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Bidirectional Effects of Parental and Adolescent Symptom Change in Trauma-Focused Cognitive Behavioral Therapy

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Objective: The current study examines dynamic, bidirectional associations between parent and adolescent symptom improvement in response to children's therapy for posttraumatic stress disorder (PTSD). ***Method:*** Data were collected from a racially and ethnically heterogeneous sample of 1,807 adolescents (age 13–18 years old; 69% female) and a parent participating in Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) at a community outpatient behavioral health clinic. Parents self-reported their depressive symptoms and youth self-reported their PTSD and depressive symptoms at the onset of treatment and every three months for up to nine months. Using a bivariate dual change score model (BDCSM) we examine: (a) individual dyad members' change in symptoms and (b) the bidirectional associations between changes in the parent's and youth's symptoms across treatment. ***Results:*** Parents' and adolescents' symptoms at the start of treatment were correlated and both parents' and adolescents' symptoms decreased over the course of treatment. Parents' elevated depressive symptoms at each time point contributed to smaller decreases in their children's PTSD and depressive symptoms at the subsequent time point. Adolescents' elevated symptoms at each time point contributed to greater decreases in their parents' symptoms at the subsequent time point. ***Conclusions:*** These findings highlight the impact that parents and children have on each other's response to children's trauma-focused psychotherapy. Notably, parents' depressive symptoms appeared to slow their children's progress in treatment, suggesting that attending to parents' symptoms and providing them with supportive services may be an important adjunct to children's interventions.

Clinical Impact Statement
This study suggests that attending to parents' depressive symptoms may improve children's response to trauma-focused psychotherapy. Thus, for some families, providing parents with supportive services may be an important addition to children's interventions.

Keywords: PTSD, TF-CBT, parent–child relations, parental depression, child psychopathology

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TF-CBT has been identified in systematic reviews and meta-analyses as an efficacious therapy to address symptoms of PTSD as well as co-occurring depression among children and adolescents who have varied histories of trauma exposure (Lenz & Hollenbaugh, 2015; Morina et al., 2016; Pfefferbaum et al., 2019). In addition to helping children overcome the negative effects of trauma, the TF-CBT model also recognizes that parents may be affected by their child's trauma exposure and traumatic stress symptoms and

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attends to parents' resultant psychological distress. Despite the fact that TF-CBT does not directly address forms of parent psychopathology not directly associated with their child's trauma (Martin et al., 2019), it results in improvements in parent depression (Martin et al., 2019).

Although the reciprocal nature of symptoms of psychopathology within families and across generations is well documented (Bornstein, 2016), intergenerational influences on *change* in symptoms in treatment is much less well elucidated. Thus, it is not clear during TF-CBT how changes in the mental health symptoms of one member of the dyad may relate to changes in the other. Understanding these patterns is of critical importance to the treatment of children and adolescents with mental health problems, and to the determination by clinicians as to when and how to involve parents in their children's treatment. This is particularly true for TF-CBT, as although parent involvement in TF-CBT is hypothesized to play an important role in enabling the child to process and recover from trauma-related memories and distress, when, how, and for whom parent involvement is therapeutically beneficial or contraindicated has not been empirically elucidated (Lang et al., 2010). To shed additional light on these processes, the current study examines the bidirectional effects of changes in parental and adolescent symptoms over the course of TF-CBT in a large community clinic-based sample of adolescents.

Assessing the timing and the potential bidirectional association of parent and child symptom improvement in response to children's therapy for PTSD is important because parental depression may have a detrimental impact on children's mental health outcomes (Goodman et al., 2011). Maternal depression has been shown to be associated with children's PTSD symptoms (Morris et al., 2012) and increases children's risk of developing depression (McAdams et al., 2015; Rice, 2010; Tully et al., 2008). Further, children of parents with more severe depression are more likely to have a poor response to treatment for their own trauma-related and depressive symptoms (Eckshtain et al., 2018; Martin et al., 2018). Parental depressive and PTSD symptoms at the outset of treatment are associated with poorer outcomes for children with internalizing, externalizing, and PTSD symptoms (Gladstone et al., 2019; Martin et al., 2019; Ros et al., 2019; Wesseldijk et al., 2018). In addition, a number of studies have found that parental mental health symptoms and distress reactions improve over the course of their child's treatment for traumatic stress and depressive symptoms (Carrion et al., 2013; Holt, Jensen, & Wentzel-Larsen, 2014; Martin et al., 2018; Neill et al., 2018; P. O. Wilkinson et al., 2013).

The effects of children's emotional symptoms on their parents' well-being are also well-recognized within the developmental psychopathology literature (Guo & Slesnick, 2011; Wesseldijk et al., 2018; Wilkinson et al., 2021). Parents frequently experience distress, impaired mental health, and significant parenting stress when their children have mental health symptoms (Raposa et al., 2011; Sellers et al., 2016). Accordingly, several recent studies have found bidirectional predictive effects of both children's and parent's internalizing symptoms (Kuckertz et al., 2018; Wiggins et al., 2014) as well as between adolescents' and parents' symptoms (Hughes & Gullone, 2010; Mennen et al., 2018).

