



Perceived social support and posttraumatic stress symptoms in children and youth in therapy: A parallel process latent growth curve model



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ABSTRACT

Many studies show that perceived social support protects against the development of posttraumatic stress symptoms (PTSS) in the aftermath of trauma, but less is known about support in relation to PTSS in trauma therapy. This study examined associations between perceived social support and PTSS in children and adolescents during trauma therapy. Parallel process latent growth curve modeling was used to examine trajectories of perceived social support and PTSS over five measurement waves in a sample of 156 patients, aged between 10 and 18 years (M age = 15.1, SD = 2.2, 79.5% girls), randomized to receive trauma-focused cognitive behavior therapy (TF-CBT) or therapy-as-usual (TAU). Across all participants there was an average decline in PTSS and increase of perceived social support from pre-therapy to 18 months after therapy. Most of the change occurred during therapy and was maintained after therapy. Higher levels of PTSS prior to therapy were associated with lower levels of perceived social support prior to therapy, and a decrease in PTSS was associated with increase in perceived social support. This co-development may have been directed by a third underlying factor or short-term temporal effects. Studies investigating within-person associations over shorter time intervals will benefit our understanding of possible temporal effects.

1. Introduction

The association between low perceived social support, defined as “the perception that others would provide assistance and care in time of need” (Thoits, 2011), and high levels of posttraumatic stress symptoms (PTSS) after traumatic events is well-established (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). This is also found in youth (Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Less is known about the role of perceived social support in therapy for PTSS, particularly in youth. Since social support can increase resilience in trauma-exposed individuals (Sippel, Pietrzak, Charney, Mayes, & Southwick, 2015), it is pertinent to delineate how social support and PTSS are related to each other in youth trauma therapy.

High levels of perceived social support after trauma may be associated with a faster natural recovery (Birkeland, Nielsen, Hansen, Knardahl, & Heir, 2017). For youth who are starting therapy, high social support prior to therapy start may be associated with reduction in PTSS. For example, individuals with strong social support may receive supporting care, as well as encouragement to confront trauma-related stimuli and to stay in therapy when it becomes emotionally challenging.

Four adult therapy studies have examined the association between pre-therapy perceived social support and reduction in PTSD (Price et al., 2018; Price, Gros, Strachan, Ruggiero, & Acierno, 2013; Shnaider, Sijercic, Wanklyn, Suvak, & Monson, 2017; Thrasher, Power, Morant, Marks, & Dalgleish, 2010). All found that better pre-therapy social support was associated with greater reductions in PTSD symptoms. In addition, poor social support was found to be associated with higher probability of dropout from trauma-focused PTSD therapy (Gros, Price, Yuen, & Acierno, 2013).

For youth, parents and caregivers may be among the most important sources of social support. In one study, parents who reported that they provided their children with high levels of support, had children with lower levels of PTSS post-therapy (Cohen & Mannarino, 2000). In a study of in-session behavior of parents who participated in therapy it was found that observed caregiver support was associated with lower internalizing but not with posttraumatic stress symptoms after therapy (Yasinski et al., 2016). In another study not investigating posttraumatic stress symptoms as an outcome, youth who believed their parents were supportive of their treatment had lower levels of drop-out than youth who did not experience parental support (Ormhaug & Jensen, 2018). To

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our knowledge, no studies have examined whether youth's access to general social support is related to reductions in PTSS, and no previous studies have assessed youth reports of perceived social support in relation to trauma therapy.

Perceived social support may improve over the course of therapy. In youth, perceived social support may increase because therapy involves parents or other caregivers such as foster parents in ways that make them more able to support their child. In trauma-focused cognitive behavior therapy (TF-CBT) for children and youth, parental support is a crucial component (Cohen, Mannarino, & Deblinger, 2017). The parenting component aims to improve parenting skills and enhance parental support of the traumatized child. In line with this, a prospective study found that parents reported that they provided their children with more support after TF-CBT compared to what they reported to do prior to TF-CBT (Cohen, Deblinger, Mannarino, & Steer, 2004). However, parent-reported support does not always reflect the actual social support that the youth experiences. In addition, youth often also consider support from other sources, such as friends.

PTSS in itself involves processing one's situation in ways that lead to a sense of current threat – for example, appraising other people's reactions after the trauma in a negative or threatening way (Ehlers & Clark, 2000). More specifically, posttraumatic stress may lead to an appraisal that others cannot help or do not care and that support from others is not available. When PTSS decreases as a consequence of therapy, the youth may also experience their social environment as more supportive and available and their perceptions of social support may improve. It may also be that reductions in PTSS enable the receipt of support that was previously difficult for friends, parents, or other caregivers to provide.

1.1. Aims

Overall, studies suggest that there may be associations between processes of change in PTSS and perceived social support. The current study investigated social support and PTSS in a sample of 156 youth aged 10–18 years receiving either TF-CBT or therapy as usual. The aims were to 1) assess the association between perceived social support and posttraumatic stress prior to therapy (baseline); 2) describe changes in perceived social support and PTSS over the course of therapy for PTSD, as well as over the first 18 months after therapy; 3) determine whether baseline levels and changes in social support and PTSS are related to one another; and 4) determine whether change, particularly in perceived social support, is associated with caregiver participation, therapy condition (whether change is specific for TF-CBT or can be found also for therapy-as-usual [TAU]), gender, and age. This study was the first to study how perceived social support and PTSS relates to one another during therapy in youth.

