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Caregiver-child affective dynamics during preschool predict preadolescent suicidal thoughts and behaviors

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ABSTRACT

While previous research highlights the significance of parenting and family dynamics in adolescent suicidal thoughts and behavior (STBs), there has been a limited focus on how early caregiver-child affective patterns may influence preadolescent STBs. This is important given the rise of STBs in preadolescents. This study employed a dynamic systems approach to explore the role of in-the-moment affective dynamics in caregiver-preschooler interactions on STB risk, focusing on affective variability and shared (positive, neutral, and negative) affect as risk factors for preschool and preadolescent STBs. Children ($N = 135$, X with a preschool depression) and their caregivers participated in a longitudinal study; STBs were assessed using clinical diagnostic interviews at preschool (ages 3–7 years) and in preadolescence (ages 8–12 years). Two groups were created to characterize history of STBs across the two periods: no/remitted-STBs and emerged/persistent STBs. During the preschool assessment, caregiver-child dyads completed two interaction tasks coded offline. State Space Grids (SSGs) were used to derive measures of dyadic affective flexibility and shared affect. Caregiver-preschooler affective dynamics were examined as predictors of STB history. Greater affective flexibility, less shared positive affect, and more shared neutral affect predicted a higher likelihood of preadolescent STBs. Follow-up analyses with all dyadic variables revealed the unique contributions of affective flexibility and less positive shared affect predicting STB status even when controlling for child psychopathology and caregiver depression. Findings suggest affective dynamics within the caregiver-preschooler relationship are associated with later STBs, suggesting a potential dyadic risk marker for poor relationship quality in this population.

1. Introduction

Most research on suicidal thoughts and behaviors (STBs) has focused on adolescent and adult samples given the higher prevalence of STBs in these groups. However, in recent years, STBs have increased rapidly in children and preadolescents (Bridge et al., 2023; Ehlman et al., 2022). STBs in young children predict STBs later in life and are associated with significant distress and impairment (Liu et al., 2022). Few studies have explored parenting and family dynamics in early childhood as predictors of STBs later in life. However, prior work suggests parenting and family dynamics, including high negativity in the caregiver-child relationship, are associated with risk for STBs (Miller et al., 2015; Oppenheimer et al., 2018; Sheftall et al., 2016). The current study aimed to investigate whether caregiver-child affective dynamics during preschool predict STB risk in preschool and preadolescence in a high-risk population.

1.1. Caregiving and STBs in youth

Decades of research highlight the critical role of the caregiver-child relationship on developmental outcomes, including psychopathology (e.g., Oppenheimer et al., 2018; Thompson & Meyer, 2007). Difficulties in social domains, including family relationships, are well-established risk

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factors for STBs in youth (King & Merchant, 2008), and feature prominently in theories of suicidality (e.g., The Interpersonal Theory of Suicide; Van Orden et al., 2010). Poor caregiver-child relationship quality, marked by low maternal responsiveness (Fergusson & Lynskey, 1995), high conflict (Wagner et al., 2003), and lower parental support (Miller et al., 2015), is associated with increased STB risk. Conversely, positive parent-child relationships, characterized by warmth, closeness, open communication (e.g., Kuramoto-Crawford et al., 2016), and parental understanding (Kushal et al., 2021), are protective against STBs.

Evidence suggests that the caregiver-child relationship may be particularly important for STBs during childhood (DeVille et al., 2020). Sheftall et al. (2016) found that children aged 5–10 experienced more relationship problems with family members than adolescents aged 12–14 who also died by suicide. Further, Oppenheimer et al. (2018) found that negative caregiver-child relationship quality predicted earlier STBs in youth (aged 8–15 years) without parental history of STBs. Potentially underlying these associations, negative caregiver-child dynamics in early life – when children largely rely on caregivers to regulate (Fox & Calkins, 2003) – can undermine the development of children's regulatory skills, increasing risk for later STBs. Thus, we need to better understand how early caregiver-child interactions may influence STB risk. This study extends existing research by exploring affective dynamics in the caregiver-child as predictors of risk for STBs.

