Psychological Trauma: Theory, Research, Practice, and Policy

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Objective: Even though there is strong evidence for the effectiveness of Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) for trauma-exposed youth, there are still youth who continue to struggle with posttraumatic stress symptoms (PTSS) after treatment. Investigating treatment trajectories and predictors of symptom change can increase our understanding of factors associated with nonresponse so that trauma treatment can be optimized. ***Method:*** The sample consisted of 155 youths (M age = 13.9 years, SD = 2.8, 72.3% girls) who received TF-CBT. To examine whether different treatment trajectories could be identified, growth mixture models with linear effects of time were estimated based on Clinical-Administered PTSD-Scale (CAPS-CA) scores at pretreatment, posttreatment and follow-up. We further explored whether gender, age, trauma type, comorbid depression and anxiety, and posttraumatic cognitions were associated with treatment response. ***Results:*** The participants' trajectories could best be represented by 2 latent classes; nonresponders (21% of the sample) and responders (79% of the sample). The nonresponder group was characterized by a higher pretreatment PTSS level and slower improvement in PTSS compared with the responder group. Gender was the only significant predictor, where girls were more likely to be assigned to the nonresponder group. ***Conclusions:*** The findings indicate that clinicians need to be aware that girls and youth with high levels of pretreatment PTSS may be at risk of nonresponse. The results support previous findings showing that TF-CBT is suitable across different age groups and can be an effective treatment for youth with a range of traumatic experiences and additional comorbid symptoms.

Clinical Impact Statement

Trauma-focused cognitive–behavioral therapy (TF-CBT) is a recommended treatment for youth suffering from symptoms of posttraumatic stress (PTSS). This study suggests that there are subgroups who differ in their response to TF-CBT where the majority experiences a significant decrease in PTSS over time. Girls and youths with high initial PTSS may be at risk for nonresponse. No evidence was found to support that age, the type of trauma experienced, having more than one diagnosis, or having many maladaptive posttraumatic thoughts was related to treatment nonresponse. Clinicians should monitor treatment progress to capture those not responding to treatment and make adaptions.

Keywords: PTSS, trauma-focused cognitive–behavioral therapy, nonresponse, children and adolescents, growth mixture modeling

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Sadly, Lutz Goldbeck died before the completion of this article.

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Psychotherapy can be helpful for many children and adolescents with mental health problems (Weisz et al., 2017). Nevertheless, the results from randomized controlled clinical trials and meta-analyses have demonstrated that for some youth, the treatment response is minimal (James, James, Cowdrey, Soler, & Choke, 2013). Nonresponse is also a major concern among empirically supported treatments for posttraumatic stress disorder (PTSD) (Schottenbauer, Glass, Arnkoff, Tendick, & Gray, 2008). Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) is a recommended first-line treatment for children and adolescents with trauma-related symptoms (National Institute for Clinical Excellence, 2018). However, differences in treatment response call for the need to examine why some youth do not respond optimally to TF-CBT. A majority of treatment outcome studies have focused on treatment response by measuring the average group response to a specific intervention (Kazdin, 2007; Kraemer, Wilson, Fairburn, & Agras, 2002). However, investigating different subpopulations within a clinical sample offers an opportunity to examine predictors that may explain the variety of responses to treatment. Such knowledge can be a step toward enhanced understanding of for whom and under what circumstances treatment may have different effects.

According to Lambert's seminal model (Lambert, 1992), factors related to the patient were proposed to account for 40% of the variance in outcome. This claim has later found some support in the psychotherapy research literature for adults (Bohart & Wade, 2013; Lambert, 2015; Wampold et al., 2010). A therapy process model for youth therapy also proposes that characteristics of the child influences and/or moderates change processes and outcomes in youth psychotherapy (Fjermestad, McLeod, Tully, and Liber (2016). This theoretical model is supported by findings within the child trauma field demonstrating that variables related to the child might predict treatment response; however, the research findings are not consistent (Lenz & Hollenbaugh, 2015).

Gender has been associated with differential responses to trauma (Alisic et al., 2014), but whether gender also is associated with treatment nonresponse is not clear (Harvey & Taylor, 2010; Hetzel-Riggin, Brausch, & Montgomery, 2007; Qouta, Palosaari, Diab, & Punamäki, 2012; Tol et al., 2010; Trask, Walsh, & DiLillo, 2011). Some findings from TF-CBT studies indicate that the effectiveness of treatment is not related to gender (Judith A Cohen, Mannarino, & Iyengar, 2011; Kane et al., 2016), but more studies are needed. Age has also been proposed as a possible predictor for treatment response; however, the current empirical findings are mixed (Harvey & Taylor, 2010; Hetzel-Riggin et al., 2007; Lenz & Hollenbaugh, 2015; Trask et al., 2011). It may be that some aspects of TF-CBT require certain developmental capacities (e.g., language skills and cognitive capacities) that are more likely mastered by older children and adolescents than by younger children (Lenz & Hollenbaugh, 2015). It has also been argued that adolescents, undergoing substantial neurological, social, and lifestyle changes, might benefit less from exposure-based treatment due to more emotional regulation difficulties at this developmental stage compared to younger children (Drysdale et al., 2014).