We hypothesized that high initial levels of PTSS are associated with low initial levels of perceived social support and that, during therapy, perceived social support increases and PTSS decreases. We further hypothesized that reductions in PTSS are associated with increases in perceived social support, and that caregiver participation would be associated with change in both. Previous publications based on our data have concluded that PTSS decreased steeply during therapy and continued to decrease until follow-up 18 months after treatment (Jensen, Holt, & Ormhaug, 2017; Jensen et al., 2014). Both PTSS and perceived social support may change differently across individuals. For example, previous studies have shown that youth receiving TF-CBT reported larger decreases in PTSS during therapy than did youth receiving TAU (Jensen et al., 2014, 2017). As TF-CBT has a specific focus on parental involvement in therapy, we believe that TF-CBT may also have a greater effect on perceived social support than TAU. Gender and age differences in levels and change processes of PTSS and perceived social support were also explored.

2. Method

2.1. Participants and procedure

The sample was part of a larger effectiveness study, with the primary objective of studying the short- and long-term effects of TF-CBT for traumatized children and youth (registered at [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT00635752) Identifier: NCT00635752). The study was approved by the Regional Committee for Medical and Health Research Ethics. Written, active consent to participate was provided by both the children and their caregivers. Participants were traumatized children and youth ($N = 156$, mean age = 15.1 years, range = 10–18; 79.5% girls) randomly assigned to receive TF-CBT or TAU. On average, participants reported exposure to 3.6 different types of traumatic events in their lifetime ($SD = 1.8$; range = 1–10). When asked to identify their worst trauma, 32.1% reported being exposed to domestic violence or physical abuse, 28.8% reported being sexually abused, 17.9% reported traumatic loss (sudden death of a caregiver or close person), 17.3% reported being exposed to violence outside the family context, 2.6% reported accidents/hospitalization, and 1.3% reported experiences related to war or being a refugee.

Assessments were performed at five time points: pre-therapy (T1, $n = 156$; $n = 79$ in TF-CBT and $n = 77$ in TAU), mid-therapy (after the sixth session, T2, $n = 123$; $n = 63$ in TF-CBT and $n = 60$ in TAU), post-therapy (after sessions 12–15, T3, $n = 122$; $n = 59$ in TF-CBT and $n = 63$ in TAU), a year after the pre-therapy assessment (T4, $n = 99$; $n = 44$ in TF-CBT and $n = 55$ in TAU), and 18 months after the post-therapy assessment (T5, $n = 75$; $n = 36$ in TF-CBT and $n = 39$ in TAU).

2.2. Therapy conditions

TF-CBT is component-based therapy comprising child, caregiver, and caregiver-child conjoint sessions. The components make up the acronym "PRACTICE": psychoeducation, parenting skills, relaxation skills, affective modulation skills, cognitive coping skills, trauma narrative and cognitive processing of the traumatic event(s), in vivo mastery of trauma reminders, conjoint child-parent sessions, and enhancing safety and work on future development (Cohen et al., 2017). The therapy comprises 12–15 sessions, and all components involve working with the caregivers. In the current study, the caregiver participation was 91.8%. In the therapies in which parents were not involved, the parents were perpetrators, had substance abuse or mental health problems, and/or the youth lived alone without parental contact. In all these therapies, the youth were > 16 years.

In the TAU condition, participants were provided with the therapy that the therapist considered best for each child. Based on the therapy process observational coding system – strategies scale (TPOCS-S, McLeod & Weisz, 2010), the three most commonly used therapeutic elements in TAU were identified: client-centered elements (92.6% of sessions), psychodynamic elements (45.7% of sessions), and family elements (35.8% of sessions). In 67.3% of all completed TAU therapies, parents were involved in more than three sessions (including both parent-alone sessions and conjoint sessions with the child). All TF-CBT and TAU therapies were audio recorded, and five sessions from each TAU-therapy and all sessions from each TF-CBT were fidelity-tested according to the TF-CBT fidelity checklist. For a more detailed description of the sample and procedure, see Jensen, Holt, Mørup Ormhaug, Fjermestad, and Wentzel-Larsen (2018; 2017; 2014).

3. Measurements

3.1. Posttraumatic stress symptoms (PTSS)

PTSS were measured using the child PTSD symptom scale (CPSS; Foa, Johnson, Feeny, & Treadwell, 2001) at T1, T2, T3, T4, and T5. The

Table 1

Descriptive data on PTSD symptoms and social support at T1 (pre-treatment), T2 (mid-treatment; after the 6th session), T3 (post-treatment (after the 12th-15th session), T4 (12 months after pre-treatment), and T5 (18 months after post-treatment measure).

	Time 1 <i>M (SD)</i>	Time 2 <i>M (SD)</i>	Time 3 <i>M (SD)</i>	Time 4 <i>M (SD)</i>	Time 5 <i>M (SD)</i>
Social support (range: 7–35)	28.00 (5.69) <i>n</i> = 113	29.07 (5.93) <i>n</i> = 102	30.19 (5.52) <i>n</i> = 108	30.35 (4.89) <i>n</i> = 89	30.97 (4.66) <i>n</i> = 75
PTSD symptoms (range: 0–51)	27.00 (7.66) <i>n</i> = 156	19.77 (11.20) <i>n</i> = 123	14.35 (11.29) <i>n</i> = 126	12.81 (10.78) <i>n</i> = 98	11.91 (11.60) <i>n</i> = 75

CPSS is a 17-item self-report questionnaire developed for children and adolescents aged between 10 and 18 years, measuring PTSD symptoms according to the DSM-IV. Symptom frequency for the previous two weeks are rated using a four-point scale: from 0 (*Not at all*) to 3 (*5 or more times a week/almost always*). Total sum score ranges from 0 to 51. The CPSS has demonstrated convergent validity, internal consistency, and test-retest reliability (Foa et al., 2001). In the current study, Cronbach's alphas for the 17 items at T1-T5 were .75, .91, .92, .91, and .94, respectively.

