



Using latent transition analysis to evaluate the impact of perceived threats on emotional and behavioral development

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Abstract

This study used latent transition analysis to examine the stability and change in perceived threats in youth's primary social contexts—neighborhoods, schools, and families—and associations with emotional and behavioral problems when youth transitioned from childhood to adolescence. The sample included 8208 racially and ethnically diverse youth enrolled in the Adolescent Brain Cognitive Development Study (47.4% female, $M_{\text{age_Baseline}} = 9.83$, $M_{\text{age_Timepoint3}} = 11.99$). Results revealed that while perceived threats in youth's neighborhoods were considerably stable, perceived threats in youth's families fluctuated in relation to stressful life events. Further, subgroups of youth characterized by elevated perceived threat experiences in different contexts showed differential associations with emotional and behavioral problems. Overall, findings highlight the importance of considering the stability of perceived threats to direct appropriate interventions.

Youth who perceive threats in their primary social contexts—their neighborhoods, schools, and families—are at increased risk for developing emotional and behavioral problems (Aldridge et al., 2016; Goldman-Mellor et al., 2016; Rabinowitz et al., 2016). Relatively little empirical research on perceived threats, though, has examined youth's primary contexts simultaneously despite the general understanding that youth spend time in multiple social contexts day-to-day (Hofferth & Sandberg, 2001). A recent study examining multiple social contexts simultaneously demonstrated that variability in perceived threats across youth's primary social contexts was associated with differences in emotional and behavioral problems (Conley et al., 2022). Specifically, using a latent profile analysis (LPA; Spurk et al., 2020), the researchers identified four distinct profiles based on youth's experiences of perceived threats during preadolescence (ages 9–10): low threat in all contexts, elevated neighborhood

threat, elevated family threat, and elevated threat in all contexts. The profiles of youth who perceived threats in their families only (i.e., elevated family threat) or across all three primary social contexts (i.e., elevated threat in all contexts) had increased emotional and behavioral problems in early adolescence (ages 11–12) compared to youth who perceived threats in their neighborhoods only and to youth who did not perceive threats at all. These findings demonstrate that variability in where and the extent to which youth perceive threats in their environments may be an important influence on emotional and behavioral development.

However, very little is known about the stability of perceived threats in youth's different primary social contexts. On the one hand, there is some reason to believe perceived threats can be stable over time. For example, there is longitudinal evidence that youth's prior experiences of perceived threats can predict their future

Abbreviations: ABCD Study®, Adolescent Brain Cognitive DevelopmentSM Study; AIC, Akaike information criterion; BIC, Bayesian information criterion; CBCL, Child Behavior Checklist; FES-FC, Family Environment Scale Family Conflict; LES, Life Events Scale; LPA, latent profile analysis; LTA, latent transition analysis; MI, measurement invariance; NSC, Neighborhood Safety/Crime; OR, odds ratio; SRPF-SE, School Risk and Protective Factors Survey School Environment.



experiences of perceived threats in their neighborhoods (Lambert et al., 2010) and in their families (Margolin et al., 2009). Similarly, research on the stability of school threats such as bullying has found that some youth experience chronically high levels of victimization at school throughout the duration of their K-12 education (Ladd et al., 2017). On the other hand, some previous research shows that perceived threats in youth's social contexts can change over time. For instance, one study in a sample of youth between the ages of 9–15 found that a 1-year increase in age was associated with a 21% increase in the likelihood of perceiving neighborhood threats (Zimmerman & Messner, 2013). At the same time, perceiving threats at school may increase, decrease, or desist when youth transfer from primary school to secondary school (Schäfer et al., 2005) as is customary during the transition from childhood to adolescence. Finally, there is evidence that perceived threats in the family context can fluctuate depending on various stressful life events such as financial instability or changes in parent or caregiver employment (Habib et al., 2014) and family member's mental health problems (Rothenberg et al., 2017). In summary, these studies suggest that there may be variability in the stability in which youth perceive threats across different contexts in their social environments.

Increased knowledge about the stability of perceived threats across youth's different primary social contexts may be relevant for understanding the consequences of perceived threats on emotional and behavioral development, especially during the transition from childhood to adolescence. Foundational theories from developmental science and developmental psychopathology stress that the impact of environmental experiences, such as perceived threats in youth's social contexts, can be contingent upon when they occur (Bronfenbrenner & Morris, 2007; Cicchetti, 1993; Sameroff, 2009). For one, youth's social environments undergo considerable changes during this period of social, psychological, and biological development (Sawyer et al., 2018). Specifically, the transition from childhood to adolescence coincides with an increase in the amount of time youth spend at school and in their neighborhoods away from their families (Eccles & Roeser, 2009). Therefore, perceived threats in these different social contexts may be more or less salient influences on youth during the transition from childhood to adolescence. Second, the transition from childhood to adolescence is considered a peak period for the onset of mental health problems, potentially due to the profound hormonal and neurobiological changes that occur during this period of development (Sisk & Gee, 2022). These dynamic hormonal and neurobiological changes are thought to contribute to an increase in youth's sensitivity to their broader social environments as they enter adolescence (Blakemore & Mills, 2014). Thus, increased knowledge about associations between youth's experiences of perceived threats in different social contexts at various ages and emotional and

behavioral problems may be important for identifying factors that may increase or buffer against the development of mental health problems in adolescence. Lastly, experiences of perceived threats that are stable across youth's multiple social contexts may pose risks that differ from those that are inconsistent or concentrated to a single context. Indeed, cumulative risk models propose that risk for emotional and behavioral problems increases with persistent exposure to threats (Evans et al., 2013). Accordingly, youth who continuously perceive threats throughout multiple social contexts may be at increased risk for emotional and behavioral problems relative to youth whose experiences of perceived threats are inconsistent. Altogether, research on the stability of perceived threats across youth's different social contexts and relationships between perceived threats and emotional and behavioral problems may be useful for directing appropriate interventions to support positive youth development.

Current study

In this paper, we examined patterns of stability and change in perceived threats in youth's neighborhoods, schools, and families and associations with emotional and behavioral problems during the transition from childhood to adolescence. We used longitudinal data from the sociodemographically diverse Adolescent Brain Cognitive DevelopmentSM Study (ABCD Study®) sample (Garavan et al., 2018). First, we applied latent transition analysis (LTA), a longitudinal extension of LPA (Nylund-Gibson et al., 2022). LTA identifies subgroups of youth, called “latent profiles” when indicator variables are continuous, who are similar across multiple variables across multiple time points while also estimating the likelihood of transitioning between latent profiles over time. Specifically, we applied LTA to (1) explore and identify latent profiles of youth based on perceived threats in their neighborhoods, schools, and families across ages 9–10 (T1), 10–11 (T2), and 11–12 (T3) and (2) estimate the likelihood of youth transitioning from one latent profile to another during this period of development. Second, we used mixed-effect models and post hoc pairwise comparisons to investigate associations between latent profiles characterized by youth's unique experiences of perceived threats at each time point and emotional and behavioral problems at T3. Third, given previous research showing that life events can contribute to changes in experiences of perceived threats (Habib et al., 2014; Rothenberg et al., 2017), we conducted an exploratory analysis to examine whether specific life events predicted the transitions between the latent profiles.