1.2. A dynamic systems approach to dyadic affect

Dynamic system approaches have been used to understand the reciprocal nature of the caregiver-child relationship (Granic, 2005). State Space Grids (SSG) were developed as a dynamic systems approach to investigate how caregiver-child dynamics unfold in real-time (Hollenstein, 2007; Lamey et al., 2004). SSGs map both caregiver and child moment-to-moment fluctuations in affect and behavior allowing for a deeper understanding of caregiver-child dynamics. This moment-to-moment measurement provides an advantage over more static measures of caregiver-child interactions that rely on global assessments of affect and behavior.

The most used SSG measure is dyadic flexibility, which refers to the level of variability in dyadic states during a caregiver-child interaction. Dyadic affective flexibility, specifically, reflects the ebb and flow of caregiver-child interactions, providing a window into how caregivers shape young children's emotional competence and regulation. Two measures of dyadic affective flexibility are dispersion and transition. *Dispersion* represents the distribution of affective displays across the grid, with higher dispersion indicating affective displays were distributed more equally across the grid (Lunkenheimer et al., 2011). *Transitions* represent the number of changes in affective states (moves between cells in the grid), with higher values indicating the dyad moved more frequently between states. Hollenstein et al. (2004) found that less dyadic affective flexibility (i.e., greater rigidity in mother-child interactions) was associated with preschoolers internalizing and externalizing symptoms concurrently and longitudinally. In another study, less dyadic flexibility in early adolescence predicted increased maternal and adolescent internalizing problems from early to late adolescence (Van der Giessen et al., 2015). This is consistent with other studies finding less variable (i.e., more rigid) dyadic interactions to be linked to increases in psychopathology symptoms across childhood and adolescence (Granic et al., 2007; Lunkenheimer et al., 2011).

Beyond dyadic flexibility, the affective nature of the caregiver-child interaction likely determines their adaptiveness (Lobo & Lunkenheimer, 2020). Therefore, in addition to examining dyadic flexibility as a predictor of STBs, we also explored shared affect— the ability of the dyad to initiate and sustain mutually matching affect (Guo et al., 2015; Lunkenheimer et al., 2011). Two measures of shared affect are visits and duration. *Visits* refers to how often the dyad visited a shared affective state (e.g., shared positive) from another region of the grid (e.g., caregiver positive and child neutral). *Duration* refers to time spent in a shared affective state (Guo et al., 2015; Lunkenheimer et al., 2013). Consistent with developmental theories, research on shared affect demonstrates that interactions characterized by higher shared positive affect are associated with better child outcomes (Lobo & Lunkenheimer, 2020; Lunkenheimer et al., 2011). While it can be adaptive to avoid a shared state (e.g., child is upset and parent is neutral), shared affect is important for understanding the dyads overall affective experience. In dysregulated caregiver-child interactions, young children's frequent dysregulated behaviors can lead to negative caregiver responses, which then creates a negative cycle that solidifies throughout development. Thus, differences in dyadic affective states may distinguish dyads where the child experiences psychopathology.

While there is evidence of how dyadic flexibility and shared affect are linked with children's internalizing and externalizing symptoms in childhood (e.g., Hollenstein et al., 2004), there is a dearth of data exploring the role of these measures on risk for STBs. Given alarming increases in childhood and preadolescent STBs, understanding the potential role of these caregiver-child affective dynamics is critical (Brewer et al., 2022; Ehlman et al., 2022). A greater understanding of how early caregiver-child dynamics influence STB risk could help identify malleable early markers of risk that can be targeted to reduce STBs in youth.

1.3. Current study and hypotheses

The current study examined dyadic flexibility and shared affect during preschool as predictors of preschool and preadolescent STBs in a sample enriched for preschool depression. Specifically, we tested whether preschool and pre-adolescent STB status could be predicted from differences in dyadic affective flexibility and shared affective displays across positive, neutral, and negative states in early childhood. Data from a preschool assessment when children were 3–7 years old was used to predict STB status based on preschool (3–7 years old) and preadolescent (8–12 years old) STBs. We hypothesized that the following would predict STB status: (a) less affective flexibility (i.e., more affective rigidity), (b) less shared positive affect, (c) more shared neutral affect, and (d) more shared negative affect between caregivers and children.