3.2. Social support

Social support was measured using seven items from the Duke-UNC functional social support questionnaire (FSSQ; Broadhead, Gehlbach, DeGruy, & Kaplan, 1988). In the current study, item 5 – concerning economic support – was omitted. Each item was scored from 1 (*Much less than I would like to*) to 5 (*As much as I would like*). A summed score was then calculated. A higher score indicates higher levels of social support. In the current study, the Cronbach's alphas were .81, .87, .87, .87, and .84, at T1-T5 respectively.

3.3. Caregiver participation

Caregiver participation was measured with a dichotomous variable indicating whether at least one caregiver participated in at least three therapy sessions.

3.4. Statistical analysis

We conducted a parallel process of latent growth curve modelling (LGCM) with a stepwise approach (Bollen & Curran, 2006). First, we specified two separate unconditional LGCMs to assess the change over time in perceived social support and PTSS. Linear and nonlinear models were tested to find the best fit for the observed data patterns (Flora, 2008). We then tested whether the growth parameters of one curve were associated with the growth parameters of the other, and the best-fitting models were combined into one unconditional parallel process model. As a final step, covariates (therapy condition, gender, age, and caregiver participation) were added to the parallel process growth curve model.

To determine model fit, the χ^2 distribution, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI) were assessed. Values of RMSEA from 0.10 to 0.08 were considered to indicate a mediocre model fit, from 0.08 to 0.05 an acceptable model fit, and below 0.05 a good model fit (Browne & Cudeck, 1992; Hu & Bentler, 1999; Little, 2013). CFI values of between 0.90 and 0.94 were considered to indicate an acceptable model fit, and values above 0.95 were considered to indicate a well-fitting model (Browne & Cudeck, 1992; Hu & Bentler, 1999; Little, 2013). We assumed that statistical significance was attained when the *p* value was < .05.

All data analyses were performed and models estimated with Mplus Version 8.3 (Muthén & Muthén, 1998–2019). The Mplus 8.3 inbuilt full information maximum likelihood (FIML) estimation with robust standard errors was used to manage missing data.

3.5. Missing data

The missing data were largely due to wave nonresponse. There were no statistically significant differences in gender, age, background information, number of traumatic events, or therapy condition between participants who completed the measurements at all five time points (*n* = 67) and those with one or more missing measurements (*n* = 89).

4. Results

4.1. Unconditional growth models

Of the 156 participating youth, 79.5% (*n* = 124) were female, and the mean age was 15.1 years (*SD* = 2.2). Youth were randomly allocated to one of two therapy conditions: 50.6% (*n* = 79) received TF-CBT, and 49.4% (*n* = 77) received treatment as usual (TAU). Table 1 presents the means and standard deviations of PTSD symptoms and perceived social support. Inspection of the raw means for both constructs suggested a non-linear pattern with a marked shift at the end of the therapy (T3; see also Fig. 1 for a visual presentation with means and 95% CI across all participants). To accommodate this non-linear growth, we specified piecewise models with one change component describing change from pre-therapy to end of therapy (T1 to T3) and another change component describing change from end of therapy to the last follow up (T3 to T5) (see Fig. 2).

For computational reasons (e.g., estimated negative variances), variance in both perceived social support and PTSS at T1 and variance in the second slope from end of therapy to the last follow-up were set to zero. The unconditional latent piecewise growth curve models provided excellent model fit for perceived social support $\chi^2(10, N = 141) = 10.516$, CFI = 0.996, RMSEA = 0.019 and for PTSS, $\chi^2(10, N = 156) = 7.685$, CFI = 1.000, RMSEA = 0.000. The unstandardized estimates of means and variances in intercepts and slopes are shown in Table 2. They indicate that across all participants, on average, perceived social support increased significantly between T1-T3, becoming stable between T3 and T5. Levels of PTSS decreased,

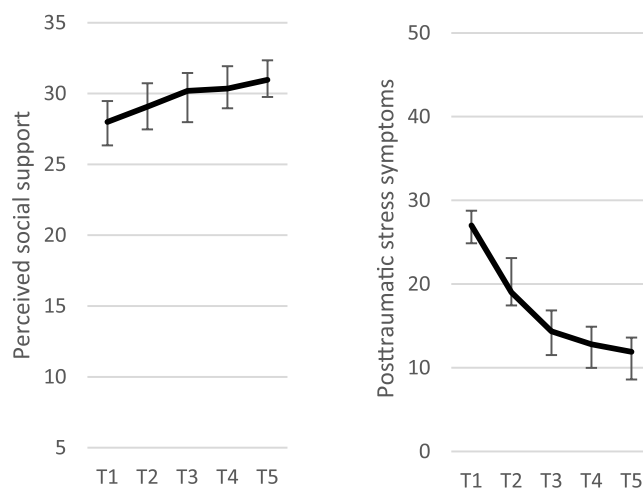


Fig. 1. Means with 95% CI of perceived social support and posttraumatic stress symptoms across all participants (*n* = 156) from T1-T5.