Based on Conley et al. (2022), we hypothesized that there would be latent profiles characterized by distinct patterns of perceived threats in youth's neighborhoods,

schools, and families. Given low rates of residential mobility in the United States compared to other industrialized nations (Sharkey, 2012), and the robust association between experiences of neighborhood threats and neighborhood disadvantage (Friedson & Sharkey, 2015), we expected that membership in latent profiles characterized by elevated perceived threats in youth's neighborhoods would be considerably stable across time points. Conversely, we expected that membership in latent profiles characterized by experiences of perceived threat in youth's families would have relatively lower stability across time points given research showing that perceived family threats can fluctuate with changes in family financial stability and/or mental health (Habib et al., 2014; Rothenberg et al., 2017). Further, we hypothesized that latent profiles characterized by elevated perceived threats across any of the three time points would be associated with higher emotional and behavioral problems at T3 compared to latent profiles characterized by low perceived threats. Lastly, we explored whether stressful life events played a role in youth's transitions between different latent profiles over time. However, we did not have specific hypotheses about associations between particular types of stressful life events and transitions between specific latent profiles given the dearth of research on the stability of youth's experiences of perceived threats across multiple social contexts.

METHOD

Participants

Participants were youth included in ABCD Study Data Release 4.0 (<https://doi.org/10.15154/1523041>). The ABCD Study is a 10-year longitudinal study following over 11,000 youth from 21 research sites across the United States (Compton et al., 2019). Youth were predominantly recruited using a school-based stratified probability sampling method to generate a diverse sample with respect to sex assigned at birth, race and ethnicity, and socioeconomic status (Compton et al., 2019). ABCD Study exclusion criteria included a diagnosis of schizophrenia, moderate to severe autism spectrum disorder, intellectual disability, substance use disorder at recruitment, persistent major neurological disorders, multiple sclerosis, sickle cell disease, seizure disorders like Lennox–Gastaut Syndrome, Dravet Syndrome, and Landau Kleffner Syndrome. Because the ABCD Study sample included siblings and twin pairs, the current study focused on only one randomly selected child per family to avoid confounds introduced by family structure (Saragosa-Harris et al., 2022). The final sample included youth with complete perceived neighborhood, school, and family threat data from the baseline (T1, collected from 2016 to 2018; ages 9–10), 1-year follow-up (T2, collected from 2017 to 2019; ages

10–11), and 2-year follow-up (T3, collected from 2018 to 2020; ages 11–12) visits ($n=8208$; 52.6% Male; 47.4% Female; 0.3% American Indian/Alaska Native; 2.3% Asian; 13.3% Black; 20.7% Hispanic; 9.1% Mixed; 0.1% Native Hawaiian/Pacific Islander; 0.6% Other; 53.6% White).

Procedure

All study procedures were approved by the centralized University of California, San Diego and individual research site institutional review boards (Clark et al., 2017). All parents or caregivers provided written consent, and youth provided verbal assent before participating in the study. ABCD Study data collection procedures have been detailed elsewhere (Feldstein Ewing & Luciana, 2018). All measures in the current study were the same (i.e., in terms of content and reporter) across all time points.

Measures

Perceived neighborhood threat

Perceived neighborhood threat was measured using the ABCD Neighborhood Safety/Crime (NSC) survey, which assessed perceived safety and crime within participants' neighborhoods. Neighborhoods were defined as “the area within about a 20-minute walk (or about a mile) from [participants'] home[s].” Perceived neighborhood threat was measured as the within time point (i.e., T1–T3, respectively) mean of all youth- and parent- or caregiver-report items because the youth survey included only one item asking youth if they agreed or disagreed with the statement: *My neighborhood is safe from crime*. The parent or caregiver survey included the exact same item and two additional items asking participants if they agreed or disagreed with the statements: (1) *I feel safe walking around my neighborhood day or night* and (2) *Violence is not a problem in my neighborhood*. At each time point, mean perceived neighborhood threat (i.e., combining the youth- and parent-report items) was reverse-scored such that higher scores signified *greater* perceived neighborhood threat (range 1–5). Within the ABCD Study sample, internal consistency for the parent- or caregiver-report NSC was considered good ($\alpha=.88$; Gonzalez et al., 2021). Descriptions of the NSC items are provided in Table S1.

Perceived school threat

Perceived school threat was measured using the youth-report School Risk and Protective Factors Survey School Environment (SRPF-SE) subscale. The SRPF-SE



included six items, which assessed youth's perceptions of the school climate related to safety and support (e.g., *I feel safe at my school; I get along with my teachers*). For each item, youth endorsed whether a statement was definitely true or definitely not true. At each time point, all items were summed and reverse-scored with higher scores indicating *greater* perceived school threat (range = 1–19). Within the ABCD Study sample, internal consistency for the youth-report SRPF-SE was considered modest ($\alpha = .61$; Gonzalez et al., 2021). Descriptions of the SRPF-SE items are provided in Table S1.

Perceived family threat

Perceived family threat was measured using the youth-report Family Environment Scale Family Conflict (FES-FC) subscale, which assessed youth's experiences of conflict and anger in their families. Across the nine items on the FES-FC (e.g., *family members sometimes hit each other; family members sometimes get so angry they throw things*), youth indicated whether the statement was true or false for most of their current family members. At each time point, all items were summed and scored with higher scores indicating *greater* perceived family threat (range 0–9). Within the ABCD Study sample, internal consistency for the youth-report FES-FC was considered modest ($\alpha = .68$; Gonzalez et al., 2021). Descriptions of the FES-FC items are provided in Table S1.

Emotional and behavioral problems

Youth emotional and behavioral problems were measured at T3 using the Achenbach System of Empirically Based Assessment Child Behavior Checklist (CBCL), a 119 item parent- or caregiver-report assessment validated for use in youth ages 6–18 (Achenbach & Rescorla, 2001). The internalizing and externalizing broad-band scales and anxious/depression, withdrawn/depression, aggression, and rule-breaking behavior syndrome scales were examined using *t*-scores. Internal consistency for the CBCL broad-band and syndrome scales is considered good ($\alpha = .80$ –.94).

Stressful life events

We conducted an exploratory analysis to evaluate whether specific stressful life events influenced transitions between latent profiles of perceived threat using youth-report data from the Life Events Scale (LES), a 25-item survey that evaluated youth's experiences across a variety of events (Hoffman et al., 2019). For each event youth endorsed experiencing, youth were asked to specify whether the event occurred in the past year. Here we used LES data from T2 and T3, reflecting stressful

life events youth experienced between T1–T2 and T2–T3, respectively.

Statistical analysis

All analyses were performed using R version 4.2.3 and were Bonferroni corrected for multiple comparisons. LTA was used to identify latent profiles characterized by similar levels of perceived threats across youth's neighborhoods, schools, and families. The key benefit of using LTA over other person-centered methods (e.g., LPA) is that it allowed us to examine latent profiles of youth with similar perceived threat experiences at T1, T2, and T3, and transitions between latent profiles across time points concurrently.