2. Methods

2.1. Participants

Participants included 135 preadolescents who, as preschoolers, completed a baseline assessment in the Parent-Child Interaction Therapy – Emotion Development (PCIT-ED) randomized controlled trial for preschool-onset major depressive disorder (PO-MDD; clinicaltrials.gov NCT02076425; Luby et al., 2018, 2019) and, as preadolescents, completed visit 1 of the follow-up Pediatric Suicidality Study (PED-SI; Hennefield et al., 2024; Thompson et al., 2024). 385 preschoolers (M_{age} = 5.13 years, SD = 1.04 years, Range 2.21–6.84 years) completed the baseline PCIT-ED assessment. Of those, 229 were randomized into the PCIT-ED study, 82 were included as community controls (did not receive PCIT-ED), and 57 were ineligible for PCIT-ED (e.g., did not meet criteria for PO-MDD). An additional 17 preschoolers had suspected developmental delays and were ineligible to participate in either PCIT-ED or PED-SI. Preadolescents were eligible to participate in PED-SI, regardless of whether they were randomized into PCIT-ED or completed therapy.

138 completed both the PED-SI visit 1 assessment, when participants were 8-to 12-years of age, and the MDD section of the KSADS-EC and PCIT-ED caregiver-child interaction task, when participants were 3–7 years of age. Of these 138 participants, three were missing data for covariates, so the final sample size was 135 (7/135 were community controls). Sample retention from preschool to preadolescence was 57.1 % (210/368). Follow-up data collection occurred between Fall 2019 and Spring 2022, overlapping with the COVID-19 pandemic, likely contributing to decreased retention. See Supplemental Table 1 for participant

details.

Child assent and parental written consent were obtained prior to participation in PED-SI, and the Institutional Review Board at [blinded for review] approved all procedures. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

2.2. Measures

2.2.1. Suicidal thoughts and behaviors

The Kiddie Schedule for Affective Disorders and Schizophrenia-Early Childhood (K-SADS-EC; Gaffrey & Luby, 2012), completed by caregivers during the preschool assessment, was used to measure preschool STBs. The K-SADS-Present and Lifetime (K-SADS-PL; Birmaher et al., 2009), completed by caregivers and preadolescents at the preadolescent assessment, was used to measure past and current STBs. The K-SADS-PL, a semi-structured age-appropriate diagnostic interview for *DSM-5* disorders, was administered separately to the primary caregiver and preadolescent by trained researchers. Caregivers reported on their child's symptoms for two periods: 1) since preschool (i.e., after participation in PCIT-ED), and 2) current (over the prior month). Preadolescents reported on their own symptoms for these same two time periods. The following suicidality constructs were assessed (presence/absence): 1) passive suicidal ideation, 2) active suicidal ideation, 3) suicidal behaviors, 4) suicide attempt. Endorsement of suicidal ideation and suicidal behaviors were not mutually exclusive. Interrater reliability was good/very good for caregiver ($k = 0.75$) and preadolescent ($k = 0.93$) STB endorsement (present/absent). In analysis, each suicide construct is considered present (1) if it was endorsed by either the caregiver or the preadolescent, and absent (0) if it was not endorsed by either the caregiver or the preadolescent.

To best characterize children's current STB status while also accounting for their history of STBs, two group memberships were created: *no/remitted-STBs* group (which included children with no preschool or preadolescent STBs *and* children with preschool STBs, but no preadolescent STBs) and an *emerged/persistent* group (children with preadolescent STBs whether or not they had preschool STBs).

2.2.2. Preschool baseline assessment measures

2.2.2.1. Externalizing/internalizing symptoms. The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000), a well-validated measure of child psychopathology, was completed by the caregiver. Caregivers completed the CBCL 1.5–5 years or 6–18 years version, depending on child age. Age-based and normed T-scores were used in analysis.