Although there is evidence that the degree of improvement in parental and child symptoms during treatment for childhood depression and anxiety appears to be related (Silverman et al., 2009; Wilkinson et al., 2013), and that mothers' and adolescents' growth curve trajectories across treatment and follow-up indicate that maternal and youth depressive symptoms fluctuate together (Perloe et al., 2014), all three of these studies used only pre- and post-treatment symptom data, precluding the ability to assess patterns of change throughout the course of treatment. Only one study, to our knowledge, has examined the bidirectional effects of treatment for childhood PTSD on symptom change among mothers and their 7–18-year-old children ($n = 47$ dyads; Neill et al., 2018). Maternal depression symptoms and child PTSD symptoms were assessed at each session of a 12-session manualized CBT for PTSD intervention, with bidirectional effects from both parent to child and child to parent identified, but only for parent-reported child PTSD symptoms (i.e., not for children's self-reported PTSD symptoms). Although this is one of the few studies to assess parental symptoms at multiple time points during child treatment, the analyses were limited to families that completed the entire course of treatment and parents who participated in every session, significantly limiting the generalizability of the findings given that dropout rates in community child and adolescent therapy settings range from 17% to 72% (de Haan et al., 2013).

The current study therefore aims to ascertain the patterns of change in psychopathology symptoms within a family system to determine the dynamic relationships between parental depressive symptoms and adolescents' PTSD and depressive symptoms. To this end, we examine (a) individual dyad members' change in symptoms (i.e., maternal depression, youth PTSD and depression) and (b) bidirectional associations between changes in the parent's and youth's symptoms during the course of community-based TF-CBT. Symptoms were assessed at four time points: the onset of treatment and every three months over the course of up to nine months of TF-CBT. While it was hypothesized that both parents' and adolescents' symptoms would improve over the course of treatment, no a priori hypotheses were made regarding if these changes would be parent- or child-driven due to limited previous examinations in this area.

We focused our investigation on adolescence. Parental factors are frequently identified as significant contributors to youth depression and PTSD (Gil-Rivas et al., 2004; Restifo & Bögels, 2009). Further, adolescence is a developmental period in which parent–child relationships are undergoing significant transformation, often are strained, yet remain important social and emotional resources for youth (Laursen et al., 2009). Together, these factors may amplify the mutual impact of parents' and adolescents' symptoms. Additionally, therapeutic interventions with adolescents often involve less parental participation than interventions with younger children (Wright et al., 2019); additional examination of these processes may help to determine the benefit of increased parental involvement in adolescent interventions.

Method

Procedures

Clinicians delivered TF-CBT through in-person 45 to 50-min sessions. They administered baseline assessment measures as part of their routine intake and initial evaluation process for treatment planning including determining the appropriateness for TF-CBT.

Assessments were re-administered at 90-day intervals and at discharge to monitor treatment progress; only assessments that fell within ± 14 days of each 90-day time point were included in the current study. Assessments were completed primarily via face-to-face interviews, sometimes by self-report, and included parent- and child-reported clinical symptom measures and clinician-reported session attendance and treatment model adherence. Data were entered into a secure, online administrative data system designed to measure and report on treatment and mental health outcomes of children receiving evidence-based treatment for quality improvement purposes.

Participants

Data for the current study were collected from January 2014 to April 2018 as part of a statewide TF-CBT dissemination and sustainability initiative administered by the Child Health and Development Institute of Connecticut funded by the state of Connecticut for the purpose of improving the quality of treatment provided to children who have experienced trauma. Clinicians received TF-CBT training and consultation from certified national trainers. This quality improvement initiative was determined to be exempt by the UConn Health Institutional Review Board. Data were reported every three months by 3,902 children and youth receiving TF-CBT at participating community outpatient behavioral health settings, their parents, and their clinicians. During the study period, there were 497 clinicians delivering TF-CBT to children and families as part of the initiative. Because these data are from a community treatment-seeking sample there were no inclusion or exclusion criteria other than the family sought treatment at a participating community outpatient clinic and the clinician determined that TF-CBT was appropriate to address the child's presenting concern.

The study sample was limited to youth ages 13–18 ($n = 1,807$) and a relative caregiver. Participants with a nonrelative adult participating in treatment ($n = 174$; e.g., group home staff member) and dyads missing data on all symptom variables ($n = 465$) were removed from the study sample, resulting in a final study sample of 1,168 dyads (mean child age = 15.13, $SD = 1.51$; 68.5% female, 31% male, 0.5% other). The racial/ethnic identification of the youth in the study sample was 37% Hispanic/Latinx, 44% White Non-Hispanic, 14% Black Non-Hispanic, and 6% other. Adults identified as the primary caregiver were 71% birth, adoptive, or step- mothers; 12% birth, adoptive, or step- fathers; 7% grandparents; 6% foster parents; and 4% other extended family members (e.g., adult siblings, aunts, or uncles). Although a sizable proportion of primary caregivers were extended family members, for consistency and to capture their role as the child's primary caregiver, the term "parent" is used throughout the paper to refer to the adult TF-CBT participant. Because family income was only recorded for approximately 30% of the sample; socioeconomic status is approximated by mothers' reported education level: 7% less than a high school degree, 23% high school degree or GED, 13% some college or an Associate's Degree, and 8% Bachelors or graduate degree. Because this is administrative data, it is not limited to families who completed treatment or attended regularly, as is often the case with clinical treatment studies. The mean (standard deviation) number of sessions attended during each 90-day period was: 7.20 (4.07) from baseline to Time 2 (T2), 6.90 (4.84) from T2 to Time 3 (T3), and 7.09 (5.25) from T3 to Time 4 (T4).

Measures

Parental Depressive Symptoms

Parental depressive symptoms were self-reported by parents using the Center for Epidemiologic Studies Depression Scale Revised (CESD-R; Eaton et al., 2004), a 20-item measure that evaluates symptoms of depression within nine subscales (e.g., sadness, sleep, and thinking/concentration) experienced during the previous week. Items are scored from 0–3 (*not at all or less than 1 day [0], 1–2 days [1], 3–4 days [2], 5–7 days [3]*). The CESD-R has been used with diverse populations and demonstrated good internal consistency, reliability, and validity (Cosco et al., 2017; Van Dam & Earleywine, 2011). Alphas in the current study across the four time points ranged from 0.91 to 0.93.