Even though studies have shown that types of trauma exposure is associated with differential risks for the development and maintenance of posttraumatic stress symptoms (PTSS) (Alisic et al., 2014; Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012), it is not well documented in the literature whether the type of trauma also influences treatment response (Schottenbauer et al., 2008). It has been debated whether youth exposed to severe and prolonged interpersonal trauma may need more than regular trauma treatment to overcome their symptoms (Cloitre et al., 2011). It is assumed that this group of youths often struggle with interpersonal and emotional regulation problems, which in turn may negatively affect engagement in therapy and the establishment of a strong therapeutic alliance, increasing the risk of poor treatment response (Stein, Dickstein, Schuster, Litz, & Resick, 2012). Contrary to these assumptions, a recent study found support for the effectiveness of TF-CBT for children and adolescents with complex trauma responses as well (Sachser, Keller, & Goldbeck, 2017). Furthermore, a meta-analysis of TF-CBT studies did not find that the type of trauma was related to variance in treatment outcome (Lenz & Hollenbaugh, 2015). In this meta-analysis, however, only studies with interpersonal trauma samples were included (with the exception of one study). As the empirical basis is still scarce, we need more knowledge about the differential effects of treatment outcome in relation to the youth's trauma exposure, particularly the role interpersonal traumas play in treatment outcome.

Since many traumatized youth referred to treatment have co-occurring problems (Famularo, Fenton, Kinscherff, & Augustyn, 1996; Kar & Bastia, 2006), it would be helpful to know whether high levels of pretreatment comorbid symptoms increase the probability of nonresponse. For instance, adolescents with symptoms of depression often struggle with problems, such as self-harming, functional impairment, sleep disturbances and lack of energy (Jaycox et al., 2009; Mueser & Taub, 2008), and often display motivational problems and high levels of negative thinking and rumination (Rapee et al., 2013). Studies on traumatized youth who received TF-CBT found that high levels of comorbid symptoms of depression have a negative impact on treatment outcome (Goldbeck, Muche, Sachser, Tutus, & Rosner, 2016; Mannarino, Cohen, Deblinger, Runyon, & Steer, 2012). Studies examining whether co-occurring symptoms of anxiety and PTSS have negative treatment effects have not been examined in youth populations, but adult studies have shown mixed results (Richardson, Elhai, & Sarreen, 2011; Rosenkranz & Muller, 2011; Tarrier, Sommerfield, Pilgrim, & Faragher, 2000; Van Minnen, Arntz, & Keijsers, 2002).

In addition to symptoms of depression and anxiety, traumatized youths have often developed dysfunctional posttraumatic cognitions about the self and the world, leading to a subjective sense of persistent and current threat (Meiser-Stedman, Smith, et al., 2009). Models of PTSD suggest that dysfunctional appraisals of the trauma and/or its sequelae contribute to both maintaining and intensifying PTSS over time (Ehlers & Clark, 2000). The strong association between posttraumatic cognitions and PTSS has implication for therapy, and a meta-analysis found that trauma-focused therapies can effectively reduce posttraumatic cognitions (Diehle, Schmitt, Daams, Boer, & Lindauer, 2014). The importance of constructive processing (i.e., decentering and accommodation of corrective information) of trauma-related content (e.g., posttraumatic cognitions) for treatment outcome has been emphasized in several youth studies (Hayes et al., 2017; Ready et al., 2015). Moreover, recently some treatment studies have found support for the assumption that changes in posttraumatic cognitions are associated with reduction in PTSS among youth (Jensen, Holt, Mørup Ormhaug, Fjermestad, & Wentzel-Larsen, 2018; McLean, Yeh, Rosenfield, & Foa, 2015; Meiser-Stedman et al., 2017; Pfeiffer, Sachser, de Haan, Tutus, & Goldbeck, 2017; Smith et al., 2007). However, to the best of our knowledge, no studies have examined whether pretreatment levels of posttraumatic cognitions predict treatment response. Thus, the influence of co-occurring symptoms and posttraumatic cognitions for response to trauma treatment is not fully understood, and studies on traumatized youth are especially lacking.

The first objective of this study was to investigate and describe differential patterns of treatment response in TF-CBT, including initial PTSS-levels, among youths suffering from PTSS. We expected to find heterogeneity of PTSS trajectories and treatment responses during trauma treatment and follow-up. Leaning on theoretical models that treatment effects are associated with pretreatment factors (Fjermestad et al., 2016; Lambert, 1992), the second objective was to examine whether pretreatment factors such as age, gender, trauma exposure, and symptom load was associated with treatment response. Given the inconclusive empirical findings regarding how age and gender relate to treatment response, we have no predefined hypotheses. Based on theory and the currently available research, we hypothesize that youth exposed to interpersonal trauma and those with high levels of co-occurring depression and anxiety at baseline will be at risk for poorer treatment response. Finally, since PTSD models suggest that posttraumatic cognitions contribute to both maintaining and intensifying PTSS over time, we hypothesize that high pretreatment levels of posttraumatic cognitions will be associated with less optimal treatment response.

Method

Procedure and Participants

This study is based on secondary analyses of data from two randomized controlled trials investigating the effectiveness of TF-CBT for trauma-exposed youth in community mental health clinics conducted in two different European countries. Aggregating the two TF-CBT samples into one sample was possible since the source studies were designed in cooperation in order to conduct secondary analysis.

