 0.68	0.03 (0.01)	**0.027**
Elevated Family T1	0.60 (0.17)	0.26, 0.93	0.04 (0.01)	**0.001**
Elevated All T1	2.22 (0.28)	1.66, 2.78	0.10 (0.01)	**<0.001**
Low Threat T2	-1.30 (0.13)	-1.55, -1.05	-0.14 (0.01)	**<0.001**
Elevated Neighborhood T2	0.31 (0.16)	-0.01, 0.63	0.03 (0.01)	0.056
Elevated Family T2	1.02 (0.17)	0.68, 1.36	0.08 (0.01)	**<0.001**
Elevated All T2	2.51 (0.28)	1.96, 3.06	0.12 (0.01)	**<0.001**
Low Threat T3	-1.42 (0.13)	-1.67, -1.16	-0.15 (0.01)	**<0.001**
Elevated Neighborhood T3	0.27 (0.17)	-0.06, 0.60	0.02 (0.01)	0.104
Elevated Family T3	1.11 (0.17)	0.78, 1.45	0.08 (0.01)	**<0.001**

Elevated All T3	2.94 (0.29)	2.38, 3.50	0.13 (0.01)	**<0.001**

Supplemental Table 8a. Results of binomial generalized mixed effect models testing associations between stressful life events and classification in the Elevated Family$_{T1}$-Low Threat$_{T2}$-Low Threat$_{T3}$ trajectory subgroup.

Elevated Family$_{T1}$-Low Threat$_{T2}$-Low Threat$_{T3}$			
Stressful life event	*Estimate (SE)*	*Odds ratio (95% CI)*	*p*
Someone in the family died T1–T2	-0.33 (0.14)	0.72 (0.55, 0.94)	0.014
Someone in the family died T2–T3	-0.25 (0.13)	0.77 (0.60, 1.01)	0.057
Negative change in parent's financial situation T1–T2	-0.72 (0.27)	0.49 (0.29, 0.83)	0.008
Negative change in parent's financial situation T2–T3	-0.36 (0.25)	0.69 (0.43, 1.12)	0.136
Family member had a drug/alcohol problem T1–T2	-0.99 (0.27)	0.37 (0.22, 0.63)	**<0.001**
Family member had a drug/alcohol problem T2–T3	-0.66 (0.26)	0.51 (0.31, 0.85)	0.009
Parent figure lost a job T1–T2	-0.03 (0.27)	0.97 (0.57, 1.65)	0.900
Parent figure lost a job T2–T3	-0.37 (0.27)	0.69 (0.40, 1.18)	0.172
One parent was away from home more often T1–T2	-0.10 (0.15)	0.90 (0.67, 1.21)	0.494
One parent was away from home more often T2–T3	-0.06 (0.17)	0.94 (0.68, 1.30)	0.724
Someone in the family was arrested T1–T2	-0.94 (0.33)	0.39 (0.20, 0.75)	**<0.005**
Someone in the family was arrested T2–T3	-1.32 (0.39)	0.27 (0.12, 0.57)	**0.001**
Family member had a mental/emotional problem T1–T2	-0.98 (0.31)	0.38 (0.21, 0.68)	**0.001**
Family member had a mental/emotional problem T2–T3	-0.45 (0.23)	0.64 (0.40, 1.01)	0.055
Parents separated or divorced T1–T2	0.10 (0.29)	1.10 (0.62, 1.95)	0.736
Parents separated or divorced T2–T3	-0.61 (0.36)	0.54 (0.27, 1.09)	0.085
Parents/caregiver got into trouble with the law T1–T2	-1.69 (0.72)	0.19 (0.05, 0.76)	0.020
Parents/caregiver got into trouble with the law T2–T3	-0.67 (0.53)	0.51 (0.18, 1.43)	0.200
One of the parents/caregivers went to jail T1–T2	-2.50 (1.01)	0.08 (0.01, 0.59)	0.013
One of the parents/caregivers went to jail T2–T3	-1.38 (0.73)	0.25 (0.06, 1.04)	0.057

Supplemental Table 8b. Results of binomial generalized mixed effect models testing associations between stressful life events and classification in the Low Threat$_{T1}$-Low Threat$_{T2}$-Elevated Family$_{T3}$ trajectory subgroup.