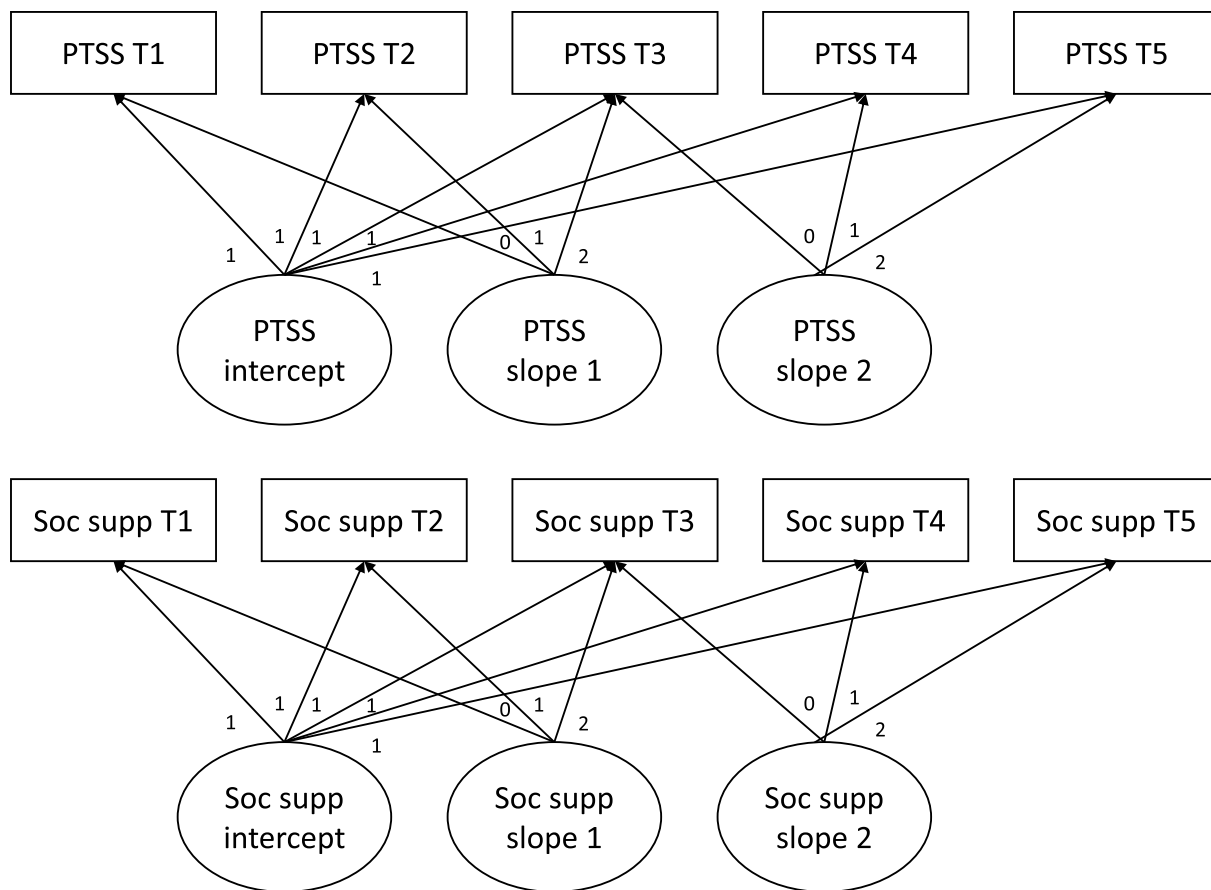


Fig. 2. Unconditional piecewise latent growth curve models of PTSS (upper panel) and perceived social support (lower panel) from T1-T5. PTSS = posttraumatic stress symptoms, soc supp = Perceived social support.

Table 2
Unstandardized estimates and standard errors of means and variances of parameters of unconditional piecewise growth models.

	Mean			Variance		
	Estimate	SE	p	Estimate	SE	p
Perceived social support						
Intercept	28.00	0.52	< 0.001	32.00	3.80	< 0.001
Slope T1-T3	1.05	0.29	< 0.001	6.25	1.27	< 0.001
Slope T3-T5	0.42	0.24	0.077	0	-	
Posttraumatic stress symptoms						
Intercept	27.01	0.61	< 0.001	58.22	5.30	< 0.001
Slope T1-T3	-6.52	0.48	< 0.001	25.14	3.41	< 0.001
Slope T3-T5	-1.11	0.46	0.016	0	-	

Note: T1 = pretreatment, T3 = post-treatment, T5 = 18 months after post-treatment measure.

during the periods of T1-T3 and T3-T5. The slope for T1-T3 was significantly steeper than that of T3-T5 (Wald test value = 50.195, df = 1, $p < .001$). The variance estimates indicate that there were significant individual differences in baseline levels and rate of change between T1-T3 for both perceived social support and PTSS. Thus, individuals varied in both initial levels and rate of change in both constructs during therapy. However, there was no significant variance in slope for T3-T5 in either of the constructs, meaning that the individuals changed similarly over the first 18 months after therapy.

There was a significant correlation between intercept and slope T1-T3 for both perceived social support and PTSS, indicating that baseline levels of perceived social support and PTSS were related to the change over time. For perceived social support, it was found that those who

reported higher levels before therapy tended to experience slower rates of increase over time: $r = -0.72, p < .001$. Higher initial levels of PTSS was typically related to a faster decline over time: $r = -0.43, p < .001$.

4.2. Conditional parallel process model

As there was no significant variance in change in perceived social support or PTSS between T3 and T5, the remaining models were estimated only for T1-T3. The unconditional growth models for perceived social support and PTSS in T1-T3 were combined in a single model to examine whether the intercepts and slopes for one process were correlated with the intercepts and slopes of the other process (see Fig. 3). The unconditional parallel process model fit the data well: $\chi^2(9, N = 156) = 10.939, CFI = 0.988, RMSEA = 0.037$. The findings from this model indicate that low baseline levels of perceived social support were associated with high baseline levels of PTSS, $r = -0.23, p = .020$. Baseline levels of perceived social support were not associated with change over time in PTSS, $r = -0.10, p = .413$, and baseline levels of PTSS were not associated with change over time in perceived social support, $r = 0.14, p = .249$. However, change in perceived social support was negatively associated with change in PTSS, $r = -0.40, p = .003$, meaning that an increase in perceived social support over the therapy course (T1-T3) was associated with a decrease in PTSS over the same period.