2.2.2.2. Caregiver depression. The Beck Depression Inventory-II (BDI; Beck et al., 1996) was completed by caregivers about their depressive symptoms. The BDI-II assesses depressive symptoms over the previous two weeks, yielding a total score by summing the 21 items. Higher scores indicate elevated depressive symptoms.

2.2.2.3. Income-to-needs ratio. The income-to-needs ratio was calculated as the total family income divided by the federal poverty level based on family size (McLoyd, 1998). A high income-to-needs ratio (>1) indicates the family has more income than necessary to meet basic needs.

2.2.2.4. Observational tasks. Caregiver-child affect was assessed using two observational tasks prior to treatment (Kochanska & Aksan, 1995, 2004). Dyads were asked to build a standing marble run based on a picture and had to work together to complete a maze on an etch-a-sketch by having each member of the dyad control one dial. Tasks were designed to elicit mild stress and require caregiver involvement.

2.2.2.5. Observational coding. Videotapes were coded using a manual (Whalen & Gilbert, 2017) adapted from previous work (e.g., Lunkenheimer et al., 2011) and used in other manuscripts from our group (Quiñones-Camacho et al., 2023; Whalen et al., 2021). The coding scheme includes assessment of affective displays and functional control/compliance behaviors (not considered in the present analysis) for the caregiver and the child. A team of coders coded each video using Noldus Observer XT software (Zimmerman et al., 2009). Coders were blind to diagnostic and treatment status of participants and to study hypotheses and were randomly assigned videos. Master coders (authors DW and KG) coded 20 % of the videos (chosen at random) to confirm that inter-observer agreement was maintained across time. All coders achieved reliability higher than 80 % with the master coders before coding independently. Affect codes were combined into positive (low and high), neutral, and negative (anger/frustration and sad/anxious) affective categories for each of the tasks. These general codes for positive, neutral, and negative caregiver and child affect were used to create the SSGs.

2.2.2.6. Creation of SSGs. Caregiver-child dyadic patterns were assessed using State Space Grids (SSG) in GridWare 1.15 (Lamey et al., 2004), consistent with previous work (e.g., Guo et al., 2015; Lunkenheimer et al., 2013). Caregiver and child affect were mapped onto SSGs with three affective displays (positive, neutral, and negative) on the x-axis for the preschooler and the y-axis for the caregiver, resulting in a total of nine possible combinations of dyadic affect. The trajectories of affective displays across the two tasks were plotted for the entire task duration (see Fig. 1 for two trajectories chosen at random from each group).

From the SSG, we derived two commonly reported measures of *dyadic affective* flexibility: dispersion, and transition and six measures of *shared affect* across positive, neutral, and negative states: duration and visits. To account for minor differences in the duration of the tasks across dyads, SSG variables were converted to proportions by dividing each SSG variable by the total duration of the task. The proportion scores for both observational tasks were then averaged into a single score.

2.3. Analysis plan

First, we examined bivariate correlations between our dyadic variables. Then, we examined binary logistic regressions to determine whether dyadic patterns differed between the no/remitted STB and emerged/persistent STBs groups, with the no/remitted STBs group serving as the reference group. All analyses controlled for age, income-to-needs ratio, CBCL externalizing and internalizing scores, and caregiver depression prior to treatment, and number of therapy sessions completed. Significant dyadic variables were then entered simultaneously into a follow-up logistic regression to assess the unique contributions of each variable.

We then conducted follow-up analyses to assess whether there were differences between emerged vs. persistent STBs to compare these groups to no/remitted STBs group (Supplemental Table 2). Lastly, a follow-up set of analyses explored the specificity of our hypothesized associations to STB status by exploring associations between our dyadic variables and lifetime history of internalizing, externalizing, and MDD (Supplemental Tables 3–5). The Benjamini-Hochberg procedure was used to correct for false discovery rate (FDR).