Youth Posttraumatic Stress Symptoms

Youth PTSD symptoms were assessed using the Child PTSD Symptom Scale (CPSS; Foa et al., 2001). The CPSS is a 17-item self-report scale for children ages 8–18 years old that evaluates the frequency with which traumatic stress symptoms have occurred in the past two weeks. Items are scored 0–3 (*not at all [0], once a week or less/once in a while [1], two to four times a week/half the time [2], and five or more times a week/almost always [3]*). It is a valid and reliable measure with demonstrated internal consistency, test-retest reliability, as well as convergent and divergent validity within an ethnically diverse sample of children and adolescents (Foa et al., 2018). Alphas in the current study ranged from 0.88 to 0.91 across the four time points.

Youth Depressive Symptoms

Youth depressive symptoms were assessed using the Short Mood and Feelings Questionnaire (SMFQ; Sharp et al., 2006), a 13-item self-report measure that assesses the cognitive and affective symptoms of depression experienced over the past two weeks. Items are scored 0–2 (*not true [0], sometimes [1], true [2]*). Alphas in the current study ranged from 0.89 to 0.91. The SMFQ has demonstrated criterion validity among an ethnically diverse sample of youth (Rhew et al., 2010) and internal reliability and discriminate validity among psychiatric outpatient and nonreferred children and youth (Angold et al., 1995).

Analytic Plan

The current study uses a bivariate dual change score model (BDCSM) to examine the interconnected patterns of improvement in symptoms among parents and adolescents over the course of TF-CBT. The BDCSM combines features of both growth curve modeling and cross-lagged panel models to model dynamic relations between constructs or dyad members. The BDCSM estimates latent change scores, which reflect the change in a variable from the prior time point to the subsequent time point, and are decomposed into proportional change, constant change, and coupling parameters. The proportional change parameter indicates how much (and in what direction) the level of the variable at the prior time point affects the change that occurs between the prior and current time points and is measured by the estimated parameter between the previous time point's true score and the latent change variable (Matusik et al.,

2021). The constant change component indicates the general increasing or decreasing trend on latent change across all time points, measured by the slope. The longitudinal coupling parameter captures the effect of one dyad member's variable level at time $t-1$ on the latent change of the other dyad member's variable between time $t-1$ and time t (McArdle & Nesselroade, 2014). By combining the constant, proportional change, and coupling parameters into one model, the BDCSM for the current study measures the extent to which the individual's and dyad member's symptom level at one time point either accelerates or slows down (the proportional change component) the effect of systematic growth (the constant change component) on the changes in their own and their partner's symptom level by the next time point (McArdle, 2009). This means that the model provides information about the rate and direction of change in parents' and youth's symptoms across the course of treatment, and the influence each dyad member's prior symptoms have on their own and the other member's rate and direction of change in symptoms.

Model fit was assessed in the sequence described by Grimm et al. (2016). First, we examined the change in symptoms for each dyad member separately by comparing the fit of four univariate latent change score models: (a) a *no change model*, in which scores do not change over time; (b) a *constant change model* that modeled a linear change in symptoms over time (by constraining the proportional change portion of the model to zero in order to estimate only the constant change effects); (c) a *proportional change model* that modeled change in symptoms as a function of the level of symptoms at the previous time point (by constraining the constant change portion of the model to zero in order to estimate only the proportional change effects); and (d) a *dual change score model* that incorporated both the constant and proportional change components. Because all three models are nested within the BDCSM, we were able to compare the fit of each of these pairs of models to determine which model of growth best characterized the decline in symptoms for each dyad member, using the Satorra–Bentler scaled chi-square difference test to compare pairs of nested models (Satorra & Bentler, 2001).

Next, we combined the best-fitting univariate models into a BDCSM that included the cross-lagged, or longitudinally coupled, pathways to simultaneously examine the dynamic relations between changes in parents' and youth's symptoms over the course of treatment. Once again, we examined a series of models to identify the one that best fit the data: (a) a model without any cross-dyad longitudinal coupling parameters that, if best fitting, would suggest that parent and youth symptom changes were correlated (i.e., parents and children improve at the same rate) but not coupled (there is no temporal order suggesting one member's change "leads" the other's), (b) a model that estimated only child to parent longitudinal coupling parameters, (c) a model that estimated only parent to child longitudinal coupling parameters, and (d) a full BDCSM model that included longitudinal coupling parameters from parents to children and from children to parents. Each pair of nested models was compared using the Satorra–Bentler scaled chi-square difference test.

All analyses were completed in SPSS Version 25 (IBM Corp., 2017) and Mplus Version 8.5 (Muthén & Muthén, 1998–2017). Data were examined for univariate and multivariate outliers, normality, skewness, and kurtosis. Participants missing symptom data at all time points were removed from the analyses ($N = 465$). Models were estimated using Full Information Maximum Likelihood (FIML) with all available data under a missing at-random assumption.