As a preliminary step for the LTA, a series of LPA was conducted to examine the optimal number of perceived threat profiles at each time point (Bray et al., 2016; Collins & Lanza, 2010) using the tidyLPA package (Rosenberg et al., 2019). At each time point, the optimal solution was identified by comparing fit indices and classification diagnostics across six models with $k = 1$ –6 latent profiles. Comparative fit was assessed using the Akaike information criterion (AIC; better fit indicated with smaller values), Bayesian information criterion (BIC; better fit indicated with smaller values), Sample-Size Adjusted BIC (better fit indicated with smaller values), entropy (a measure of classification uncertainty ranging from 0 to 1 with more certainty and higher class discriminations with values approaching 1 and values ≥ 0.80 considered acceptable), and bootstrapped likelihood ratio test where a model k was preferred relative to a model $k - 1$ when indicated with a significant *p*-value (Weller et al., 2020). Because the magnitude of associations between the perceived threat variables was small (Spearman's $r = .04$ –.23; Figure S1), and an overall focus on preserving model usefulness and conceptual clarity, the covariance–variance matrices for the preliminary series of LPA and LTA models were specified to have equal variances and no residual covariances between indicators (Masyn, 2013). However, different forms of the within-profile variance–covariance matrices (i.e., allowing variances or residual covariances or both to be freely estimated) for the LPA models were investigated for comparison (Johnson, 2021; see Supporting Information). Ultimately, results from the preliminary LPA were used to provide guidance for final model selection with LTA (Bray et al., 2016; Collins & Lanza, 2010).

Next, consistent with recommendations that selection of the final LTA model should be based on assessment of fit using data from all time points (Collins & Lanza, 2010), the optimal number of latent profiles, k , was evaluated across T1–T3 concurrently using the LMest package, which performs parameter estimation using the expectation–maximization algorithm (Bartolucci et al., 2017). The LMest package assumes longitudinal measurement

invariance (MI) for item-response probabilities (i.e., item-response probabilities for the different latent profiles are held equal across all time points), which ensures the meaning of the latent profiles remained constant over time (Collins & Lanza, 2010; Lanza & Bray, 2010). The optimal LTA model was determined based on a combination of fit indices, parsimony, and interpretability (Hickendorff et al., 2018). Comparative fit of the LTA models was evaluated using the AIC and BIC, with better fit indicated by smaller values and a diminishing decrement in values for each added latent profile. Before extracting the parameter estimates for the optimal LTA model, supplemental analyses were conducted to assess whether the assumption of longitudinal MI was plausible by comparing a model with item-response probabilities freely estimated at each time point to a model where the item-response probabilities were constrained to be equal across time points (see [Supporting Information](#)). Sensitivity analyses also were conducted to evaluate the stability of results when taking the multilevel data structure into account during the LPA and LTA model enumeration process (see [Supporting Information](#)).

After selecting the final LTA model, estimated transition probabilities, which reflect the probability of being in latent profile i at time point t conditional on being in latent profile j at time point $t - 1$ (Collins & Lanza, 2010; Nylund-Gibson et al., 2022), were preserved to evaluate the stability of each latent profile. In addition, at each time point (T1–T3), participants were assigned to the latent profile for which their posterior probability distribution was highest (i.e., modal assignment). To ensure that estimates would not be biased by high rates of classification error (Nylund-Gibson et al., 2019) across the different latent profiles, classification diagnostics were generated to evaluate latent profile-specific classification uncertainty and accuracy, and posterior probabilities were preserved for supplemental sensitivity analyses (see [Supporting Information](#)).

Following the LTA, associations between latent profiles (T1–T3) and emotional and behavioral problems at T3 were evaluated with mixed-effect models using the lme4 package. For all models, household income was standardized and included as a fixed-effect covariate, and research site was included as a random intercept to account for the ABCD Study multisite sampling design (Saragosa-Harris et al., 2022). We then examined differences in the magnitude of pairs of associations between latent profiles and emotional and behavioral problems by performing posthoc pairwise comparisons with the emmeans package.

Finally, we performed an exploratory analysis to examine whether stressful life events were related to transitions between the different latent profiles across time points. For this analysis, we focused on the subset of youth who changed latent profile membership at least once (i.e., youth who were in the same latent profile across all time points were excluded from the exploratory

TABLE 1 Model fit of the latent transition analysis.

Latent profiles	Log-likelihood	AIC	BIC
1	−139,972.4	279,962.9	280,026.0
2	−135,538.0	271,109.9	271,229.1
3	−133,366.4	266,790.7	266,994.1
4	<i>−131,831.1</i>	<i>263,752.1</i>	<i>264,067.7</i>
5	−130,478.4	261,086.8	261,542.6
6	−129,909.2	259,996.4	260,620.5

Note: The selected model solution is italicized.

Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion.

analysis). We then classified youth into subgroups based on their transitions across latent profiles across time points and examined the frequency of specific transition trajectories. To avoid the potential for overinterpreting spurious subgroups of youth (Spurk et al., 2020), we constrained the exploratory analysis to focus on subgroups of youth with sample sizes greater than 2.5% of the overall sample ($n > 205$). We then examined whether distinct stressful life events were associated with the likelihood of being in the different subgroups using binomial generalized mixed-effect models with research site included as a random intercept. For brevity, we report significant results from the exploratory analysis as odds ratios (ORs) with 95% confidence intervals. However, full results from the exploratory analysis are provided in [Supporting Information](#).

RESULTS

Latent profiles were characterized by perceived threats in youth's social contexts

Individual LPAs for T1–T3 indicated that four profiles optimally explained the heterogeneity in perceived threats in youth's social environments ([Tables S2](#) and [S3a–c](#)). Using these preliminary results as a guide, statistical fit was examined for LTA models with 1–6 latent profiles to confirm selection of the four-profile model ([Table 1](#)). Across LTA models, AIC and BIC indicated that models with 2–6 profiles showed improved fit relative to those with one fewer profile. Of these, BIC values displayed diminishing decrements in value beyond the four-profile solution ([Figure S2](#)). Thus, the four-profile solution was selected as the best fitting model. MI of the four-profile solution was deemed plausible, and item-response probabilities were restricted to be equal across T1–T3 to keep interpretation of the latent profiles the same across time (see [Table S4](#) for comparison of MI and non-MI LTA models). Classification diagnostics for the four-profile solution indicated that there were high rates of latent profile separation and assignment accuracy and minimal latent profile assignment error ([Table S5](#)).

The largest latent profile, Low Threat, was characterized by low perceived neighborhood threat, low perceived school threat, and low perceived family threat across T1–T3 ($n_{T1}=4753$, 57.9% sample; $n_{T2}=4837$, 58.9% sample; $n_{T3}=4877$, 59.4% sample; Figure 1a). The next largest latent profile, Elevated Neighborhood, was characterized by elevated neighborhood threat, low family threat, and low school threat across T1–T3 ($n_{T1}=1686$, 20.5% sample; $n_{T2}=1715$, 20.9% sample; $n_{T3}=1645$, 20.0% sample). The third largest latent profile, Elevated Family, was characterized by elevated family threat, low neighborhood threat, and low school threat across T1–T3 ($n_{T1}=1299$, 15.8% sample; $n_{T2}=1185$, 14.4% sample; $n_{T3}=1223$, 14.9% sample). The smallest latent profile, Elevated All, was characterized by elevated neighborhood threat, elevated school threat, and elevated family threat across T1–T3 ($n_{T1}=470$, 5.7% sample; $n_{T2}=471$, 5.7% sample; $n_{T3}=463$, 5.6% sample).