3. Results

Participant characteristics are detailed in Table 1. Participants with emerged/persistent STBs were significantly older and had significantly higher externalizing and internalizing scores than did participants with no/remitted STBs. Bivariate correlations across dyadic affect variables are in Table 2, with most falling within the moderately correlated range.

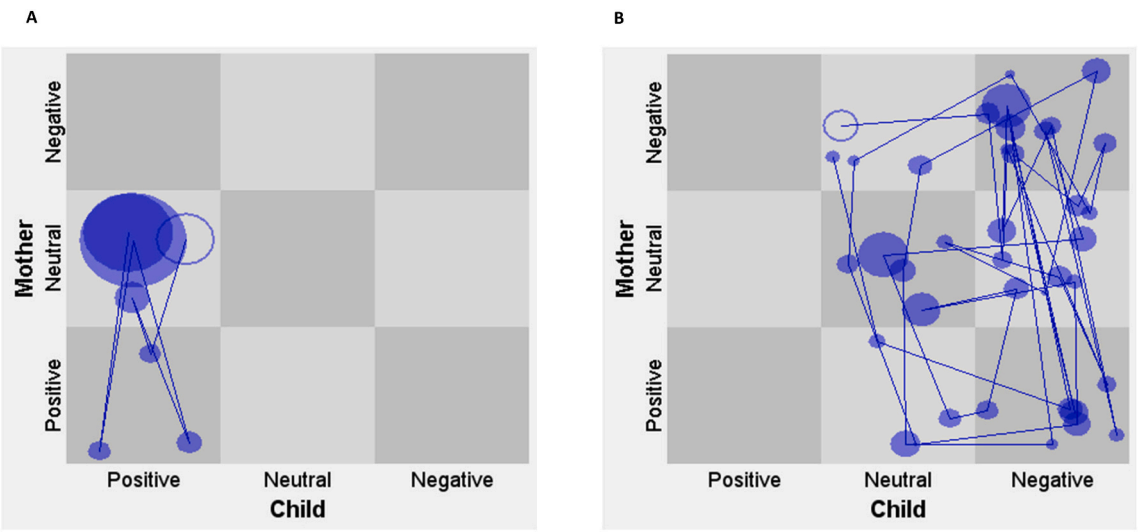

Fig. 1. Representative SSGs depicting trajectories for caregiver-child behavior in one dyad in the no/remitted group (A) and one dyad in the persistent/emerged group (B) during the MR task Each circle in the SSG grid indicates a dyadic affective state (e.g., caregiver positive, preschooler positive), and its size indicates the duration of time spent in that state. Bigger circles indicate more time spent on that state. Lines show transitions between dyadic states.

Table 1
Participant characteristics.

	All participants ($N = 135$)		No/remitted STB's ($N = 45$)		Emerged/persistent STB's ($N = 90$)		Emerged/persistent vs. no/remitted STB's	
Demographic variables	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	***t***	***p***
Baseline age	5.35	1.00	5.26	1.07	5.40	0.97	0.78	0.4390
Preadolescent age	10.06	1.00	9.70	1.04	10.24	0.93	3.08	0.0025
Baseline income-to-needs	3.06	1.24	3.14	1.07	3.01	1.32	−0.57	0.5664
	%	***N***	**%**	***N***	**%**	***N***	χ^2	***p***
Female	31.1	42	33.3	15	30.0	27	0.16	0.6933
Hispanic	5.2	7	8.9	4	3.3	3	F.E.	0.2214
Race							F.E.	0.0677
White	82.2	111	91.1	41	77.8	70		
Black	7.4	10	2.2	1	10.0	9		
Asian	0.7	1	2.2	1	0.0	0		
Multiracial	9.6	13	4.4	2	12.2	11		
Child Psychopathology	**%**	***N***	**%**	***N***	**%**	***N***	χ^2	***p***
Baseline MDD/MDD-NOS	94.8	128	88.9	40	97.8	88	F.E.	0.0410
Baseline externalizing diagnosis*	57.8	74	50.0	20	61.4	54	1.46	0.2276
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	***t***	***p***
Baseline CBCL externalizing T-score	64.47	12.01	60.51	13.99	66.46	10.43	2.52	0.0140
Baseline CBCL internalizing T-score	66.04	9.54	63.49	9.30	67.32	9.44	2.23	0.0271
PCIT-ED Therapy*	**%**	***N***	**%**	***N***	**%**	***N***	χ^2	***p***
Completed all 20 therapy sessions	77.3	99	80.0	32	76.1	67	0.23	0.6284
Parental Psychopathology	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	***t***	***p***
Baseline BDI-II total score	10.80	9.00	10.47	10.16	10.97	8.42	0.30	0.7622