Both studies were approved by their respective Ethical Committees for Medical and Mental Health Research. Informed written consent was obtained from all study participants and their legal guardians. Children and adolescents were invited to participate if they had experienced at least one traumatic event and suffered from clinically significant PTSS. The exclusion criteria were suicidal behavior, acute psychosis and nonproficiency in the native language. Since the primary objective of this study was to investigate treatment response in TF-CBT, only participants allocated to TF-CBT were included. For further details of the sample characteristics for the two sites see Table 1 and for progress of participants through the study, see the flowchart (see Figure 1).

The merged sample consisted of 155 traumatized children and adolescents between 7 and 18 years old (*M* age = 13.9 years, *SD* = 2.8, 72.3% girls) exposed to an average of 5.1 (*SD* = 3.0, range = 1–16) different types of traumas, with most index events involving physical abuse, sexual abuse and traumatic loss of a close friend/relative. Since the majority of the youth had experi-

Table 1
Baseline Characteristics of Study Sample (N = 155)

	Total sample (*N* = 155)	Norwegian sample (*N* = 79)	German sample (*N* = 76)	Statistics
Gender, *n* (%)				
Girls	112 (72.3)	59 (74.7)	53 (69.7)	$\chi^2 = .473, p = 492$
Boys	43 (27.7)	20 (25.3)	23 (30.3)	
Age, (*SD*)				
Mean	13.9 (2.8)	15.03 (2.2)	12.66 (2.92)	$t(153) = 5.72, p < .001$
Range	7–18	10–18	7–18	—
Number of traumatic events				
Mean (*SD*)	5.07 (3.0)	3.68 (1.7)	6.62 (3.4)	$t(148) = -6.72, p < .001$
Range	1–16	1–10	1–16	—
Type of index event, *n* (%)				
Interpersonal	121 (78.1)	60 (75.9)	61 (80.3)	$\chi^2 = .42, p = .516$
Accidental	34 (21.9)	19 (24.1)	15 (19.7)	
Posttraumatic Stress				
PTSS (CAPS), *M* (*SD*)	59.4 (18.8)	60.19 (19.90)	58.51 (17.41)	$t(153) = -.56, p = .578$
PTSD Diagnosis, *n* (%)	106 (68.4)	49 (62.0)	57 (75.0)	$\chi^2 = 3.02, p = .082$
Anxiety				
SCARED, *M* (*SD*)	32.43 (15.96)	34.12 (15.97)	30.72 (15.88)	$t(147) = -1.30, p = .194$
Anxiety Diagnosis, *n* (%) (Cut-off 25)	97 (62.6%)	52 (65.8%)	45 (59.2%)	$\chi^2 = 1.19, p = .275$
Depression, *M* (*SD*)				
MFQ, *M* (*SD*)	—	35.43 (11.78)	—	—
CDI-T-Score, *M* (*SD*)	—	—	59.74 (12.65)	—
Depression Diagnosis, *n* (%)*	94 (60.6)	56 (70.9%)	38 (50.0%)	$\chi^2 = 7.08, p = .008$
CPTCI, *M* (*SD*)	60.12 (15.69)	62.77 (14.67)	57.36 (16.32)	$t(151) = 2.16, p = .033$

Note. SCARED = The Screen for Child Anxiety-Related Disorders; MFQ = The Mood and Feelings Questionnaire; CDI = Children's Depression Inventory; CPTCI = Child Posttraumatic Cognition Inventory.
* MFQ Cut-off 27; CDI Cut-off T-Value 60.