4.3. Covariates

The intercept and slope growth factors were regressed on four time-invariant predictors: therapy condition (TF-CBT vs TAU), caregiver

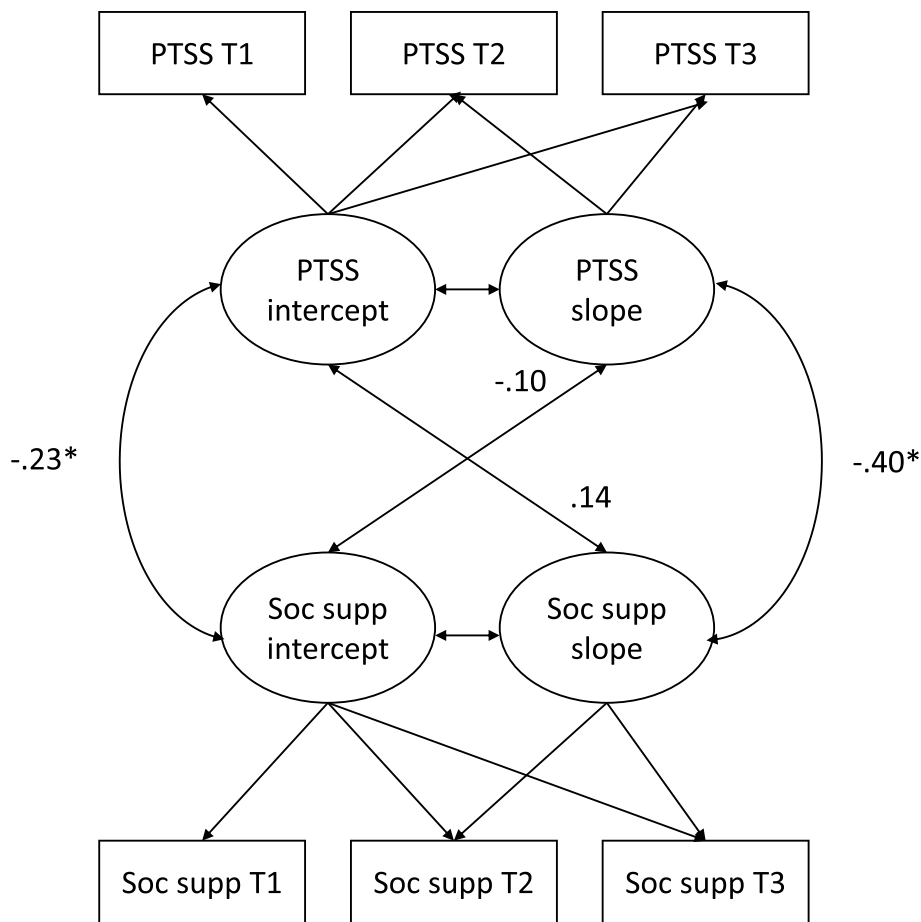


Fig. 3. Conditional parallel process model of PTSS and perceived social support from T1-T3 with standardized estimates of associations between intercepts and slopes. * $p < .05$. PTSS = posttraumatic stress symptoms, soc supp = Perceived social support.

participation, gender, and age (see Fig. 4). Model fit indices indicated excellent fit $\chi^2(17, N = 156) = 16.438$, CFI = 1.000, RMSEA = 0.000. Table 3 presents some of the most relevant results from the final conditional model. As expected and as found in previous studies on the same data (with other analytic strategies), therapy condition predicted rate of change of posttraumatic stress ($\beta = 0.23$, $p = .025$). Therapy condition did not predict rate of change in perceived social support ($\beta = -0.18$, $p = .146$). Neither caregiver participation, gender, nor age significantly predicted baseline levels or rate of change in perceived social support or PTSS.

5. Discussion

This study is the first to investigate the relationship between perceived social support and PTSS among youth in trauma therapy. As expected, we found a significant relationship between low levels of perceived social support and high levels of PTSS at baseline. This is in line with earlier findings for both adults (Brewin et al., 2000; Ozer et al., 2003) and youth (Trickey et al., 2012). This study adds that this association is also evident in a clinical sample of therapy-seeking youth. This suggests that therapy-seeking youth with high levels of PTSS are also at risk of experiencing lower levels of social support.

Youth undergoing therapy for PTSD reported not only decreasing PTSS, but also increasing levels of perceived social support during the therapy. As a group, youth can expect to feel more supported throughout therapy. As we measured general perceived social support, we are not able to specify the source of this social support – thus, it could be specific to parents, friends, or therapists. As parents participated in therapy, it may be reasonable to believe that some of the

increased support could be due to parents being more informed about trauma reactions and how to support their child. Increased social support can also reflect a general perception that others are available for emotional and instrumental support. Having a positive experience with a supportive therapist may also change how the youth think about the possibility of receiving support.

Mean levels of perceived social support were stable during the first 18 months after therapy. While the changes in the individuals differed significantly in degree of change during the therapy period, they did not in the period from end of therapy to 18 months after therapy. This indicates that, during therapy, some youth reported steeper improvement in social support than others; but afterwards, most reported stable levels of perceived social support – in effect, support of the same level as that seen at the time the therapy ended. That the improvement in perceived social support does not wane after therapy suggests that such improvement does not simply reflect the support given by the therapist. Rather, it seems that the increased perceived social support remains a stable resource which the youth can rely on even after therapy.