F.E. = Fisher's Exact test; *7 Community control participants were not administered the KSADS externalizing diagnoses modules and were not invited to participate in therapy.

3.1. Dyadic-affective flexibility and preadolescent STBs

Results from logistic regression models examining preschool-age dyadic affective flexibility predicting STB group membership (emerged/persistent vs. no/remitted) are in Table 3. Only affective transitions significantly predicted STB group membership. Findings indicated that participants from dyads with higher affective transitions during the preschool assessment were more likely to be part of the emerged/persistent STB group than the no/remitted group.

3.2. Dyadic shared affect and preadolescent STBs

Logistic regression models examining shared affect as a predictor of STB group (emerged/persistent vs. no/remitted) are also in Table 3. Of the models examined, two measures of shared affect differentiated between the emerged/persistent vs. no/remitted groups: duration spent in shared positive affect and number of visits to shared neutral affect. Children of caregiver-child dyads who spent more time in a shared positive state were less likely to be part of the emerged/persistent STB group, whereas children of caregiver-child dyads who made more visits to a shared neutral state were more likely to be part of emerged/persistent STB group.

3.3. Unique contributions of significant dyadic variables on STB status

Follow-up logistic regression included dyadic affective transitions, duration of shared positive affect, and visits to shared neutral affect in the same model to determine unique predictors of STB group membership (emerged/persistent vs. no/remitted; Table 4). Two dyadic measures contributed uniquely to differentiating between the emerged/

Table 2
Preschool affect SSG variable correlations (N = 135).

	Dispersion	Transitions	Duration of shared positive affect	Visits to shared positive affect	Duration of shared neutral affect	Visits to shared neutral affect	Duration of shared negative affect	Visits to shared negative affect
Dispersion	1.000							
Transitions	0.411***	1.000						
Duration of shared positive affect	0.132	0.014	1.000					
Visits to shared positive affect	0.574***	0.340***	0.626***	1.000				
Duration of shared neutral affect	−0.023	0.040	−0.461***	−0.350***	1.000			
Visits to shared neutral affect	0.122	0.604***	−0.390***	−0.267**	0.641***	1.000		
Duration of shared negative affect	0.313**	0.384***	−0.063	0.033	−0.097	0.120	1.000	
Visits to shared negative affect	0.650***	0.538***	0.051	0.321**	−0.113	0.131	0.722***	1.000

** $p < 0.01$.
*** $p < 0.0001$.

Table 3
Logistic regression models of emerged/persistent vs. no/remitted STB's in preadolescence as predicted by preschool affect SSG variables (N = 135).

Preschool affect SSG	No/remitted STB's (N = 45)		Emerged/persistent STB's (N = 90)		Emerged/persistent vs. no/remitted STB's				
	Mean	SD	Mean	SD	Est.	SE	χ^2	p	FDR p
Dispersion	0.003	0.004	0.003	0.002	37.65	71.45	0.28	0.5983	0.8209
Transitions	0.054	0.028	0.070	0.037	18.53	6.79	7.44	0.0064	0.0200[a]
Duration of shared positive affect	0.167	0.193	0.089	0.115	−3.50	1.31	7.15	0.0075	0.0200[a]
Visits to shared positive affect	0.009	0.011	0.008	0.009	−4.43	19.97	0.05	0.8246	0.8246
Duration of shared neutral affect	0.272	0.240	0.349	0.251	1.39	0.83	2.81	0.0939	0.1878
Visits to shared neutral affect	0.012	0.010	0.018	0.013	54.59	19.38	7.93	0.0049	0.0200[a]
Duration of shared negative affect	0.013	0.026	0.014	0.031	3.43	6.83	0.25	0.6157	0.8209
Visits to shared negative affect	0.003	0.009	0.003	0.005	9.36	28.99	0.10	0.7469	0.8246