The most stable latent profiles across T1–T3 were the Low Threat and Elevated Neighborhood latent profiles, with 90.4% and 81.4% of these youth, respectively, estimated to remain in the same latent profile across time (Figure 1b). Conversely, the least stable latent profiles across T1–T3 were the Elevated Family and Elevated All latent profiles, with 65.2% and 58.5% of these youth, respectively, estimated to remain in the same latent profile across time. As depicted in Figure 1b, for youth who transitioned out of the Low Threat latent profile, it was estimated that 7.4% transitioned to the Elevated

Family latent profile, 1.9% transitioned to the Elevated Neighborhood latent profile, and <0.1% transitioned to the Elevated All latent profile. For youth who transitioned out of the Elevated Neighborhood latent profile, it was estimated that 9.9% transitioned to the Elevated All latent profile, 6.8% transitioned to the Low Threat latent profile, and 1.9% transitioned to the Elevated Family latent profile. For youth who transitioned out of the Elevated Family latent profile, it was estimated that 29.7% transitioned to the Low Threat latent profile, 2.9% transitioned to the Elevated Neighborhood latent profile, and 2.1% transitioned to the Elevated All latent profile. Lastly, for youth who transitioned out of the Elevated All latent profile, it was estimated that 34.5% transitioned to the Elevated Neighborhood latent profile, 5.2% transitioned to the Elevated Family latent profile, and 1.8% transitioned to the Low Threat latent profile. The frequency of transitions between the latent profiles to which youth were modally assigned at T1–T3 is presented in Table S6a–b for comparison.

Youth in latent profiles with elevated perceived threats had higher emotional and behavioral problems

Consistent with our hypotheses, youth in latent profiles characterized by low perceived threats had fewer emotional and behavioral problems compared to youth

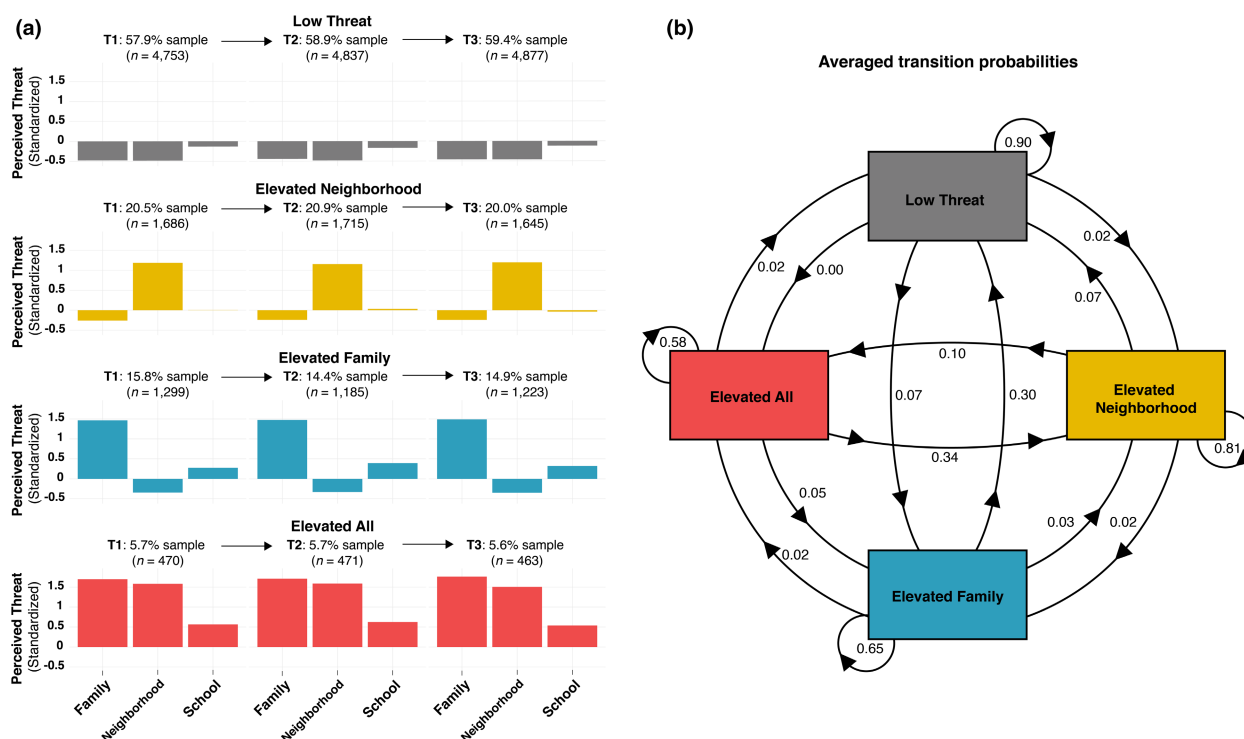


FIGURE 1 Results from the Latent Transition Analysis showing (a) box plots for standardized perceived threats in the family, neighborhood, and school contexts for each latent profile across time points (b) the averaged transition probabilities for staying in or transitioning between the latent profiles.

in latent profiles with elevated threats. Specifically, membership in the Low Threat latent profiles from T1–T3 was associated with significantly lower broadband internalizing, withdrawn/depression, broad-band externalizing, aggression, and rule-breaking behavior symptoms at T3 relative to the elevated threat latent profiles (Table 2). Membership in the Low Threat latent profiles at T2 and T3 was associated with significantly lower anxious/depression symptoms at T3 relative to the elevated threat latent profiles. There were no significant differences in associations between membership in the Low Threat and Elevated Family latent profiles at T1 and anxious/depression symptoms at T3.

In contrast, youth in latent profiles characterized by elevated perceived threats across all three primary contexts had the highest emotional and behavioral problems compared to other youth. In particular, membership in the Elevated All latent profiles from T1–T3 was related to significantly greater broad-band internalizing, withdrawn/depression, broad-band externalizing, aggression, and rule-breaking behavior symptoms at T3 than the Elevated Neighborhood or Elevated Family latent profiles. Further, membership in the Elevated All latent profiles at T2 and T3 was related to significantly greater anxious/depression symptoms at T3 than the Elevated Family and Elevated Neighborhood latent profiles. There were not significant differences in associations between membership in the Elevated All latent profile and the Elevated Family or Elevated Neighborhood latent profiles at T1 and anxious/depression symptoms at T3.

Youth who perceived threats in their families primarily had higher externalizing problems compared to youth who perceived threats in their neighborhoods only. Specifically, membership in the Elevated Family latent profiles from T1–T3 was associated with significantly higher broad-band externalizing symptoms at T3 relative to the Elevated Neighborhood latent profiles. Further, membership in the Elevated Family latent profiles at T2 and T3 was associated with significantly higher aggression and rule-breaking behavior symptoms at T3 than the Elevated Neighborhood latent profiles. There were not significant differences in associations between membership in the Elevated Neighborhood or Elevated Family latent profiles from T1–T3 and any of the internalizing domains at T3.

Lastly, youth who perceived threats in their neighborhoods only had higher emotional and behavioral problems compared to youth with low perceived threats. Membership in the Elevated Neighborhood latent profiles from T1–T3 was associated with significantly higher broadband internalizing, withdrawn/depression, anxious/depression, broadband externalizing, aggression, and rule-breaking behavior symptoms at T3 compared to the Low Threat latent profiles.