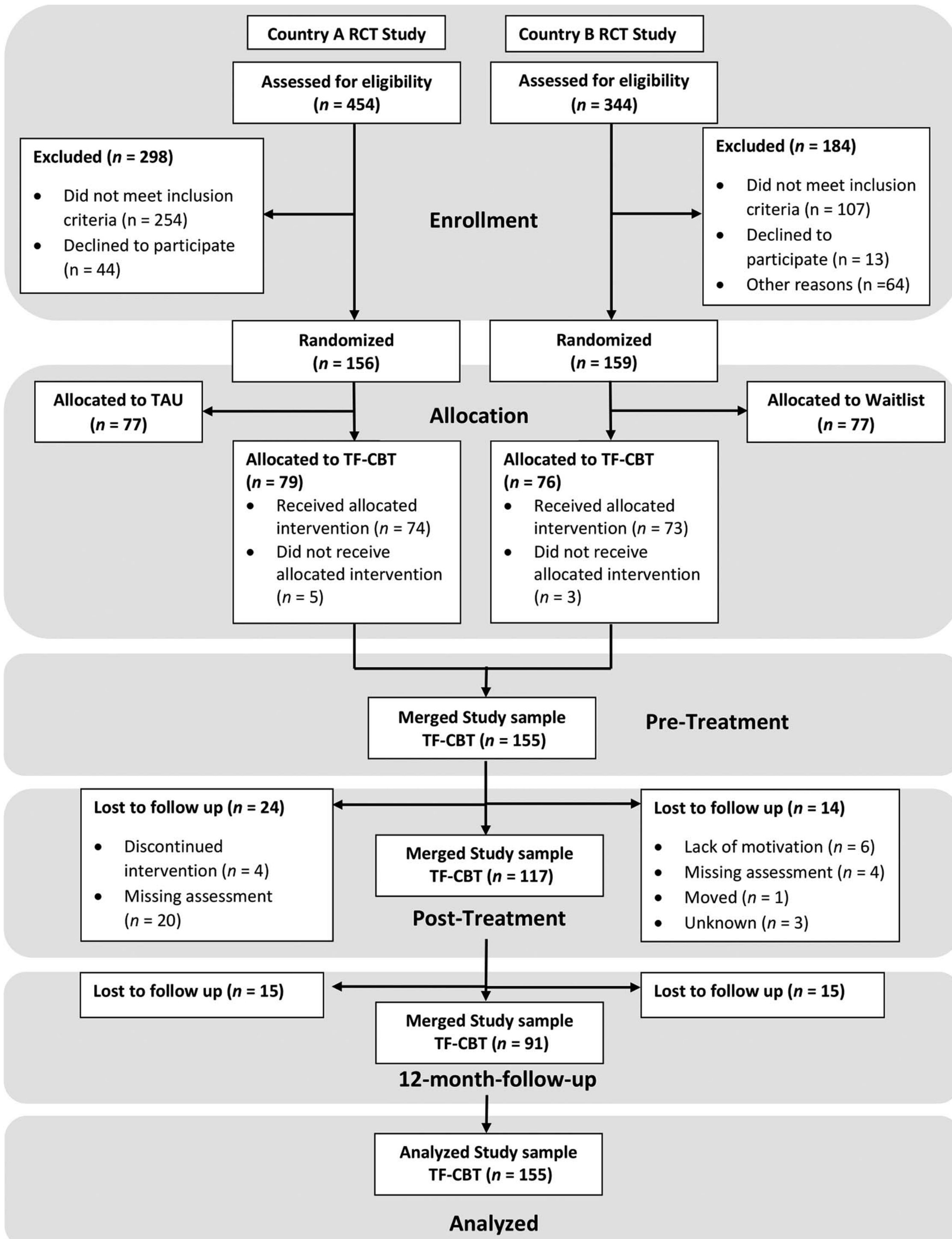

Figure 1. Flow chart participants.

enced multiple traumas, the participants' reported index trauma was used in the categorization of trauma type and applied in the analyses. Trauma type was classified as either interpersonal (i.e., intentionally caused by humans; e.g., sexual abuse, physical abuse, violence) or accidental (e.g., accidents, natural disasters) trauma. For a detailed sample description, see Table 1.

PTSS level, anxiety, depression and posttraumatic cognitions were evaluated by assessors blinded for the treatment condition at pretreatment (T1), posttreatment (T2: after 12–15 sessions) and at follow-up (T3: 10–12 months after T1). (For a more detailed description of the two trials, see Goldbeck et al., 2016 and Jensen et al., 2014).

Intervention

TF-CBT is a flexible phase- and component-based model for trauma-exposed children and adolescents with significant trauma-related symptoms. The treatment is a short-term intervention (12–15 sessions), and both children and nonoffending parents are involved in the treatment through parallel and conjoint sessions. Cognitive, behavioral, interpersonal and family therapy principles, together with specific trauma interventions, are integrated into the model. The treatment consists of three phases: a stabilization and skills building phase, a trauma narrative and processing phase, and an integration and consolidation phase. Each of the phases is usually provided in equal length. The components of the model are described by 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 & Mannarino, 2017).

Therapists

The treatment was delivered by psychologists, psychiatrists, educational therapists, and social workers who had on average 9.34 years of clinical experience (*SD* = 7.14, range: 1–31). All therapists had completed a certified web-based learning course for TF-CBT (www.musc.edu/tfcbt) and had received training in the TF-CBT protocol by treatment developers or other approved TF-CBT trainers.

Measurements

Posttraumatic stress symptoms. PTSS were measured with the Clinical-Administered PTSD-Scale for Children and Adolescents (CAPS-CA; Nader et al., 2004). The CAPS-CA is a structured clinical interview assessing the frequency and intensity of the 17 *DSM–IV* defined symptoms of PTSD during the last month. Items are scored based on the children's answers together with clinical judgment during the interview. CAPS-CA is considered suitable for both young children and adolescents (Griffin, Uhlmansiek, Resick, & Mechanic, 2004; Nader et al., 1996, 2004) and has demonstrated good psychometric properties in several studies (Ohan, Myers, & Collett, 2002). In this sample, the instrument showed satisfactory internal consistency (α = .86).

Depression. In the Norwegian study the Mood and Feelings Questionnaire (MFQ) was used to assess symptoms of depression. MFQ is a self-report questionnaire designed to assess depressive symptoms in children and adolescents (Angold, Costello, Messer, & Pickles, 1995). The MFQ consists of 34 items measuring the full range of *DSM–IV* diagnostic criteria for depressive disorders and includes additional items reflecting common affective, cognitive and somatic features of childhood depression. Items are scored on 3-point frequency scale from 0 (*not true*), 1 (*sometimes true*), and 2 (*true*). The MFQ demonstrated good internal consistency (α = .91). In the German study, symptoms of depression were assessed by self-reports on Children's Depression Inventory (CDI; Kovacs, 2004). The CDI is a self-report questionnaire consisting of 27 items assessing depressive symptoms among children and youth. The instrument demonstrated good internal consistency (α = .89).