Note: SSG variables reported here are proportion scores to control for small variations in the length of the dyadic episode across dyads. Analyses control for age, income-to-needs, internalizing problems, externalizing problems, caregiver depression, and number of therapy sessions completed.
[a] Significant after FDR correction.

Table 4
Logistic regression model of emerged/persistent vs. no/remitted STB's in preadolescence as predicted by preschool affect SSG variables significant in separate models (N = 135).

Parameter	Est.	SE	χ^2	p
Intercept	−4.83	2.23	4.70	0.0302
Baseline age	0.12	0.21	0.31	0.5759
Baseline income-to-needs ratio	−0.11	0.20	0.30	0.5836
Baseline CBCL externalizing T-score	0.04	0.02	3.89	0.0486
Baseline CBCL internalizing T-score	0.04	0.02	2.40	0.1210
Baseline BDI-II total score	−0.03	0.02	1.41	0.2352
Number of therapy sessions completed	−0.01	0.03	0.15	0.7027
Transitions	18.09	8.72	4.30	0.0382
Duration of shared positive affect	−3.41	1.61	4.46	0.0348
Visits to shared neutral affect	8.03	26.04	0.10	0.7578

persistent vs. no/remitted groups: dyadic affective transitions and duration of shared positive affect. Children from dyads who had more affective transitions and who spent less time in a shared positive state were more likely to be a member of the emerged/persistent STB group than the no/remitted group.

3.4. Differences between emerged and persistent STB status

Results from exploratory follow-up analyses examined whether there were differences when the emerged/persistent STBs group was split into emerged vs. persistent STBs compared to no/remitted STBs (Supplemental Table 2). Analyses revealed that dyads with more affective transitions were more likely to have children with persistent STBs than no/remitted STBs, but dyads with children who had emerged STBs did not differ from the no/remitted or persistent STBs group. There were no significant differences after FDR correction for duration of time in a shared positive state or number of visits to a shared neutral state.

3.5. Specificity analyses for STBs versus internalizing, externalizing, and MDD history

Results from follow-up logistic regressions examining the role of our dyadic measures on lifetime history of internalizing, externalizing, and MDD, controlling for the same variables as previous models, were conducted to assess the specificity of findings to STBs (supplemental Tables 2–4). Dyadic affect variables did not predict a lifetime history of internalizing, externalizing, or MDD.

4. Discussion

Given the increasing prevalence of STBs in children and preadolescents, this study examined caregiver-child affective dynamics during early childhood as a predictor of STB risk. Using a dynamic systems approach, we analyzed caregiver-child affective dynamics during preschool, focusing on affective flexibility and shared affect. More affective transitions and shared neutral affect were associated with greater STB risk, while longer shared positive affect was associated with reduced STB likelihood. Supplemental analyses exploring differences between the emerged and persistent group revealed that more affective transitions were linked with a higher likelihood of being in the persistent STB group. These findings demonstrate that dyadic affective patterns differ between emerged and persistent STBs and no/remitted STBs in meaningful ways, highlighting caregiver-child interactions as an early STB risk factor.

Inconsistent with hypotheses, we found that greater dyadic affective flexibility, defined by more affective transitions, predicted STB group membership. Dyads with more affective transitions during the preschool assessment were more likely to have offsprings in the emerged/persistent STB group. Follow-up analyses revealed this to be particularly true for the persistent STBs group. While dyadic flexibility is often considered adaptive, in dysfunctional caregiver-child interactions, greater flexibility may reflect greater child emotion dysregulation and inconsistent parenting. Our findings are in line with work suggesting that measures of dyadic flexibility alone are not enough to determine the adaptiveness of an interaction (Lobo & Lunkenheimer, 2020). Greater variability in less positive interactions may hinder co-regulation, especially in children with clinical symptoms and high dysregulation (Lunkenheimer et al., 2016) contributing to STBs risk.