Results

Descriptive Statistics

Sample sizes, means, standard deviations, and correlations of adolescent depression and PTSD and parent depression scores at each of the four time points, as well as adolescents' age and the number of sessions they attended in each wave, are presented in Table 1. Because youths' depression and PTSD scores were strongly intercorrelated at each time point (significant rs ranging from .71–.82), we combined these measures into a latent variable (Youth Mental Health Symptoms) in the BDCSM. Thus model-estimated means of youth mental health symptoms in the BDCSM reflect this latent variable score. Associations with parent depression were relatively modest, and primarily limited to the earlier time points (significant rs ranging from .15–.36). Youth were highly symptomatic at the start of treatment, with 56% of youth reporting depression symptom scores that exceed the clinical cut-off for major depressive disorder (score = 8 on the SMFQ; $M = 11.1$, $SD = 6.7$) and 68% reporting posttraumatic stress symptoms that exceed the clinical cut-off for a PTSD diagnosis (score = 16 on the CPSS; $M = 23.0$, $SD = 11.4$). Parents also endorsed high levels of depressive symptoms at baseline, with 43% of parents reporting scores of 16 or higher, which are considered clinically significant on the CES-D ($M = 15.9$, $SD = 13.4$). Because children's age was associated with symptom scores at the first three time points, we centered the age variable and included it as a covariate predictor in all models that included youths' scores. The number of sessions attended during the three-month period preceding each assessment was not correlated with either youth or parent symptoms at the corresponding assessment and therefore was not included in the model.

Univariate Dual Change Score Models

A series of univariate models were examined separately for parents and adolescents across four competing models of change to determine the one that best characterized the data.

Parent Univariate DCSM

Fit statistics for the univariate parent models are available in Table 1 in the online supplemental materials. A comparison of nested models revealed that both the no change model and the proportional change model had significantly worse fit than the univariate dual change score model ($\Delta\chi^2$ [4] = 59.02, $p < .001$ and $\Delta\chi^2$ [1] = 12.35, $p = .006$, respectively). However, the comparison of the constant change model to the dual change score model did not result in significant degradation, $\Delta\chi^2$ (1) = 1.27, $p = .26$. Thus, the more parsimonious constant change model was used in the bivariate DCSM to estimate change in parents' depressive symptoms (i.e., the autoregressive proportional change pathways from parents' symptoms to the latent change score of parents' symptoms were not estimated). Thus, the univariate parent model is equivalent to a standard linear growth model.

The parameter estimates from the univariate constant change model of parents' symptom improvement are presented in Figure 1 in the online supplemental materials. The average level of parents' depressive symptoms at baseline was 15.8 ($SE = .46$, $p < .001$), and there was significant variation in initial mean

Table 1
Bivariate Associations and Sample Statistics for Symptom Scores and Children's Age

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Child Depr-T1	—	.60***	.53***	.42***	.71***	.51***	.46***	.24*	.19***	.12	−.10	.22	.16***	.05	.05	.04
2.	Child Depr-T2		—	.55***	.23	.48***	.79***	.47***	.20	.14*	.23***	.15	.12	.11*	.05	.18*	.16
3.	Child Depr-T3			—	.79***	.48***	.51***	.79***	.70***	.01	.13	.21*	.36*	.15*	.03	.06	.07
4.	Child Depr-T4				—	.48***	.27	.66***	.82***	.06	.02	.03	.30*	.16	.16	.02	.05
5.	Child PTSD-T1					—	.56***	.54***	.45***	.18***	.15*	−.04	.15	.16***	.01	.08	−.12
6.	Child PTSD-T2						—	.58***	.30*	.25***	.29***	.21*	.18	.11*	.08	.14	.25*
7.	Child PTSD-T3							—	.76***	.15	.19	.14	.23	.15*	.09	.08	.13
8.	Child PTSD-T4								—	.06	.01	.02	.23	.16	.15	.07	.09
9.	Parent Depr-T1									—	.62***	.48***	.30*	.01	−.04	.10	.09
10.	Parent Depr-T2										—	.49***	.48**	.03	.01	.11	.06
11.	Parent Depr-T3											—	.36*	−.03	.08	.13	.02
12.	Parent Depr-T4												—	−.06	−.01	−.19	−.12
13.	Child's Age													—	−.01	−.11	−.08
14.	# Sessions-T2														—	.69***	.80***
15.	# Sessions-T3															—	.85***
16.	# Sessions-T4																—
	M	11.13	8.90	7.10	6.45	22.99	18.04	15.22	13.37	15.93	13.24	10.46	12.63	15.13	7.20	6.90	7.09
	SD	6.71	6.67	5.70	5.68	11.44	11.46	10.32	10.35	13.43	12.00	9.76	11.72	1.51	4.07	4.84	5.25
	Range	0–26	0–26	0–24	0–24	0–51	0–51	0–45	0–51	0–56	0–48	0–41	0–43	13–18	0–31	0–40	0–38
	N	1,008	392	192	104	1,005	393	192	103	792	268	145	72	1,168	575	291	144

Note. Depr = Depression.
*$p < .05$. **$p < .01$. *** $< .001$.

values, indicating individual differences in the starting levels of parent's depression ($\sigma^2 = 132.6$, $SE = 10.3$, $p < .001$). The constant change component was significant and negative (slope = −2.04, $p < .001$), suggesting parents experienced a progressive decrease in depressive symptoms over time. The impact of the constant change influences on the change in parents' symptoms is estimated by the following equation:

$$\Delta\text{Parent} = \alpha_{\text{parent}} \quad (1)$$

and resulted in model-estimated means of parents' symptoms of 13. 8 at T2, 11.7 at T3, and 9.7 at T4. Parents' intercept and constant change components were negatively correlated (r=−.68, $p < .001$), suggesting that parents with higher levels of depressive symptoms at the start of their children's treatment had more negative constant change components. In other words, the depression scores of parents with higher initial depression fell (improved) more quickly.

Adolescent Univariate DCSM

To examine the adolescents' data, we again compared four competing univariate models, for which the fit statistics are presented in Table 2 in the online supplemental materials. A comparison of nested models revealed that the no change model ($\Delta\chi^2$ [4] = 260.77, $p < .001$), the constant change model ($\Delta\chi^2$ [1] 8.39, $p = .004$) and the proportional change model ($\Delta\chi^2$ [1] 168.05, $p < .001$) each had significantly worse fit when compared with the dual change score model. Therefore, the dual change score model was used to model adolescents' symptom change in the bivariate DCSM model.