The overall pattern of associations between the different latent profiles and emotional and behavioral

problems was replicated when using posterior probabilities (instead of latent profile classification) as independent variables in the mixed effect models (Table S7).

Stressful life events related to transitions in and out of latent profiles characterized by perceived family threats

We conducted an exploratory analysis to evaluate whether distinct stressful life events were related to transitions between latent profiles. First, we examined patterns of transition trajectories among youth who transitioned between latent profiles across T1–T3 ($n=2262$). As described in Table 3, among youth who transitioned between latent profiles across T1–T3, four subgroups of youth contained $>2.5\%$ of the full sample. The largest subgroup ($n=358$) was characterized by youth who transitioned out of the Elevated Family latent profile at T1 to the Low Threat latent profiles at T2 and T3 (Elevated Family_{T1}-Low Threat_{T2}-Low Threat_{T3}). The second largest subgroup ($n=277$) was characterized by youth who transitioned from the Low Threat latent profiles at T1 and T2 to the Elevated Family latent profile at T3 (Low Threat_{T1}-Low Threat_{T2}-Elevated Family_{T3}). The third largest subgroup ($n=232$) was characterized by youth who transitioned from the Low Threat latent profile at T1 to the Elevated Family latent profiles at T2 and T3 (Low Threat_{T1}-Elevated Family_{T2}-Elevated Family_{T3}). The fourth largest subgroup ($n=228$) was characterized by youth who transitioned from Elevated Family latent profiles at T1 and T2 to the Low Threat latent profile at T3 (Elevated Family_{T1}-Elevated Family_{T2}-Low Threat_{T3}). No subgroups of youth characterized by transitions between the Elevated All or Elevated Neighborhood latent profiles contained $>2.5\%$ of the full sample.

Next, we explored whether specific stressful life events were associated with the likelihood of youth being in the four subgroups of youth who transitioned between the latent profiles described above. Because the largest subgroups of youth who transitioned between latent profiles across T1–T3 were characterized by transitions between the Low Threat and Elevated Family latent profiles, we focused on 10 stressful life events related to the family (*someone in the family died; negative change in parent's financial situation; family member had a drug/alcohol problem; parent figure lost a job; one parent was away from home more often; someone in the family was arrested; family member had a mental/emotional problem; parents separated or divorced; parents/caregiver got into trouble with the law; one of the parents/caregivers went to jail*).

Across these life events, youth who had a family member with a drug/alcohol problem between T1 and T2 had a 63% lower likelihood of being in the Elevated Family_{T1}-Low Threat_{T2}-Low Threat_{T3} subgroup (OR [95% CI]=0.37 [0.22, 0.63], $p<.001$). Youth who had one



TABLE 2 Mixed effect models and post-hoc comparisons for associations between latent profiles at T1–T3 and emotional and behavioral problems at T3.

Latent profile	Estimate (SE)	95% CI	β (SE)	<i>p</i>	Post-hoc comparisons
Internalizing					
Low threat T1	47.38 (.35)	46.69, 48.07	−.08 (.03)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T1	1.66 (.38)	0.92, 2.39	.16 (.04)	<.001	
Elevated family T1	1.30 (.38)	0.55, 2.05	.12 (.04)	.001	
Elevated all T1	3.12 (.66)	1.84, 4.41	.30 (.06)	<.001	
Low threat T2	42.27 (.35)	46.58, 47.95	−.09 (.03)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T2	1.68 (.37)	0.95, 2.42	.16 (.04)	<.001	
Elevated family T2	1.95 (.40)	1.17, 2.73	.19 (.04)	<.001	
Elevated all T2	3.87 (.66)	2.59, 5.16	.37 (.06)	<.001	
Low threat T3	47.31 (.35)	46.63, 47.99	−.08 (.03)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T3	1.79 (.38)	1.05, 2.53	.17 (.04)	<.001	
Elevated family T3	1.68 (.39)	0.92, 2.44	.16 (.04)	<.001	
Elevated all T3	3.32 (.65)	2.05, 4.60	.32 (.06)	<.001	
Anxious/depression					
Low threat T1	52.96 (.17)	52.62, 53.30	−.06 (.03)	<.001	LT versus EN; LT versus EA
Elevated neighborhood T1	0.71 (.21)	0.30, 1.12	.12 (.04)	.001	
Elevated family T1	0.52 (.21)	0.10, 0.94	.21 (.09)	.016	
Elevated all T1	1.19 (.36)	0.48, 1.91	.36 (.21)	.001	
Low threat T2	52.91 (.17)	52.57, 53.24	−.07 (.03)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T2	0.56 (.21)	0.15, 0.97	.10 (.04)	.007	
Elevated family T2	0.82 (.22)	0.39, 1.26	.14 (.04)	<.001	
Elevated all T2	2.09 (.37)	1.38, 2.81	.36 (.06)	<.001	
Low threat T3	52.92 (.17)	52.58, 53.25	−.07 (.03)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T3	0.58 (.21)	0.16, 0.99	.10 (.04)	.006	
Elevated family T3	0.84 (.22)	0.41, 1.26	.14 (.04)	<.001	
Elevated all T3	1.72 (.36)	1.01, 2.43	.30 (.06)	<.001	
Withdrawn/depression					
Low threat T1	53.11 (.14)	52.83, 53.39	−.08 (.02)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T1	0.92 (.21)	0.51, 1.33	.16 (.04)	<.001	
Elevated family T1	0.80 (.21)	0.38, 1.22	.14 (.04)	<.001	
Elevated all T1	2.23 (.37)	1.52, 2.95	.38 (.06)	<.001	
Low threat T2	53.08 (.14)	52.81, 53.36	−.08 (.02)	.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T2	0.80 (.21)	0.39, 1.20	.14 (.04)	<.001	
Elevated family T2	1.07 (.22)	0.63, 1.51	.18 (.04)	<.001	
Elevated all T2	2.77 (.37)	2.05, 3.48	.47 (.06)	<.001	
Low threat T3	53.11 (.14)	52.84, 53.39	−.08 (.02)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EA; EF versus EA
Elevated neighborhood T3	0.86 (.21)	0.44, 1.27	.15 (.04)	<.001	
Elevated family T3	0.97 (.22)	0.55, 1.40	.17 (.04)	<.001	
Elevated all T3	2.16 (.36)	1.45, 2.87	.37 (.06)	<.001	
Externalizing					
Low threat T1	43.47 (.24)	43.00, 43.94	−.12 (.02)	<.001	LT versus EN; LT versus EF; LT versus EA; EN versus EF; EN versus EA; EF versus EA
Elevated neighborhood T1	1.92 (.34)	1.25, 2.60	.20 (.04)	<.001	
Elevated family T1	2.88 (.35)	2.18, 3.57	.30 (.04)	<.001	
Elevated all T1	4.78 (.60)	3.60, 5.96	.49 (.06)	<.001	

TABLE 2 (Continued)