Anxiety. The Screen for Child Anxiety-Related Disorders (SCARED; Birmaher et al., 1999) was applied to measure anxiety symptoms during the last three months. SCARED is a self-report questionnaire consisting of 41 items that cover five specific anxiety disorders: panic disorder or significant somatic symptoms, generalized anxiety disorder, separation anxiety disorder, social anxiety disorder, and significant school avoidance. The youth rate the problem frequency using a 3-point scale: 0 (*not true or hardly ever true*), 1 (*somewhat true or sometimes true*), and 2 (*very true or often true*). SCARED has demonstrated good psychometric properties (Birmaher et al., 1999) and the instrument showed good internal consistency in the present sample (α = .93).

Posttraumatic cognitions. The Child Posttraumatic Cognitions Inventory (CPTCI) is a 25-item self-report measure of maladaptive trauma-related appraisals suited for children and adolescents (Meiser-Stedman, Smith, et al., 2009). The CPTCI consists of two subscales: "permanent and disturbing change" and "fragile person in a scary world." The youth rate the items on a 4-point scale, where higher scores indicate the presence of more dysfunctional trauma-related appraisals. In the present sample, the total scale showed good internal consistency (α = .92).

Data Analyses

As a first step, a set of growth mixture models (GMM) were fitted to determine whether there was evidence for more than one distinct class of treatment response. GMMs are an extension of latent growth models, where the parameters describing group level change trajectories are allowed to differ across distinct subclasses. Change was modeled by the linear effects of time on CAPS-CA scores at three assessment waves (pretreatment, posttreatment and follow-up). The intercept represents the estimated initial status at pretreatment, while the slope represents the estimated change in PTSS over time. Inspection of the empirical trajectories revealed a pattern of rapid decline in symptoms during treatment, followed by a relatively slower reduction during follow-up (see Figure 2). Because of the nonlinear nature of the change, and as we could not include a quadratic effect of time with three measurement waves, time was log-transformed. Consequently, log-months (0, 1.61, and 2.57) were used as factor loadings for the latent slope factor across the time points (0, 4 and 12 months). A set of unconditional GMMs with one to four classes were fitted in order to determine whether there was evidence for more than one distinct treatment response. These models do not require an a priori definition of treatment response but allows us to identify distinct subpopulations and to assess the characteristics of individuals within these classes (Muthén, 2004; Ram & Grimm, 2009). The best-fitting model was chosen by comparing the fit of the four growth mixture models (1–4 classes) on the Bayesian Information Criterion (BIC), Sample-Size Adjusted Bayesian Information Criterion (SSA-BIC), and Entropy. Among the information criteria, BIC is generally preferred (Nylund, Asparouhov, & Muthén, 2007), and lower values on BIC indicate a better model fit. Entropy represents the quality of classification of individuals into latent classes. Entropy values can range from 0 to 1, with higher scores indicating greater classification accuracy.

After having determined the number of treatment response classes, we subsequently added covariates to the model. In these analyses, we explored whether gender, age, trauma type, pretreat-