The parameter estimates from the univariate DCSM of adolescents' mental health symptom improvement are presented in Figure 2 in the online supplemental materials. The average level of adolescents' combined PTSD and depressive symptoms at the start of treatment was 11.2 ($SE = .20$, $p < .001$). There was significant variation, indicating individual differences in the starting levels of youths' mental health symptoms (σ^2 = 31.7, $SE = 1.8$, $p < .001$), and youths' symptoms were predicted by their age ($b = .76$, $p < .001$), with older adolescents reporting greater symptoms. Youths' intercept and slope were not correlated, suggesting their response to treatment was not associated with their initial symptom level. The constant change component (slope) for this univariate model ($\alpha = 1.81$) was not significantly different from zero ($p = .16$). Youths' proportional change parameter was significant and negative ($b = -0.39$, $p = .002$) indicating a slowing of the change in adolescents' mental health symptoms over the course of treatment. The combined impact of the constant and proportional change influences on the change in youths' mental health symptoms is estimated by the following equation:

$$\Delta\text{Child} = \alpha_{\text{child}} + (b_{\text{child}} * \text{child}_{\text{previous}}) \quad (2)$$

and resulted in model-estimated means of youths' mental health symptoms of 8.6 at T2, 7.0 at T3 and 6.1 at T4.

Bivariate Dual Change Score Models

To examine the dynamic relations between parent and adolescent symptom change, we modeled them simultaneously in a series of BDCSMs using the best-fitting univariate models. In addition to the constant and proportional change parameters examined in the univariate models, coupling parameters estimating the influence of one dyad members' symptoms at time $t-1$ on the change in the other member's symptoms at time t were added to the model, and covariances between the parents' and children's slopes and intercepts were estimated.

A full BDCSM fit the model reasonably well, χ^2 (71) = 222.522, $p < .001$, root mean square error of approximation (RMSEA) = .043, 95% CI [.036, .049], comparative fit index/

Tucker Lewis Index (CFI/TLI) = .916/.908, standardized root mean square residual (SRMR) = .09. We compared this model to three additional competing (and nested) models to determine the model that best fit the data: (a) a model that estimated only parent-to-child longitudinal coupling parameters, (b) a model that estimated only child to parent longitudinal coupling parameters, and (c) a model without any cross dyad longitudinal coupling parameters. Fit statistics for the four BDCSMs are presented in Table 2. Each of the competing models resulted in a significant degradation of fit when compared with the full BDCSM. Therefore, the comparison of models supported the use of the full BDCSM.

Parameter estimates for the BDCSM are presented in Figure 1. Adolescents' combined PTSD and depressive symptoms at T1 (the start of treatment) were predicted by their age, with older youth reporting higher scores ($b = 0.42$, $p = .001$). At T1, the predicted value of youths' mental health symptoms (children's intercept) for youth at the mean age ($M = 15.1$ years) was 11.09 ($SE = .20$, $p < .001$) and the mean level of parents' symptoms (parents' intercept) was 16.1 ($SE = .48$, $p < .001$). These intercepts were positively correlated with each other ($r = .25$, $p < .001$), suggesting that adolescents with higher levels of mental health symptoms at the start of treatment had parents with higher levels of depressive symptoms at the start of treatment.

For parents, change in depressive symptoms across treatment was estimated by the constant change component (slope) and the coupling parameter from the adolescent (youths' level of mental health symptoms at the previous time point). Their combined impact on the change in parents' symptoms is estimated by the following equation:

$$\Delta\text{Parent} = \alpha_{\text{parent}} + (\Upsilon_{\text{child}} * \text{child}_{\text{previous}}) \quad (3)$$

The mean of the constant change component for parents was not significantly different from zero (slope = 3.287, $SE = 1.77$, $p = .063$). The coupling parameter from adolescents' symptoms at the previous time point was statistically significant and negative ($b = -0.571$, $p = .003$), indicating that youth with higher levels of symptoms at one time point had parents with more negative latent change scores at the subsequent time point. These associations are made clearer when we calculate the change scores using Equation 3:

$$\Delta\text{Parent at T2} = 3.287 + (-.571 * 11.09) = -3.04$$
$$\Delta\text{Parent at T3} = 3.287 + (-.571 * 8.84) = -1.76$$
$$\Delta\text{Parent at T4} = 3.287 + (-.571 * 6.93) = -0.67$$

which result in model-estimated means of parents' depressive symptoms of 13.04 at T2, 11.28 at T3, and 10.61 at T4 (see also, Table 3 in the online supplemental materials). The higher the youths' previous mental health symptom level, the larger the parent's decrease in depressive symptoms at the subsequent time point. As a result, as adolescents' symptoms decreased across treatment, parents' depressive symptoms also dropped, albeit more slowly.