Latent profile	Estimate (SE)	95% CI	β (SE)	<i>p</i>	Post-hoc comparisons
Low threat T2	43.32 (.24)	42.85, 43.78	-.13 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T2	2.05 (.34)	1.38, 2.72	.21 (.04)	<.001	LT versus EA; EN versus EF;
Elevated family T2	3.85 (.37)	3.13, 4.57	.40 (.04)	<.001	EN versus EA; EF versus EA
Elevated all T2	5.54 (.60)	4.36, 6.72	.57 (.06)	<.001	
Low threat T3	43.22 (.23)	42.76, 43.67	-.14 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T3	2.18 (.34)	1.51, 2.86	.23 (.04)	<.001	LT versus EA; EN versus EF;
Elevated family T3	3.81 (.35)	3.12, 4.51	.39 (.04)	<.001	EN versus EA; EF versus EA
Elevated all T3	6.58 (.59)	5.42, 7.75	.68 (.06)	<.001	
Aggression					
Low threat T1	51.87 (.12)	51.65, 52.10	-.10 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T1	0.86 (.18)	0.51, 1.20	.17 (.04)	<.001	LT versus EA; EN versus
Elevated family T1	1.27 (.18)	0.92, 1.63	.26 (.04)	<.001	EA; EF versus EA
Elevated all T1	2.06 (.31)	1.46, 2.66	.42 (.06)	<.001	
Low threat T2	51.81 (.11)	51.59, 52.05	-.11 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T2	0.75 (.17)	0.41, 1.09	.15 (.04)	<.001	LT versus EA; EN versus EF;
Elevated family T2	1.71 (.19)	1.34, 2.07	.35 (.04)	<.001	EN versus EA; EF versus EA
Elevated all T2	2.88 (.31)	2.28, 3.48	.59 (.06)	<.001	
Low threat T3	51.77 (.11)	51.55, 52.00	-.12 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T3	0.80 (.18)	0.46, 1.14	.16 (.04)	<.001	LT versus EA; EN versus EF;
Elevated family T3	1.66 (.18)	1.30, 2.01	.34 (.04)	<.001	EN versus EA; EF versus EA
Elevated all T3	3.33 (.30)	2.73, 3.92	.68 (.06)	<.001	
Rule-breaking behavior					
Low threat T1	51.76 (.09)	51.58, 51.94	-.08 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T1	0.65 (.15)	0.36, 0.93	.16 (.04)	<.001	LT versus EA; EN versus
Elevated family T1	0.74 (.15)	0.45, 1.03	.18 (.04)	<.001	EA; EF versus EA
Elevated all T1	2.07 (.25)	1.57, 2.57	.51 (.06)	<.001	
Low threat T2	51.70 (.09)	51.52, 51.88	-.10 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T2	0.68 (.14)	0.40, 0.97	.17 (.04)	<.001	LT versus EA; EN versus EF;
Elevated family T2	1.07 (.15)	0.76, 1.37	.26 (.04)	<.001	EN versus EA; EF versus EA
Elevated all T2	2.46 (.25)	1.96, 2.95	.60 (.06)	<.001	
Low threat T3	51.65 (.09)	51.47, 51.83	-.11 (.02)	<.001	LT versus EN; LT versus EF;
Elevated neighborhood T3	0.77 (.15)	0.48, 1.05	.19 (.04)	<.001	LT versus EA; EN versus EF;
Elevated family T3	1.19 (.15)	0.90, 1.49	.29 (.04)	<.001	EN versus EA; EF versus EA
Elevated all T3	2.59 (.25)	2.09, 3.08	.63 (.06)	<.001	

Note: All models include household income as a covariate and a random intercept for Adolescent Brain Cognitive DevelopmentSM Study site. Bold *p*-values indicate significance following Bonferroni correction for $n=6$ comparisons (6 outcomes). Listed pairwise comparisons indicate significant differences ($p < .05$) between latent profiles.

Abbreviations: EA, elevated all; EF, elevated family; EN, elevated neighborhood; LT, low threat.

parent away from home more often between T1 and T2 had a 77% higher likelihood of being in the Low Threat_{T1}-Elevated Family_{T2}-Elevated Family_{T3} subgroup (OR [95% CI]=1.77 [1.29, 2.42], $p < .001$). Youth who had a family member arrested between T1 and T2 or between T2 and T3 had a 61% or 73% lower likelihood, respectively, of being in the Elevated Family_{T1}-Low Threat_{T2}-Low Threat_{T3} subgroup (OR [95% CI]=0.39 [0.20, 0.75], $p < .01$; OR [95% CI]=0.27 [0.12, 0.57], $p < .001$).

Finally, youth who had a family member with a mental/emotional problem between T1 and T2 had a 62% lower likelihood of being in the Elevated Family_{T1}-Low Threat_{T2}-Low Threat_{T3} subgroup (OR [95% CI]=0.38 [0.21, 0.68], $p < .01$) and 103% higher likelihood of being in the Elevated Family_{T1}-Elevated Family_{T2}-Low Threat_{T3} subgroup (OR [95% CI]=2.03 [1.32, 3.13], $p = .001$). A full list of results from the exploratory analysis is presented in Table S8a–d.

TABLE 3 Frequency of transitions between latent profiles across T1–T3.

Among youth who were <u>Low Threat</u> at T1 (<i>n</i> = 757; 15.9%)					
<i>At T2:</i>					
<i>At T3:</i>		<i>LT</i>	<i>EN</i>	<i>EF</i>	<i>EA</i>
	<i>LT</i>	--	46 (6.1%)	277 (36.6%)	10 (1.3%)
	<i>EN</i>	13 (1.7%)	72 (9.5%)	8 (1.1%)	6 (0.8%)
	<i>EF</i>	85 (11.2%)	6 (0.8%)	232 (30.6%)	2 (0.3%)
	<i>EA</i>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Among youth who were <u>Elevated Neighborhood</u> at T1 (<i>n</i> = 494; 28.8%)					
<i>At T2:</i>					
<i>At T3:</i>		<i>LT</i>	<i>EN</i>	<i>EF</i>	<i>EA</i>
	<i>LT</i>	82 (16.6%)	3 (0.6%)	7 (1.4%)	1 (0.2%)
	<i>EN</i>	85 (17.2%)	--	21 (4.3%)	132 (26.7%)
	<i>EF</i>	4 (0.8%)	3 (0.6%)	13 (2.6%)	1 (0.2%)
	<i>EA</i>	2 (0.4%)	57 (11.5%)	8 (1.6%)	75 (15.2%)
Among youth who were <u>Elevated Family</u> at T1 (<i>n</i> = 726; 55.9%)					
<i>At T2:</i>					
<i>At T3:</i>		<i>LT</i>	<i>EN</i>	<i>EF</i>	<i>EA</i>
	<i>LT</i>	358 (49.3%)	7 (1.0%)	43 (5.9%)	2 (0.3%)
	<i>EN</i>	7 (1.0%)	26 (3.6%)	2 (0.3%)	1 (0.1%)
	<i>EF</i>	228 (31.4%)	13 (1.8%)	--	9 (1.2%)
	<i>EA</i>	2 (0.3%)	12 (1.7%)	4 (0.6%)	12 (1.7%)
Among youth who were <u>Elevated All</u> at T1 (<i>n</i> = 285; 60.6%)					
<i>At T2:</i>					
<i>At T3:</i>		<i>LT</i>	<i>EN</i>	<i>EF</i>	<i>EA</i>
	<i>LT</i>	4 (1.4%)	0 (0.0%)	1 (0.4%)	0 (0.0%)
	<i>EN</i>	7 (2.5%)	108 (37.9%)	8 (2.8%)	27 (9.5%)
	<i>EF</i>	3 (1.1%)	0 (0.0%)	13 (4.6%)	0 (0.0%)
	<i>EA</i>	1 (0.4%)	100 (35.1%)	13 (4.6%)	--

Note: % reflects the percentage of the T1 latent profile; Subgroups of youth with >2.5% of the full sample (*n*>205) are bolded; Cells reflecting no changes in profile membership are marked “—” because the exploratory analysis focused only on youth who transitioned between latent profiles.
Abbreviations: EA, elevated all; EF, elevated family; EN, elevated neighborhood; LT, low threat.