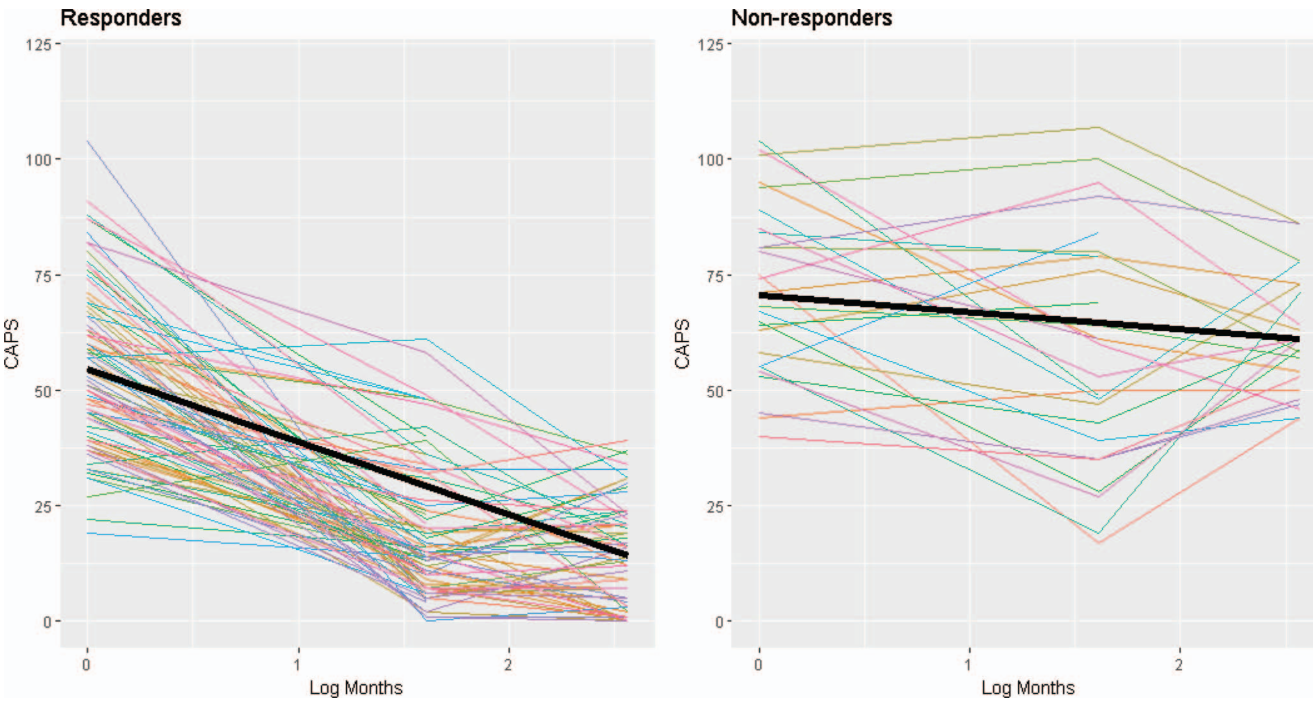

Figure 2. Estimated growth trajectories of the GMM two-class model of PTSS from pretreatment to follow-up. Responders (n = 123, 79%), Non-responders (n = 32, 21%). GMM = Growth Mixture Modeling; PTSS = Posttraumatic Stress Symptoms. See the online article for the color version of this figure.

ment level of depression and anxiety and degree of posttraumatic cognitions at baseline were associated with class membership. In our current sample, standardized scores of the continuous variables (i.e., age, MFQ, CDI, SCARED and CPTCI) were used in the analyses. Following current recommendations for mixture modeling with longitudinal data (Muthén and Muthén, 2012), class membership, intercept and slope were regressed on the covariates (i.e., class membership, intercept and slope are defined as dependent variables). Even though we were foremost interested in potential variables predicting class membership, intercept and slope were regressed on the covariates to control for the direct effects of the covariates on intercept and slope. To investigate the crude effect of each predictors, class membership, intercept and slope were first regressed on the covariates individually in six separate models. Subsequently, we fitted a model in which all covariates were included jointly as predictors of class membership, intercept and slope in order to examine the predictive value of the covariates after allowing the variables to control for each other. In this joint model, the three paths (i.e., the paths from the covariates to class, intercept and slope) were estimated simultaneous. Thus, one model was run with multiple covariates (independent variables) and multiple dependent variables (i.e., class membership, intercept and slope). (See online supplementary data for illustration of the growth mixture model). The residual variance in depression at T3 (follow-up) was initially estimated by Mplus to a nonsignificant negative value and was consequently constrained to zero in all subsequent models. All data analyses were performed in Mplus 7.31 (Muthén & Muthén, 2012). Missing data were handled by the full information maximum likelihood procedure (FIML) accounting for missing data at random (MAR) assumptions.

Results

Means and standard deviation of PTSD measures at all time points used in the study are presented in Table 2.

Growth Mixture Model Analyses

While strong support was found in the unconditional growth mixture models in favor of a multiclass solution, the fit statistics did not lend conclusive support to either a two- or three-class model. While the BIC favored a two-class model, sample-size adjusted BIC and entropy slightly favored three classes. Based on the interpretability of the symptom profiles, and the fact that the three-class model resulted in a class with only 6 observations, the two-class model was deemed the overall best-fitting unconditional model (see Table 3).

The two classes were interpreted and labeled nonresponders and responders. The shapes of the growth trajectories for these two distinct classes are shown in Figure 2. The nonresponse group, representing 21% (n = 32) of the sample, was characterized by a

Table 2
Descriptive Statistics of PTSD Symptoms Over Time

	n	*M*	*SD*	*Min*	*Max*
CAPS-CA total, T1	155	59.4	18.8	19	109
CAPS-CA total, T2	117	28.2	24.3	0	107
CAPS-CA total, T3	91	26.5	23.6	0	86

Note. T1 = pre-treatment; T2 = post-treatment; T3 = 12-month-follow-up.

Table 3
Model Fits for One- to Four Class Models (1–4), and the Final Two Class Model With Predictors (5)

Model	Log-likelihood	Numbers of parameters	BIC	SSA-BIC	Entropy
1	−1595.457	7	3226.219	3204.062	—
2	−1578.737	10	3207.909	3176.256	.711
3	−1575.626	13	3216.816	3175.668	.744
4	−1569.916	16	3220.526	3169.882	.737
5	−1478.665	26	3087.433	3005.150	.797

Note. BIC = Bayesian Information Criterion; SSA-BIC = Sample-Size Adjusted Bayesian Information Criterion.

heightened initial PTSS level at pretreatment with a slight reduction of symptoms over time. More specifically, the nonresponder group had a mean intercept of 70.52 (i.e., estimated initial symptom level at pretreatment) and a mean slope of −3.52 (i.e., rate of change in PTSS per log-month). The responder group, which comprised 79% (n = 123) of the sample, was characterized by lower PTSS at pretreatment, followed by a greater symptom reduction over time compared to the nonresponder group. More specifically, the responder group had a mean intercept of 54.75 and a mean slope of −15.75. The intercept and slope were not significantly correlated within classes (i.e., one's initial value of PTSS was not significantly related to their trajectory across time).