	Low Threat$_{T1}$-Low Threat$_{T2}$-Elevated Family$_{T3}$		
Stressful life event	*Estimate (SE)*	*Odds ratio (95% CI)*	*p*
Someone in the family died T1–T2	-0.08 (0.15)	0.93 (0.70, 1.23)	0.598
Someone in the family died T2–T3	-0.00 (0.14)	1.00 (0.75, 1.32)	0.982
Negative change in parent's financial situation T1–T2	-0.20 (0.25)	0.82 (0.50, 1.35)	0.435
Negative change in parent's financial situation T2–T3	0.13 (0.24)	1.14 (0.72, 1.82)	0.573
Family member had a drug/alcohol problem T1–T2	-0.74 (0.28)	0.48 (0.27, 0.83)	0.009
Family member had a drug/alcohol problem T2–T3	-0.18 (0.25)	0.83 (0.51, 1.35)	0.456
Parent figure lost a job T1–T2	-0.08 (0.32)	0.93 (0.50, 1.72)	0.808
Parent figure lost a job T2–T3	0.26 (0.25)	1.30 (0.79, 2.14)	0.301
One parent was away from home more often T1–T2	-0.21 (0.17)	0.81 (0.58, 1.15)	0.237
One parent was away from home more often T2–T3	0.06 (0.18)	1.06 (0.75, 1.51)	0.729
Someone in the family was arrested T1–T2	-0.34 (0.31)	0.71 (0.39, 1.31)	0.272
Someone in the family was arrested T2–T3	0.07 (0.27)	1.08 (0.63, 1.83)	0.786
Family member had a mental/emotional problem T1–T2	-0.15 (0.25)	0.86 (0.53, 1.41)	0.552
Family member had a mental/emotional problem T2–T3	0.12 (0.22)	1.13 (0.73, 1.74)	0.575
Parents separated or divorced T1–T2	0.02 (0.33)	1.02 (0.53, 1.95)	0.959
Parents separated or divorced T2–T3	0.29 (0.30)	1.34 (0.74, 2.41)	0.336
Parents/caregiver got into trouble with the law T1–T2	-0.53 (0.52)	0.59 (0.21, 1.64)	0.308
Parents/caregiver got into trouble with the law T2–T3	-0.13 (0.48)	0.87 (0.34, 2.25)	0.781
One of the parents/caregivers went to jail T1–T2	0.14 (0.39)	1.15 (0.54, 2.45)	0.725
One of the parents/caregivers went to jail T2–T3	0.36 (0.42)	1.43 (0.63, 3.27)	0.391

Supplemental Table 8c. Results of binomial generalized mixed effect models testing associations between stressful life events and classification in the Low Threat$_{T1}$-Elevated Family$_{T2}$-Elevated Family$_{T3}$ trajectory subgroup.