DISCUSSION

Perceived threats in youth's primary social contexts can heighten the risk for emotional and behavioral

problems during development (Aldridge et al., 2016; Conley et al., 2022; Goldman-Mellor et al., 2016; Rabinowitz et al., 2016). The current study extends our understanding of the developmental sequelae of perceived

threats by characterizing the stability and specificity of associations between youth's unique experiences of perceived threats in their neighborhoods, schools, and families and emotional and behavioral problems during the transition from childhood to adolescence. Using LTA, we provided novel evidence that there is variability in the stability of where and the extent to which youth perceive threats in their social environments. Consistent with previous work (Conley et al., 2022), LTA identified four distinct groups of youth characterized by perceived threats in their neighborhoods, schools, and families: low threat in all contexts, elevated threat in the neighborhood only, elevated threat in the family primarily, and elevated threat in all contexts. Results demonstrated that while perceived threats in youth's neighborhoods were considerably stable during the transition from childhood to adolescence, perceived threats in youth's families were less stable and fluctuated in relation to stressful life events. Further, groups of youth who perceived threats in their families at any time point had the highest emotional and behavioral problems compared to youth who perceived threats in their neighborhoods only or not at all. These results suggest that efforts to support positive emotional and behavioral development may benefit from interventions that are tailored to the different contexts in which youth perceive threats.

Stability and change in perceived threats in youth's social environments

For some youth, perceived threats were stable during the transition from childhood to adolescence. Across all three time points, the majority of the sample had the highest probability of membership in the Low Threat latent profile (~60% sample across T1–T3). Among these youth, 90% experienced stable low perceived threats in their neighborhoods, schools, and families. Similarly, and as hypothesized, for youth who had the highest probability of membership in the Elevated Neighborhood latent profile (~20% sample across T1–T3), 81% experienced stable elevated perceived threats in their neighborhoods only. These findings are consistent with and extend previous research in a sample of youth from Baltimore showing that youth's experiences of neighborhood threats were considerably stable across grades six through eight, with the majority of youth reporting low exposure to threats overall (Lambert et al., 2010). One possible explanation for these findings is that youth experience few changes in their neighborhood contexts due to constrained residential mobility that is thought to reflect the vast structural and economic segregation in the United States (Sharkey, 2012). Specifically, evidence shows that it is difficult for families to gather the social and financial resources necessary to move out of neighborhoods affected by concentrated disadvantage (Bergman et al., 2019), which is a strong correlate of neighborhood violence and

crime (Friedson & Sharkey, 2015). Therefore, without improvements in social structure, it is likely that youth who live in neighborhoods with elevated levels of violence and crime may continue to perceive neighborhood threats across the transition from childhood to adolescence.

For other youth, perceived threats changed during the transition from childhood to adolescence. In particular, results from the current study highlighted the family context as one where perceived threats were changing the most. While the Elevated Family and Elevated All (which included elevations in the family context) latent profiles captured a smaller proportion of the sample overall (~15% and ~6% of the sample, respectively), over a third of youth in the Elevated Family and nearly half of youth in the Elevated All latent profiles experienced a change in latent profile membership during the transition from childhood to adolescence. Specifically, among youth who transitioned out of the Elevated Family latent profile, a large majority transitioned into the Low Threat latent profile. Comparably, among youth who transitioned out of the Elevated All latent profile, most transitioned into the Elevated Neighborhood latent profile. In other words, for most of the youth that transitioned out of the Elevated All latent profile, the relative level of perceived threat in their families substantially decreased as evidenced by low levels of threat in the family context in the Elevated Neighborhood latent profile. This pattern suggests that threats in youth's family contexts can change considerably (Habib et al., 2014; Rothenberg et al., 2017), but changes in the family context do not necessarily protect against perceived threats in other contexts. Altogether, increased knowledge of fluctuations in perceived threats in youth's different contexts underscores the importance of incorporating multicontextual and continuous approaches to screening practices to achieve greater accuracy and precision in evaluating the risks embedded within youth's broader social environments.

Supporting emotional and behavioral development in youth who perceive threats

Youth's unique experiences of perceived threats in different contexts showed associations with emotional and behavioral development. As expected, at all time points, the Low Threat latent profile was associated with the lowest emotional and behavioral problems across the internalizing and externalizing domains at T3 compared to the elevated threat latent profiles. While the comparisons between the low and elevated threat latent profiles are unsurprising, our results demonstrated meaningful differences in emotional and behavioral problems among the elevated threat latent profiles that add nuance to a growing body of evidence showing that the sequelae of early life adversity may be influenced by the contexts in which adversity is experienced (Conley et al., 2022).



Youth in the Elevated Neighborhood latent profiles were at heightened risk for emotional and behavioral problems relative to youth in the Low Threat latent profiles. Further, youth in the Elevated All latent profiles had the highest emotional and behavioral problems among all youth in the current study. Given that most youth who perceived threats remained in the Elevated Neighborhood or transitioned between the Elevated All and Elevated Neighborhood latent profiles across the three time points, youth who perceive threats in their neighborhoods may benefit from increased access to services that support them in coping with their experiences in their neighborhoods throughout development.

As one example, there is evidence that school-based cognitive behavioral interventions can be effective for reducing internalizing and externalizing symptoms, exposure to stressors, and victimization among youth residing in neighborhoods with high levels of crime and violence (Ali-Saleh Darawshy et al., 2020). Accordingly, funding to support school-based services that are offered to youth throughout development may help to mitigate the risk for emotional and behavioral problems among youth who perceive threats in their neighborhoods.

At the same time, without addressing the structural determinants of neighborhood threats, results from the current study suggest that a large group of youth will stay at heightened risk for emotional and behavioral problems. Extant theory and empirical research on the social ecology of violence suggest that residential segregation, concentrated disadvantage, and indicators of physical disorder (e.g., vacant lots, litter or broken glass, graffiti, etc.) are structural factors that can increase risk for neighborhood violence and crime (Branas et al., 2013; Sampson, 1985). Therefore, policy interventions that target changes to the built neighborhood environment may serve as sustainable and high-impact preventative measures for supporting the largest group of youth who perceive threats and those at the highest risk for emotional and behavioral problems. Growing evidence from quasi-experimental and naturalistic experimental studies demonstrated that efforts to deconcentrate high-rise public housing through scattered-site low-density public housing or voucher programs that subsidize private affordable housing can be effective at reducing residential segregation, concentrated disadvantage, and neighborhood violence and crime (see Kondo et al., 2018 for review). Studies also show that initiatives to demolish or remediate vacant buildings and “green and clean” vacant lots may decrease opportunities for illegal activity and violent crime (Branas et al., 2018; Jay et al., 2019). Given that youth's neighborhoods are thought to become an increasingly important context for social learning as youth gain independence from their families throughout adolescence (Zimmer-Gembeck et al., 2011), policymakers have an opportunity to reduce place-based disparities in youth mental health by supporting structural interventions that target neighborhood violence and crime.