A crosstab that provides the frequencies or means for each of the covariates for the two classes is presented in Table 4.

Dropout was not found to be associated with class membership ($p = .679$).

Predictions of Treatment Response

Results from the regression analyses where class membership, intercept and slope were regressed on the predictors simultaneously revealed that only gender ($p < .01$) was significantly associated with class membership where girls were more likely to be assigned to the nonresponder group (see Table 5). In the joint model, the effects of the other predictors on the gender effect on class membership were controlled for, and the results showed that age, trauma type, comorbidity or posttraumatic cognitions did not explain the gender effect on treatment response. Moreover, post hoc analyses investigating whether pretreatment levels of PTSS, anxiety and posttraumatic cognitions differed between girls and boys supported results from the initial analyses (see supplementary data, Table 6).

Among the six predictors, posttraumatic cognitions and anxiety were significantly associated with intercept at pretreatment (estimates 5.35, $p < .01$ and 4.73, $p < .01$, respectively), after controlling for class membership. The effect of posttraumatic cognitions and anxiety on intercept indicate that youths with high levels of posttraumatic cognitions and anxiety, independent of class membership, had higher PTSD scores at pretreatment. Depression was the only measure significantly associated with slope after accounting for class membership (estimate −2.90, $p < .01$). The effect of depression on the slope factor indicate that youths with high degree of depressive symptoms, independent of class membership, showed a greater reduction in PTSS over time. In this study, the aim was to examine potential predictors for class membership; therefore, the results from the analyses investigating predictors on intercept and slope are not presented in Table 5.

Discussion

The present study is one of the first to examine longitudinal patterns of changes in PTSS in a clinical sample of youth using growth mixture modeling. Even though the majority of the study sample represented severely traumatized youth, most participants experienced a clinically significant decrease in PTSS over time. As expected, the results demonstrated heterogeneity in the course of PTSS change during trauma treatment and follow-up. The analyses indicated that two distinct growth trajectories (representing latent classes) could best explain the variation in PTSS across time. The first class, interpreted and labeled nonresponders, represented 21% (n = 32) of the sample. The nonresponse group was characterized by a high symptom level at pretreatment and only a slight reduction of symptoms over time. The second class, labeled responders, represented 79% (n = 123) of the sample. The responder group was characterized by lower PTSS at pretreatment followed by a greater symptom reduction over time compared to the nonresponder group. Gender was the only predictor that was significantly associated with class membership, as girls were more likely to be assigned to the nonresponder group.

The result showing that the nonresponse group was characterized by a higher intercept (i.e., estimated initial symptom level at pretreatment) compared to the response group indicates that youth with high levels of pretreatment symptoms may be at risk of nonresponse. This was in line with our prediction and more studies are needed to understand how treatment can be altered to accommodate this vulnerable patient group. It may be that they would benefit from receiving a longer course of treatment or that additional treatment components are needed. The developers of the model argue that, for youth with high initial levels of dysregulation, therapists should spend more time on the stabilization skills training phase and that the treatment length often needs to be extended to 16–25 sessions (Cohen & Mannarino, 2017), but this has not been examined empirically yet. The findings also indicate that clinicians need to be aware that slow initial decreases of symptoms may be predictive of nonresponse, emphasizing the importance of repeated assessment and monitoring of symptoms.

Table 4
Overview on Frequencies N (%) or Means (SD) for Age, Gender, Trauma Type, Anxiety, Depression and Cognitions by Class

Variable	Response class (n = 123)	Non-response class (n = 32)
Age	13.85 (2.98)	13.91 (2.22)
Gender		
Female	85 (69.1)	27 (84.4)
Male	38 (30.9)	5 (15.6)
Trauma type		
Accidental	31 (25.2)	3 (9.4)
Interpersonal	92 (74.8)	29 (90.6)
Anxiety	30.43 (15.34)	40.03 (16.26)
Depression	28.21 (30.68)	33.44 (33.49)
Cognitions	57.89 (14.62)	68.90 (16.88)

Note. Depression = standardized scores.

Table 5
Predictors of Class Membership

Predictors	Single predictors			Multiple predictors		
	Estimate	95% CI	*p*-value	Estimate	95% CI	*p*-value
Gender	2.073	[.401, 3.744]	.02*	2.450	[.671, 4.229]	<.01*
Age	.145	[−.269, .559]	.49	−.031	[−.501, .439]	.90
Trauma type	.768	[−.831, 2.367]	.35	1.030	[−1.179, 3.238]	.36
Anxiety	.431	[.001, .862]	.05	−.356	[−1.331, .619]	.47
Depression	.285	[−.365, .936]	.39	.330	[−.639, 1.299]	.51
Cognitions	.549	[−.034, 1.132]	.07	.963	[−.286, .619]	.13

Note. Class 1 = non-response, used as reference group; Trauma type = accidental vs. interpersonal; Age, Cognitions, Anxiety, Depression = standardized scores.
* $p < .05$.