Contrary to our hypothesis, individuals with high baseline levels of social support were not found to have a steeper reduction of PTSS. This stands in contrast to results from previous studies (e. g., Cohen & Mannarino, 2000). We cannot draw strong conclusions based on this null finding; but from the current study, it seems that the effect of therapy on PTSS does not require a high baseline level of social support.

Change in posttraumatic stress was associated with concurrent change in perceived social support during therapy. This indicates that during therapy, these constructs change together: they travel together. When different constructs travel together or co-develop, the changes may be directed by a third underlying variable. For example, in line

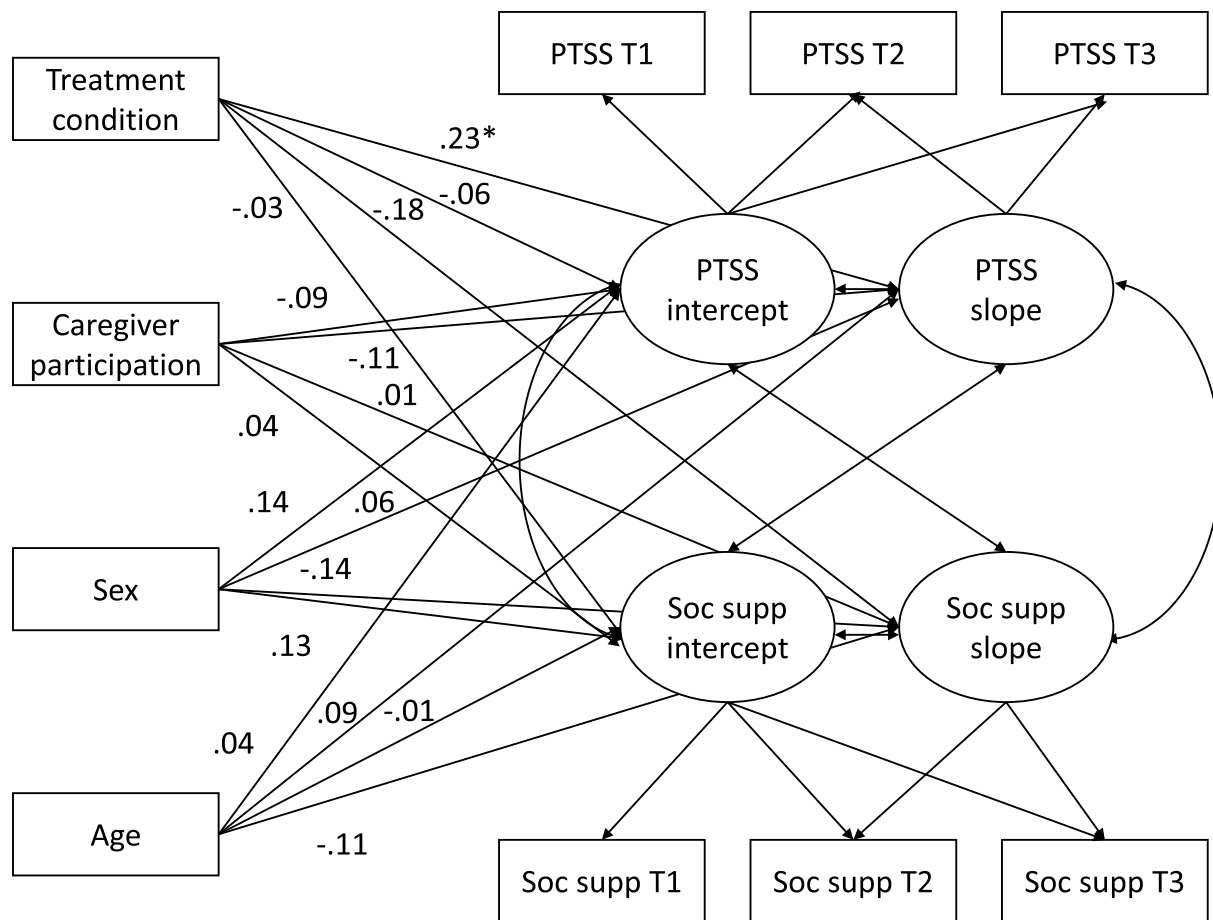


Fig. 4. Conditional parallel process model of PTSS and perceived social support from T1-T3 with covariates. Standardized estimates of associations between covariates and intercepts and slopes. *p < .05. PTSS = posttraumatic stress symptoms, soc supp = Perceived social support.

with the literature suggesting a core role of post-trauma cognitions in PTSD (Meiser Stedman et al., 2010) and changing cognitions as an important change mechanism (Diehle, Schmitt, Daams, Boer, & Lindauer, 2014; Jensen et al., 2018), it might be that therapy instigates changes in maladaptive cognitions related to social support, such as “I cannot trust other people.” It may be that thoughts such as these maintain both high levels of PTSS and influence perceptions of social support. During therapy, the youth may alter this maladaptive belief and accept help from both the therapist and their caregivers, thus contributing to changes in both PTSS and perceived social support. Another explanation is that there might be a directional effect: for

example, reduction in PTSS may enable the individual to view others as more supportive, or increases in perceived social support may reduce the pervasiveness of PTSS.