As predicted, members of the emerged/persistent STB group had less shared positive and more visits to neutral affect during dyadic interactions compared to the no/remitted group. Importantly, shared positive affect emerged as uniquely contributing to STB risk. This is consistent with work demonstrating the importance of high positive interactions for child outcomes (Kochanska et al., 2008). However, it also extends the literature by demonstrating how a lack of shared positive affect early in life may increase risk for STBs in at-risk children. Shared positive affect with a caregiver early in development influences the dyads emotional bond, laying the foundation for healthy development and encouraging resilience in the face of stress. When young children do not experience positive emotions with a caregiver, they may struggle to effectively manage intense emotions, an impairment that may contribute to the development of STBs.

While the detrimental impact of low positive shared affect is unlikely to be unique to STBs, our associations emerged even after controlling for internalizing and externalizing symptoms. Moreover, follow-up analyses with our data (Supplemental Tables 3–5) showed that these dyadic measures did not predict lifetime prevalence of internalizing, externalizing, or MDD. The specificity of our findings to STBs highlights the importance of positive caregiver-child interactions during the preschool period to early-life risk for STBs.

While we had hypothesized that more shared negative affect would predict STB status, negative affect was low in our sample regardless of STB status. It is possible this was due to the mildly stressful nature of the tasks. It is also possible, however, that in the context of STBs, a lack of developmentally expected positive shared affect (rather than simply higher negative affect) is a more potent signal of impaired affective dynamics within this group. The specificity of our finding to shared positive and neutral affect is not unique to this study as others have found similar patterns (e.g., Guo et al., 2015).

Our findings have clinical implications. First, dyadic-level factors during preschool relate to risk of STBs into preadolescence, which may help identify children who are at high risk of experiencing STBs. This early identification could then be used in targeted prevention efforts by enhancing shared positive affect with a caregiver. Second, our findings suggest that interventions focused on enhancing dyadic positive emotions could be useful to improve child symptoms and enhance the quality of the caregiver-child relationship. Lastly, these findings underscore the importance of moving beyond assessments of individual, child-level factors to consider dyadic and relational aspects of functioning when assessing for STBs risk.

Limitations should also be noted. Our study reports on secondary data analysis of a randomized control trial and needs to be interpreted considering the RCT inclusion criteria (e.g., enriched for PO-MDD) and exclusion criteria (e.g., developmental disorders, antidepressant medication use, and ongoing psychotherapy). This sample was largely composed of White children, so the generalizability of our findings to other populations is limited. We chose developmentally appropriate tasks for the caregiver-child interactions, yet the level of negative affect was generally low, potentially precluding a thorough exploration of how shared negative affect may influence STBs.

We found that more dyadic affective transitions, less shared positive affect, and more shared neutral affect – all possible measures of less effective dyadic affective patterns – were more likely to have persistent or emerged STBs compared to no or remitted STBs during preschool and preadolescence. Our findings offer a noteworthy and unique contribution to the literature by underscoring the importance of early caregiver-child affective dynamics on the emergence and maintenance of STBs early in life.

CRediT authorship contribution statement

Laura E. Quiñones-Camacho: Conceptualization, Visualization, Writing – original draft, Writing – review & editing. **Kirsten E. Gilbert:** Writing – original draft, Writing – review & editing, Conceptualization, Methodology. **Laura Hennefield:** Writing – original draft, Writing – review & editing. **Caroline Hoyniak:** Writing – original draft, Writing – review & editing. **Renee J. Thompson:** Writing – original draft, Writing – review & editing. **Rebecca Tillman:** Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Deanna M. Barch:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing. **Joan L. Luby:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing. **Diana J. Whalen:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2025.113048.

Data availability

Data available from the last author upon request.

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