For adolescents, change in symptoms across treatment was estimated by the constant change component (slope), the auto-proportional change (youths' level of mental health symptoms at the previous time point) and the coupling parameter (the effect of parents' depressive symptoms at the previous time point on change in youth's mental health symptoms). The combined impact of these influences is estimated by the following equation:

$$\Delta\text{Child} = \alpha_{\text{child}} + (b_{\text{child}} * \text{child}_{\text{previous}}) + (\Upsilon_{\text{parent}} * \text{parent}_{\text{previous}}) \quad (4)$$

This model produced a negative, but not significant, constant change component (slope = −1.742, $SE = 3.07$, $p = .57$) and a negative, statistically significant auto-proportional change component ($b = -1.602$, $p < .001$). The negative slope reflects an underlying decrease in adolescents' mental health symptoms across treatment. The auto-proportional change component is also negative, indicating that the change in adolescents' previous symptom levels decreases at a rate proportional to their symptoms at the prior time point. However, the magnitude of this auto-proportional effect diminishes across time as symptom levels from the prior time point decrease. The coupling parameter from parents' previous depressive symptoms to the change in youth mental health was positive and statistically significant ($b = 1.073$, $p < .001$), meaning parents' higher levels of prior depression symptoms were associated with less negative change in adolescents' symptoms at the next time point (i.e., contributing to smaller decreases in their PTSD and depressive symptoms). Combining the constant, auto-proportional, and coupled-proportional influences on the changes in youth symptom scores, we can estimate adolescents' change scores at each time point using Equation 4 (see Table 4 in the online supplemental materials):

$$\Delta\text{Child T2} = -1.742 + (-1.602 * 11.086) + (1.073 * 16.076) = -2.25$$
$$\Delta\text{Child T3} = -1.742 + (-1.602 * 8.84) + (1.073 * 13.03) = -1.91$$
$$\Delta\text{Child T4} = -1.742 + (-1.602 * 6.93) + (1.073 * 11.27) = -0.74$$

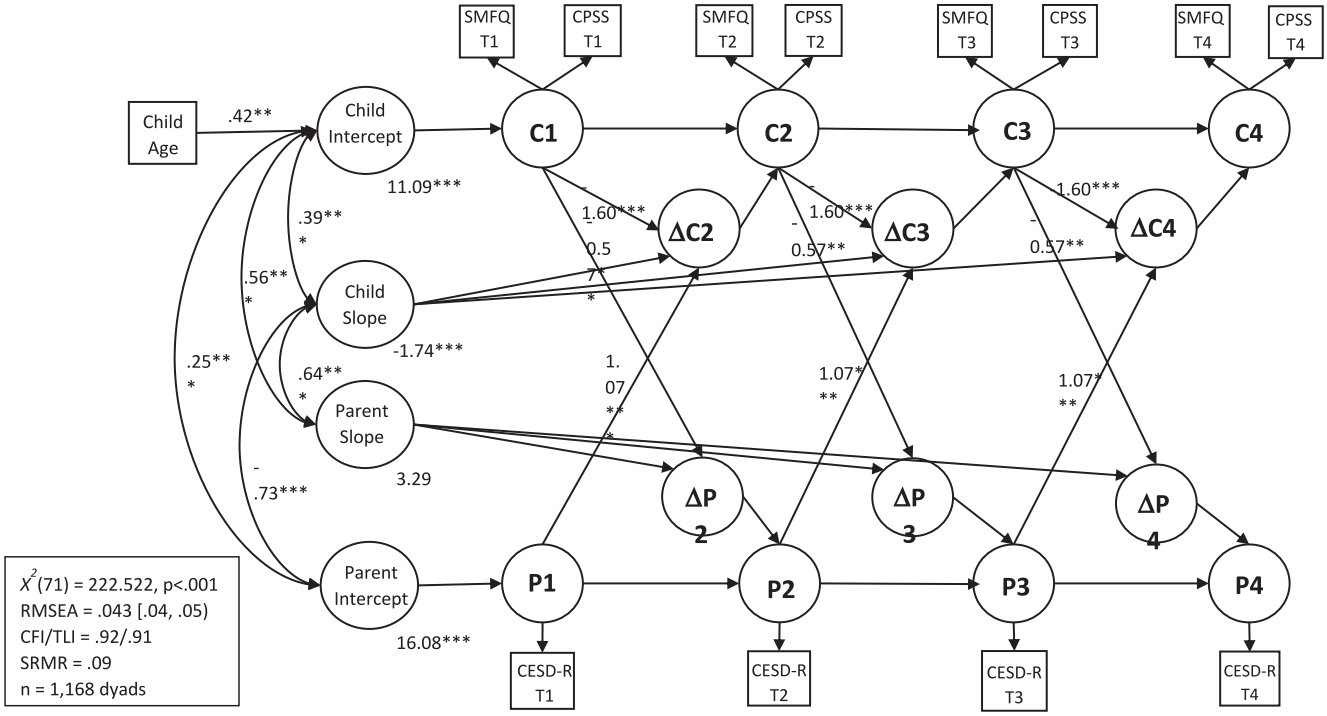
From these equations, we see that at each time point, the latent change score decreases as a function of constant change and the

Table 2
Bivariate Dual Change Score Model (DCSM) Fit Comparisons

Model	χ^2	*Df*	*p*	RMSEA	CFI	TLI	SRMR
1. Parent-to-child coupling only	234.037	72	<.001	0.044	0.910	0.903	0.09
2. Child-to-parent coupling only	304.338	72	<.001	0.053	0.871	0.861	0.12
3. No coupling	310.765	73	<.001				
4. Full bivariate DCSM	222.522	71	<.001	0.043	0.916	0.908	0.09
Nested comparisons	SB$\Delta\chi^2$	Δdf	*p*				
Parent-to-child coupling to full coupling	1.947	1	<.001				
Child-to-parent coupling to full coupling	28.655	1	<.001				
No coupling to full coupling	47.354	2	<.001				

Figure 1

Bivariate Dual Change Score Model for Parents' and Children's Symptoms



Note. Diagram with path coefficients for the bivariate model of children's mental health (depressive and PTSD) symptoms and parents' depressive symptoms. CPSS = Child PTSD Symptoms Scale; SFSQ = Short Mood and Feelings Questionnaire; CESD-R = Center for Epidemiologic Studies Depression Scale Revised. Paths with no coefficient are fixed to 1.
*$p < .05$. **$p < .01$. *** $< .001$.

level of the youth's prior mental health symptoms (which are, on average, decreasing across time) but increases as a function of the parent's prior depression symptoms (which are also, on average, decreasing across time). That is, higher prior youth depression and PTSD symptoms exert a downward influence on the latent change score, and higher parent depressive symptoms exert an upward influence on the latent change score, leading to a slowing in adolescents' rate of improvement across treatment. The final model resulted in model-estimated means of youths' mental health symptoms of 8.8 at T2, 6.9 at T3 and 6.2 at T4.