Findings from the present study also corroborate the results from Conley et al. (2022) demonstrating that cumulative perceived threat experiences alone do not explain all differences in emotional and behavioral development for all youth who perceive threats. In particular, youth in the Elevated Family latent profiles at any time point had higher externalizing problems at T3 compared to youth who perceived threats in their neighborhoods only. Compared to neighborhood contexts, then, it is possible that youth's family contexts have a more direct influence on behavioral development during the transition from childhood to adolescence when youth still spend a considerable amount of time at home with their families (Eccles & Roeser, 2009). This result is aligned with prior work suggesting that perceived threats in the family context such as harsh and coercive parenting and inter-caregiver aggression can pose risks for disruptive and aggressive behavior (Patterson, 1982; Pinquart, 2017). Youth's families can serve as a proximal context for the development of self-regulation because youth learn about emotional and behavioral management through observational learning and social modeling of parents and caregivers, parenting practices, and the overall emotional climate of the family (Morris et al., 2017). Threats in the family context therefore may interfere with the development of self-regulation abilities, which are associated with the onset and maintenance of externalizing problems (Fairchild et al., 2019). Thus, youth who indicate perceived threats in their families may benefit from treatments that target self-regulation abilities. Nevertheless, nearly a third of youth who perceived threats in their families primarily (i.e., in the Elevated Family latent profiles) transitioned to the Low Threat latent profiles. As such, preventative interventions that target broader family dynamics may be effective in reducing emotional and behavioral problems among youth who perceive threats in their families.

Increasing caregiver support may ameliorate risks associated with perceived threats in youth's families

Results from the exploratory analysis indicated that transitions between latent profiles characterized by perceived threats in youth's families were related to stressful life events. Specifically, changes in latent profile membership between the Elevated Family and Low Threat latent profiles were related to family members mental health and substance use problems, changes in the amount of time a parent or caregiver was away from home, and family member arrest. These results can be contextualized in light of other research showing that adolescents perceive family conflict to be higher in families with parental mental health and substance use problems, low inter-adult relationship satisfaction, and family member legal system involvement (Aaron & Dallaire, 2010; Keller et al., 2008; Rothenberg

et al., 2017). Although it is likely that other stressful life events that were not included in the ABCD Study battery may influence changes in family dynamics, results from the exploratory analysis may provide clues about fruitful avenues for future research and targets for policy.

Policies and practices that support caregivers and strengthen parenting skills may be effective at mitigating risks related to perceived threats in youth's families. There is evidence that providing economic assistance for families with children, such as the monthly cash payments included in the expanded Child Tax Credit under the 2021 American Rescue Plan Act, can reduce psychological distress and mental health problems among adults (Batra et al., 2023). Studies also show that parent education programs that are adapted for caregivers who are incarcerated can be effective in reducing parental stress and increasing positive parent–child interactions among families with legal system involvement (Armstrong et al., 2018; Eddy et al., 2013). Altogether, a continued focus on relieving family stress will be important for reducing the risk for emotional and behavioral problems among youth who perceive threats in their families.

Limitations and future directions

Before concluding, several limitations of the present study should be acknowledged. First, while we examined associations between stability and change in youth's perceived threat experiences between ages 9–10, 10–11, and 11–12 and emotional and behavioral problems at ages 11–12, the analyses were correlational and cannot address causation or shed light on the potential mechanisms by which perceived threat experiences influence development. Second, previous research has documented bidirectional associations between youth's perceptions of their primary social contexts and behavior problems (Midouhas et al., 2021; Shaffer et al., 2013). The goal of the current study was to examine stability and change in perceived threats in youth's social contexts and associations with emotional and behavioral outcomes during the transition from childhood to adolescence; however, future research with longitudinal datasets should examine potential co-occurring shifts in youth's experiences in their broader social environments and emotional and behavioral development. Third, though youth's neighborhoods, families, and schools are considered primary social contexts in which youth spend time (Hofferth & Sandberg, 2001), there are other contexts in which youth may perceive threats that were not measured in the ABCD Study. For instance, youth become increasingly focused on peer relationships throughout adolescence (Eccles & Roeser, 2009) and, in recent years, have begun turning to the internet and social media as a primary means of peer connection (Yan, 2018). Future studies including measures of perceived threats among youth's peers, in real life and online, will be important

for furthering our understanding of relations between youth's broader social environments and development. Fourth, while the ABCD Study sample approximates the sociodemographic diversity of US youth on sex, race and ethnicity, and socioeconomic status, the sample may not generalize to all US youth (Compton et al., 2019) or represent the full spectrum of youth who perceive threats. Although youth in the latent profiles characterized by elevated perceived threats indicated higher perceived threats relative to the low threat latent profiles, most youths did not indicate maximal levels of threat in their neighborhoods, schools, or families. Further, the current study was constrained to youth between the ages of 9–10 and 11–12. More research is needed to evaluate relations between associations between multicontextual perceived threats and emotional and behavioral development in samples of youth who experience more severe perceived threats across a larger developmental window. Finally, the magnitude of observed effects in the present study is small using traditional heuristics. That said, the large ABCD Study sample has increased statistical power to detect small effects, which some researchers consider more accurate estimates than previously reported effect sizes that can be inflated due to small sample sizes (Dick et al., 2021). For example, a recent study suggests that benchmarks such as below average $\approx .03$, average $\approx .05$, above average $\approx .09$, and extremely above average $\geq .18$ may be a well-suited heuristic for research using the ABCD Study sample (Owens et al., 2021). While there is growing recognition that even very small effects can meaningfully accumulate over time (Funder & Ozer, 2019), future studies are needed to examine the reliability and clinical significance of associations between the perceived threat latent profiles and emotional and behavioral outcomes. Nevertheless, results from the present study highlight the utility of person-centered, multicontextual approaches for deepening our understanding of relations between perceived threats in youth's social contexts and emotional and behavioral development.

CONCLUSIONS

The present study provided novel evidence that there is variability in the stability of perceived threats in youth's primary social contexts during the transition from childhood to adolescence. While perceived threats in youth's neighborhoods may be more entrenched, perceived threats in youth's families may be subject to fluctuations related to broader dynamics within youth's family systems. Further, changes in where and the extent to which youth perceive threats in their different social contexts may have a bearing on emotional and behavioral development. Ultimately, a multipronged approach is needed to promote positive emotional and behavioral development: clinicians should consider supporting youth in coping by tailoring treatments to the contexts

in which youth perceive threats and policymakers should support initiatives that bolster safety in youth's neighborhoods and families.

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DATA AVAILABILITY STATEMENT

Data used in the preparation of this article were obtained from the Adolescent Brain Cognitive Development (ABCD) Study (<https://abcdstudy.org>), held in the NIMH Data Archive (NDA). This is a multisite, longitudinal study designed to recruit more than 10,000 children aged 9–10 years and follow them over 10 years into early adulthood. The ABCD data repository grows and changes over time. The ABCD data used in this report came from <https://doi.org/10.15154/1523041>. The analytic code and materials necessary to reproduce the analyses presented in this paper are publicly accessible via reasonable request to the corresponding author. The analyses presented here were not preregistered.

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