While TF-CBT was associated with faster symptom relief, therapy condition did not predict changes in perceived social support. Caregiver participation did not predict starting levels or changes in neither PTSS nor perceived social support. TF-CBT specifically targets parental support, but parents were also highly involved in the TAU therapies (67.3% cases involved parents in more than three sessions). Thus, in both therapy conditions, parents participated to a considerable degree. It is possible that parents' participation in sessions is more important for

Table 3

Standardized estimates of associations between covariates (treatment condition, caregiver participation, sex, and age) and growth parameters (T1-T3) of perceived social support and posttraumatic stress symptoms (PTSS) in the final conditional parallel process model (n = 156).

	Perceived social support			Posttraumatic stress symptoms			
	Estimate	SE	p	Estimate	SE	p	
Treatment ^a → intercept	-0.03	0.10	0.742	-0.06	0.09	0.509	
Treatment ^a → slope	-0.18	0.10	0.197	0.23	0.10	0.025	
Caregiver ^b → intercept	0.04	0.10	0.694	-0.09	0.10	0.334	
Caregiver ^b → slope	0.01	0.13	0.942	-0.11	0.11	0.326	
Sex ^c → intercept	-0.14	0.10	0.742	0.14	0.08	0.091	
Sex ^c → slope	0.13	0.10	0.197	0.06	0.10	0.557	
Age → intercept	-0.01	0.01	0.900	0.04	0.09	0.648	
Age → slope	-0.11	0.13	0.445	0.09	0.10	0.334	

^a TF-CBT vs TAU.

^b Participation vs no participation.

^c Female vs male.

youth-perceived social support than the specific interventions themselves. Although we know the number of sessions in which the parents/caregivers participated in TAU, we do not know what they did in these sessions. Additionally, it should be noted that the measure of social support does not specify from whom the youth received this support, so it may have been a mix of support from both parents and other people close to the youth. Furthermore, the scores for perceived social support were skewed to the positive end of the scale at all measurement points. As a result, the variance may be too small to detect relationships between perceived social support and PTSS, and the null findings may reflect a ceiling effect. Ceiling effects when measuring perceived social support are very common. In this case, there may be true high levels of perceived social support, or this finding may reflect a social desirability bias. In other words, respondents may over-report their access to social support if they consider it shameful to admit that they do not have this.

This study has both strengths and limitations. This is the first study to assess longitudinal associations between PTSS and perceived study social support in youth in therapy for PTSD. We investigated this in a context of multi-traumatized youth referred for therapy in regular community clinics. We had five measurement time points, the last of which was after a considerably long follow-up period (18 months after the end of therapy). Although there was a high attrition rate at the follow-up measurement points, the use of growth curve modeling made it possible to use all available data. While we measured the youth's self-reported perceived social support, our measure of social support measured the general perceived social support, thus we cannot specify the sources of social support (e.g., parents, friends).

The findings from this study may contribute to an increased focus on youth social support in clinical settings. It is important for clinicians to be aware that low levels of social support travels together with high levels of PTSS, and increases during therapy. Such awareness may help clinicians to explore the youth's social context such as friends and family networks and how the youth perceives their existing access to social support sources. It may be helpful to explore this when starting therapy, but also to have a continuing glance and focus at this during, and at the end of the therapeutic process. For youth who are isolated, working to improve their social network and support should be an important treatment goal in itself. If the youth are reluctant to ask for support from their caregivers or friends, the therapist could normalize this and help to reduce barriers to receiving social support such as feelings of shame or not wanting to burden their surroundings (Thoresen, Jensen, Wentzel-Larsen, & Dyb, 2014).

For some youth, loneliness, social challenges and difficulties with approaching social support sources might be part of, or a result of their trauma history. Then working with unhelpful cognitions related to social support might be helpful. It may also be useful for therapists to communicate to the youth that most people will perceive an increase in level of support during therapy, as this could offer hope to those youth who feel a lack of assistance and care when entering therapy. In that regard, it should be noted that youth reporting little social support pre-treatment are the ones who experience the most increase in social support during therapy. These results might provide hope to the most isolated and lonely youth.

In conclusion, this study finds that perceived social support increases during trauma therapy. As symptoms of posttraumatic stress decline, perceived social support increases. To understand why or how this co-development occurs, it may be beneficial to measure other processes that could explain how these factors are related (e.g., changes in post-trauma cognitions, social cognition, social interactions, social network). It may be helpful to develop ways of measuring social relationships that are not subject to strong ceiling effects. Furthermore, to understand whether there are directional or temporal relationships, we need to measure PTSS and social relationships more frequently, with short measurement intervals.

CRedit authorship contribution statement

Marianne S. Birkeland: Conceptualization, Formal analysis, Writing - review & editing. **Tonje Holt:** Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing. **Silje M. Ormhaug:** Conceptualization, Methodology, Investigation, Writing - review & editing. **Tine K. Jensen:** Project administration, Conceptualization, Methodology, Investigation, Writing - review & editing, Supervision, Funding acquisition.

Declaration of competing interest

None.