The positive correlation between parents' and adolescents' constant change components ($r = .64$, $p < .001$), indicates the constant change components in parents' and youths' symptoms fluctuated with each other. Adolescents' constant change component and intercept were positively correlated ($r = .39$, $p < .001$), suggesting that for youth, higher levels of mental health symptoms at the start of treatment were associated with a more positive constant change component (i.e., their constant change component was less negative). The correlation between parents' constant change component and parents' intercept was not statistically significant ($r = -.23$, $p = .095$). Adolescents' constant change component was negatively correlated with parents' intercept ($r = -.73$, $p < .001$), suggesting parents with higher symptoms at baseline tended to have children with more negative constant change components. In contrast, parents' constant change component was positively associated with their adolescents' intercept ($r = .56$, $p < .001$) suggesting youth with higher mental health symptoms at the start of treatment had parents with more positive constant change components.

Discussion

Although associations among parental depression and adolescents' mental health have been previously observed, little is known about patterns of *change* in psychopathology symptoms within a family system that results from children's psychotherapeutic interventions. The current study, therefore, examined these patterns among a racially and ethnically diverse sample of adolescents and their parents during the course of community-based treatment to address children's trauma.

Study results demonstrated that both parents' and adolescents' symptoms improved over the course of nine months of TF-CBT. Adolescents' PTSD and depressive symptoms declined dramatically during treatment, although progress was slower for youth who started treatment with a higher level of symptoms. Parents also appeared to vicariously benefit from their children's psychotherapeutic treatment. At the outset of treatment, parents' depressive symptoms were, on average, very near the clinical range for major depression. As hypothesized, and consistent with previous studies of TF-CBT (Martin et al., 2019), parents' symptoms systematically decreased over the course of treatment.

In addition, by examining changes in parents' and children's symptoms over the course of treatment, the current study moves beyond previous studies of correlated associations between parent

and child symptoms (Morris et al., 2012; Perloe et al., 2014; Wilkinson et al., 2013) and begins to shed light on the temporal order of parents' and children's symptom change over the course of psychotherapy. There are a number of possible explanations for why both parents and children benefit when children receive treatment to address their traumatic experiences. On the one hand, it is possible that parents' symptoms improve as a response to a decrease in their children's symptoms. Within the developmental psychopathology literature, the reverse and reciprocal effects that child factors (e.g., temperament, behavior) have on parenting behaviors and parent–child interactions are well established (Bornstein, 2016). Analogously, a child's trauma-related symptoms may contribute to or exacerbate his or her parents' depressive symptoms. An alternative possibility is that children's symptoms improve as a response to a decrease in parents' symptoms. In this scenario, it is theorized that parents learn coping skills to address their own symptoms or to manage their distress associated with their child's trauma either directly or indirectly via participation in their children's treatment.

The fact that the BDCSM model provided the best fit of the data among the four tested bivariate models suggests that one member of the dyad "led" the changes in the other. A review of the model's path coefficients suggests that parents influenced their children's response to treatment. Specifically, the data in the current study provide initial support for the idea that adolescents' self-reported symptoms improved, in part, as a response to a decrease in their parents' symptoms. Within this sample of treatment-seeking families, adolescents with parents who entered treatment with greater levels of depressive symptoms tended to have higher levels of their own PTSD and depressive symptoms at the start of treatment. Further, parents' high levels of depressive symptoms appear to have interfered with adolescents' improvement, as children of parents with elevated depressive symptoms demonstrated smaller decreases in symptoms at the subsequent time point compared with children of parents with lower symptoms. In this way, parents' symptoms acted as a brake on children's improvement across treatment, slowing their progress. However, as parents' symptoms remitted over time, so did their slowing influence. These findings are consistent with previous studies documenting an association between parental depressive and PTSD symptoms at the outset of treatment and poorer outcomes for children with internalizing, externalizing, and PTSD symptoms (Gladstone et al., 2019; Martin et al., 2019; Ros et al., 2019; Wesseldijk et al., 2018).

Parental depression may make it more difficult to respond supportively to a child's symptoms. Indeed, parents who have difficulty regulating their emotions are more likely to respond negatively to their children's negative affect (Martin et al., 2018; Morris et al., 2007), which, in turn, is associated both cross-sectionally and longitudinally with youth internalizing and externalizing problems (Klimes-Dougan et al., 2007; Schwartz et al., 2014). Similarly, children's traumatic experiences may be painful reminders of parents' past experiences that could cause them to withdraw or, alternatively, could trigger their own posttraumatic reactions that might exacerbate their child's symptoms (Scheeringa & Zeenah, 2001).

This suggests that when parents learn coping skills to address their own symptoms or to manage their distress associated with their child's trauma either directly or indirectly via participation in their children's treatment, these improvements in parental symptoms may lead to greater responsivity by a parent to their child. As parents' depressive symptoms decrease, they may be better able to provide their child with the support needed to help them recover from traumatic stress, and thus the child's symptoms may remit more rapidly. This would be consistent with evidence that when parents seek their own treatment for depression, children's symptoms also improve (Gunlicks & Weissman, 2008) and that changes in parental depression have been found to mediate changes in children's depressive and PTSD symptoms from pre- to post-treatment among traumatized youth (Holt, Cohen, et al., 2014; Neill et al., 2018).