Low Threat$_{T1}$-Elevated Family$_{T2}$-Elevated Family$_{T3}$			
Stressful life event	*Estimate (SE)*	*Odds ratio (95% CI)*	*p*
Someone in the family died T1–T2	0.14 (0.15)	1.15 (0.85, 1.54)	0.358
Someone in the family died T2–T3	-0.10 (0.16)	0.90 (0.66, 1.23)	0.508
Negative change in parent's financial situation T1–T2	0.33 (0.23)	1.38 (0.88, 2.18)	0.160
Negative change in parent's financial situation T2–T3	0.39 (0.23)	1.48 (0.94, 2.33)	0.094
Family member had a drug/alcohol problem T1–T2	0.35 (0.21)	1.42 (0.93, 2.16)	0.101
Family member had a drug/alcohol problem T2–T3	0.37 (0.22)	1.44 (0.93, 2.24)	0.104
Parent figure lost a job T1–T2	-0.08 (0.34)	0.92 (0.47, 1.80)	0.811
Parent figure lost a job T2–T3	0.26 (0.27)	1.30 (0.76, 2.20)	0.338
One parent was away from home more often T1–T2	0.57 (0.16)	1.77 (1.29, 2.42)	**<0.001**
One parent was away from home more often T2–T3	-0.03 (0.20)	0.98 (0.66, 1.43)	0.899
Someone in the family was arrested T1–T2	-0.04 (0.31)	0.96 (0.53, 1.74)	0.895
Someone in the family was arrested T2–T3	-0.25 (0.32)	0.78 (0.41, 1.47)	0.447
Family member had a mental/emotional problem T1–T2	0.57 (0.22)	1.78 (1.15, 2.74)	0.009
Family member had a mental/emotional problem T2–T3	0.30 (0.22)	1.34 (0.87, 2.08)	0.187
Parents separated or divorced T1–T2	-0.61 (0.47)	0.54 (0.22, 1.36)	0.192
Parents separated or divorced T2–T3	-0.32 (0.40)	0.72 (0.33, 1.58)	0.416
Parents/caregiver got into trouble with the law T1–T2	0.58 (0.37)	1.79 (0.86, 3.72)	0.120
Parents/caregiver got into trouble with the law T2–T3	-0.17 (0.53)	0.85 (0.30, 2.38)	0.752
One of the parents/caregivers went to jail T1–T2	-0.22 (0.47)	0.80 (0.32, 2.02)	0.636
One of the parents/caregivers went to jail T2–T3	-0.42 (0.60)	0.66 (0.20, 2.13)	0.483

Supplemental Table 8d. Results of binomial generalized mixed effect models testing associations between stressful life events and classification in the Elevated Family$_{T1}$-Elevated Family$_{T2}$-Low Threat$_{T3}$ trajectory subgroup.

Elevated Family$_{T1}$-Elevated Family$_{T2}$-Low Threat$_{T3}$			
Stressful life event	*Estimate (SE)*	*Odds ratio (95% CI)*	*p*
Someone in the family died T1–T2	-0.07 (0.16)	0.93 (0.68, 1.27)	0.646
Someone in the family died T2–T3	0.03 (0.16)	1.03 (0.76,1.39)	0.869
Negative change in parent's financial situation T1–T2	0.27 (0.24)	1.32 (0.83, 2.09)	0.245
Negative change in parent's financial situation T2–T3	-0.40 (0.31)	0.67 (0.36, 1.22)	0.190
Family member had a drug/alcohol problem T1–T2	0.07 (0.23)	1.07 (0.68, 1.69)	0.766
Family member had a drug/alcohol problem T2–T3	-0.13 (0.61)	0.87 (0.52, 1.47)	0.613
Parent figure lost a job T1–T2	-0.23 (0.36)	0.79 (0.40, 1.60)	0.519
Parent figure lost a job T2–T3	-0.28 (0.32)	0.76 (0.40, 1.43)	0.389
One parent was away from home more often T1–T2	0.11 (0.18)	1.12 (0.79, 1.58)	0.523
One parent was away from home more often T2–T3	0.06 (0.19)	1.06 (0.73, 1.55)	0.763
Someone in the family was arrested T1–T2	-0.50 (0.35)	0.61 (0.31,1.22)	0.160
Someone in the family was arrested T2–T3	-0.06 (0.30)	0.94 (0.52,1.70)	0.835
Family member had a mental/emotional problem T1–T2	0.71 (0.22)	2.03 (1.32, 3.13)	**0.001**
Family member had a mental/emotional problem T2–T3	-0.14 (0.26)	0.87 (0.52, 1.44)	0.590
Parents separated or divorced T1–T2	-0.39 (0.43)	0.68 (0.29, 1.57)	0.363
Parents separated or divorced T2–T3	-0.18 (0.38)	0.84 (0.40, 1.75)	0.633
Parents/caregiver got into trouble with the law T1–T2	-0.13 (0.48)	0.87 (0.34, 2.22)	0.777
Parents/caregiver got into trouble with the law T2–T3	-0.43 (0.60)	0.65 (0.20, 2.11)	0.475
One of the parents/caregivers went to jail T1–T2	-0.07 (0.44)	0.94 (0.40, 2.21)	0.882
One of the parents/caregivers went to jail T2–T3	0.15 (0.48)	1.17 (0.45, 3.00)	0.748

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