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References

- Birkeland, M. S., Nielsen, M. B., Hansen, M. B., Knardahl, S., & Heir, T. (2017). Like a bridge over troubled water? A longitudinal study of general social support, colleague support, and leader support as recovery factors after a traumatic event. *European Journal of Psychotraumatology*, *8*, 1302692.
- Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation approach*. Hoboken, NJ: Wiley.
- Brewin, C., Andrews, B., & Valentine, J. (2000). Meta-analysis of risk factors for post-traumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology*, *68*, 748–766.
- Broadhead, W. E., Gehlbach, S. H., DeGruy, F. V., & Kaplan, B. H. (1988). The Duke-UNC Functional Social Support Questionnaire. Measurement of social support in family medicine patients. *Medical Care*, *26*, 709–723.
- Browne, M., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research*, *21*, 230–258.
- Cohen, J. A., Deblinger, E., Mannarino, A. P., & Steer, R. A. (2004). A multisite, randomized controlled trial for children with sexual abuse-related PTSD symptoms. *Journal of the American Academy of Child & Adolescent Psychiatry*, *43*, 393–402.
- Cohen, J. A., & Mannarino, A. P. (2000). Predictors of treatment outcome in sexually abused children. *Child Abuse & Neglect*, *24*, 983–994.
- Cohen, J. A., Mannarino, A., & Deblinger, E. (2017). *Treating trauma and traumatic grief in children and adolescents*. New York: The Guilford Press.
- Diehls, J., Schmitt, K., Daams, J. G., Boer, F., & Lindauer, R. J. (2014). Effects of psychotherapy on trauma-related cognitions in posttraumatic stress disorder: A meta-analysis. *Journal of Traumatic Stress*, *27*, 257–264.
- Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*, 319–345.
- Flora, D. B. (2008). Specifying piecewise latent trajectory models for longitudinal data. *Structural Equation Modeling*, *15*, 513–533.
- Foa, E. B., Johnson, K. M., Feeny, N. C., & Treadwell, K. R. (2001). The Child PTSD Symptom Scale: A preliminary examination of its psychometric properties. *Journal of Clinical Child Psychology*, *30*, 376–384.
- Gros, D. F., Price, M., Yuen, E. K., & Acierno, R. (2013). Predictors of completion of exposure therapy in OEF/OIF veterans with posttraumatic stress disorder. *Depression and Anxiety*, *30*, 1107–1113.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.
- Jensen, T. K., Holt, T., Mørup Ormhaug, S., Fjermestad, K. W., & Wentzel-Larsen, T. (2018). Change in post-traumatic cognitions mediates treatment effects for traumatized youth—a randomized controlled trial. *Journal of Counseling Psychology*, *65*, 166.
- Jensen, T. K., Holt, T., & Ormhaug, S. M. (2017). A follow-up study from a multisite, randomized controlled trial for traumatized children receiving TF-CBT. *Journal of Abnormal Child Psychology*, 1–11.
- Jensen, T. K., Holt, T., Ormhaug, S. M., Egeland, K., Granly, L., Hoaa, L. C., ... Wentzel-Larsen, T. (2014). A randomized effectiveness study comparing trauma-focused cognitive behavioral therapy with therapy as usual for youth. *Journal of Clinical Child and Adolescent Psychology*, *43*, 356–369.
- Little, T. D. (2013). *Longitudinal structural equation modeling*. New York: The Guilford Press.
- McLeod, B. D., & Weisz, J. R. (2010). The therapy process observational coding system for child psychotherapy strategies scale. *Journal of Clinical Child and Adolescent Psychology*, *39*, 436–443.
- Meiser Stedman, R., McKinnon, A., Dixon, C., Boyle, A., Smith, P., & Dalgleish, T. (2010). A core role for cognitive processes in the acute onset and maintenance of post-traumatic stress in children and adolescents. *Journal of Child Psychology and*

- Psychiatry*, 60(8), 875–884.
- Muthén, B., & Muthén, L. K. (1998-2019). *Mplus*. Los Angeles: Muthén & Muthén (Version 8.3).
- Ormhaug, S. M., & Jensen, T. K. (2018). Investigating treatment characteristics and first-session relationship variables as predictors of dropout in the treatment of traumatized youth. *Psychotherapy Research*, 28, 235–249.
- Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: A meta-analysis. *Psychological Bulletin*, 129, 52–73.
- Price, M., Gros, D. F., Strachan, M., Ruggiero, K. J., & Acierno, R. (2013). The role of social support in exposure therapy for operation Iraqi freedom/operation enduring freedom veterans: A preliminary investigation. *Psychological Trauma: Theory, Research, Practice, and Policy*, 5, 93.
- Price, M., Lancaster, C. L., Gros, D. F., Legrand, A. C., van Stolk-Cooke, K., & Acierno, R. (2018). An examination of social support and PTSD treatment response during prolonged exposure. *Psychiatry*, 81, 258–270.
- Shnaider, P., Sijercic, I., Wanklyn, S. G., Suvak, M. K., & Monson, C. M. (2017). The role of social support in cognitive-behavioral conjoint therapy for posttraumatic stress disorder. *Behavior Therapy*, 48, 285–294.
- Sippel, L., Pietrzak, R., Charney, D., Mayes, L., & Southwick, S. (2015). How does social support enhance resilience in the trauma-exposed individual? *Ecology and Society*, 20.
- Toitso, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior*, 52, 145–161.
- Thoresen, S., Jensen, T. K., Wentzel-Larsen, T., & Dyb, G. (2014). Social support barriers and mental health in terrorist attack survivors. *Journal of Affective Disorders*, 156, 187–193.
- Thrasher, S., Power, M., Morant, N., Marks, I., & Dalgleish, T. (2010). Social support moderates outcome in a randomized controlled trial of exposure therapy and (or) cognitive restructuring for chronic posttraumatic stress disorder. *Canadian Journal of Psychiatry*, 55, 187–190.
- Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review*, 32, 122–138.
- Yasinski, C., Hayes, A. M., Ready, C. B., Cummings, J. A., Berman, I. S., McCauley, T., ... Deblinger, E. (2016). In-session caregiver behavior predicts symptom change in youth receiving trauma-focused cognitive behavioral therapy (TF-CBT). *Journal of Consulting and Clinical Psychology*, 84, 1066–1077.