Surprisingly, adolescents' PTSD and depressive symptoms at each time point contributed to *decreases* in their parents' symptoms at the subsequent time point. In other words, adolescents' PTSD and depressive symptoms accelerated their parents' response to treatment. This seems inconsistent with previous studies documenting that parents frequently experience distress, and potentially impaired mental health, as a result of their children's symptoms and experiences (Raposa et al., 2011; Sellers et al., 2016). It may be that for parents of highly symptomatic children, enrolling them in therapy provides relief from their worry, and contributes to the remittance of their depressive symptoms. Alternatively, once children are enrolled in treatment, parents' concern for their children may cause them to value the role of therapy, and lead them to be more committed to and engaged with their child's treatment (Self-Brown et al., 2016), which, in turn, produces greater vicarious benefits to themselves.

Clinical Implications

These findings underscore the substantial impact that parents and children have on each other's response to children's treatment to address posttraumatic symptoms. Parents who are experiencing depressive symptoms may find it difficult to engage fully or effectively in their children's treatment or may engage in treatment-interfering behaviors. The reductions in depression symptoms shown by parents during their child's trauma-focused treatment suggest that participating in, and seeing their child benefit from, trauma-focused therapy may substantially ameliorate the parent's depression. Thus, for many parents, separate treatment may not be necessary in order to recover. However, child-focused treatment may not be sufficient to assist some parents who have severe depression symptoms, and thus therapists should also carefully monitor parental symptoms to detect any cases in which those symptoms are distressing for the child or sufficiently severe to require separate treatment. This may have been the case for some parents in the current study; whether the parents who were receiving TF-CBT in this cohort also were receiving individual therapy was not assessed.

Study findings suggest that high levels of children's PTSD and depressive symptoms do not interfere with parents' ability to reap benefits from their children's treatment. Indeed, parents whose children are experiencing relatively high levels of symptoms may benefit more than other parents in TF-CBT. This could be due to those parents being more engaged in their children's treatment due to higher levels of distress, the parents feeling less distress when a child is able to reduce their posttraumatic symptom severity to a more manageable level as TF-CBT progresses, or to another aspect of the therapy or the parent–child interaction and relationship.

Limitations

There are several limitations that should be acknowledged. First, the data examined here were not collected within the context of a controlled research study. These are administrative data collected and utilized with the intention of improving the quality of services provided to children

who have experienced trauma. As such, there were inconsistencies in the timing of assessments, the frequency of sessions, the extent of parents' participation, and the length of treatment. While this makes for "messier" data, it also means that the data represent what actually occurs in community mental health. To the best of our ability, we addressed these factors by including only assessments that fell within ± 14 days of each 90-day time point, examining session frequency as a covariate, and utilizing FIML to retain families with missing assessments over the nine-month treatment period. Another caveat of examining administrative data is that there were no inclusion or exclusion criteria. As a result, children and adults with unassessed co-morbidities may have been included in the sample. While this may increase the possibility that other types of symptoms (e.g., parental PTSD or substance use) are contributing to the identified associations, it also increases the generalizability of the findings to describe patterns of psychopathological symptoms among parents and adolescents. In contrast, some clinical trials of TF-CBT exclude parents with psychological problems that may interfere with treatment (de Arellano et al., 2014), and therefore may not reflect community treatment-seeking populations. Finally, because this was child treatment data, there was limited assessment of parents. Future studies would benefit from the inclusion of additional parent symptoms (e.g., trauma-related symptoms) as well as other parent characteristics and parent–child relationship factors that might influence treatment outcomes.

The amount of drop-out across the nine-month treatment period is also a limitation of the current data, resulting in a significantly smaller sample size at the later time points as compared with T1. This is not surprising or unusual in outpatient psychotherapy. Although many of the children who discontinued prior to the final time point may have successfully completed their course of therapy, others may have dropped out of treatment prematurely. Attrition does affect the analytical power to identify significant effects at a later time point, (i.e., the lack of significant correlations between parental depressive and child PTSD symptoms at time points 3 and 4). However, because both parent and child mental health symptoms at subsequent time points were well predicted by their own scores at the prior time points (see Table 1), we feel confident about our assumption that the data were missing at random, which underpins all of our analyses (Enders, 2010). Nevertheless, findings should be interpreted in this context.

A final limitation is the consideration of gender. Consistent with epidemiological research (Merikangas et al., 2010), female youth reported higher levels of depressive and PTSD symptoms across time points, and mothers reported higher levels of depressive symptoms at baseline than fathers. However, differences on symptom means by gender do not necessarily mean that the DCSM differs by gender; that is, a youth's and parent's response to treatment and the rates of change in symptom levels across time may or may not be influenced by the parent's or child's gender. To answer that question, we would need to conduct multiple group models (i.e., separate models for boys and girls; mothers and fathers); however, we did not have a large enough sample to do so. This is an important question to address in future studies.

Conclusion

The current study provides an examination of the intergenerational, and bidirectional, associations in psychopathology symptoms within a family system during the course of community-based TF-CBT. While both parents and youth benefitted from participation in the intervention, the data suggest that changes in symptoms of each member of the dyad had an impact on each other. Notably, parents' depressive symptoms appeared to slow their children's progress in treatment, suggesting that attending to parents' symptoms and providing them with supportive services may be an important adjunct to children's interventions.

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