The other objective of this study was to examine whether pretreatment characteristics were associated with different treatment trajectories. The results showed that gender significantly predicted class membership, where girls were more likely to be assigned to the nonresponder group. This finding is in contrast to previous TF-CBT studies that have not found that gender is associated with treatment response (Cohen et al., 2011; Kane et al., 2016). One explanation for the gender effect may be related to sex-differences in cognitive appraisals. For instance, a study by Olff, Langeland, Draijer, and Gersons (2007) found that females report higher perception of threat and loss of control than men. There are also studies showing that females report higher levels of maladaptive posttraumatic cognitions than men report (de Haan, Ganser, Münzer, Witt, & Goldbeck, 2017; Meiser-Stedman, Dalgleish, Glucksman, Yule, & Smith, 2009). According to the current analyses, gender differences in treatment response do not seem to be related to pretreatment level of posttraumatic cognitions. However, since the results showed that the effects of posttraumatic cognitions and anxiety on class membership approached significance as single predictors, while not in the joint model, might indicate that parts of the effects of posttraumatic cognitions and anxiety may be attributable to sex differences in level of posttraumatic cognitions and anxiety. Moreover, it might be that girls struggle with different types of posttraumatic cognitions than boys do, which may be more resistant to change. For instance, since females are more often victims of interpersonal trauma compared to boys (Alisic et al., 2014), trauma-related shame and self-blame might be more frequent among girls exposed to interpersonal trauma (Su & Chen, 2008). One study that investigated whether guilty and shameful thoughts were associated with treatment response among adult patient with PTSD support this suggestion, showing that higher pretreatment levels of shame and guilt predicted less reduction of PTSS over the course of prolonged exposure therapy (Øktedalen, Hoffart, & Langkaas, 2015).

The results might also be related to differences in psychological and biological stress responses and coping styles between genders. A review investigating gender differences in PTSD among adults found that gender differences in reactivity to psychological stress (e.g., higher hypothalamic-pituitary-adrenal (HPA) axis dysregulation among females) could explain why females need longer time to recover from post trauma symptoms compared to men (Olff et al., 2007). However, this remains unstudied within a clinical youth sample. It is also possible that the effect of gender on treatment response is not linked specifically to trauma exposure or trauma treatment. Rather, the results may reflect that girls overall report a greater reduction in life satisfaction during adolescence compared to boys (Goldbeck, Schmitz, Besier, Herschbach, & Henrich, 2007), which explains, in part, their poorer response to psychotherapy. Future research should continue to investigate gender-specific psychobiological reactions to trauma, since gender differences may indicate the need for a different treatment focus and specific clinical needs across genders (Blain, Galovski, & Robinson, 2010; Olff et al., 2007).

Contrary to our expectations, age, trauma type and pretreatment level of anxiety and depression were not significantly associated with class membership. Although caution is warranted when interpreting nonsignificant results, these findings may indicate that TF-CBT is helpful for a range of trauma-exposed youth, many with serious interpersonal trauma experiences who experience co-occurring symptoms of PTSS, depression and anxiety. In addition, the model seems to allow for flexible use across developmental ages. The response rate in TF-CBT is also relatively high compared to other treatments (Morina, Koerssen, & Pollet, 2016).

The results showed that high levels of posttraumatic cognitions at baseline were associated with higher PTSS at baseline (i.e., intercept). However, youths reporting high levels of posttraumatic cognitions at pretreatment seem not to be at higher risk for nonresponse. The results may therefore indicate that if TF-CBT succeeds in addressing and changing posttraumatic cognitions in therapy, pretreatment level of posttraumatic cognitions will not be an obstacle for treatment success. Moreover, high degree of depressive symptoms at baseline were associated with greater reduction in PTSS over time (i.e., slope). The finding might indicate that the treatment effectively targets and reduces depressive symptoms (Knutsen, Czajkowski, & Ormhaug, 2018), and further that comorbid depressive symptoms do not increase the risk for poor treatment response.

This study has several strengths worth noting. Using merged data from two randomized controlled trials resulted in a relatively large sample size compared with other clinical studies. The two RCT studies are therefore similar in many aspects (e.g., conducted in outpatient clinics by regular therapists, applied similar exclusion and inclusion criteria, comparable sample sizes, randomization procedure used to allocate participants to TF-CBT or control group in both studies, longitudinal design and several of the measurements to assess symptoms overlapped). There were also similar within-group effect sizes of the PTSS scores (assessed with CAPS-CA) in the TF-CBT groups in the Norwegian study ($d = 1.49$) and in the German study ($d = 1.51$). Moreover, PTSS scores were not found to be significantly different at any assessment points between the two studies.

Furthermore, this is one of few studies examining longitudinal patterns of PTSS change and investigating potential predictors for treatment response in a clinical youth sample. In addition, since the youths participating in the study were recruited from clinical populations, the external validity of the study is strong. However, the study has some important limitations that should be considered when interpreting the results. This study used three assessment waves to model growth trajectories of PTSS across treatment and follow-up. Future studies should try to include more time points, as this provides the opportunity to test models while taking into account nonlinear change in symptoms over time. As for the nonsignificant findings, we cannot draw definitive conclusions about them. Even though the sample size of the study was relatively large considering it is a clinical population, the power to detect significant predictors for class membership would increase with a larger sample. Moreover, even though the majority of those with comorbid symptoms fell into the responder group, 90% of the youth in the nonresponder group had either high levels of pretreatment depression or anxiety or both. Lack of variability may have affected the opportunity to reveal the effect of comorbid symptoms on treatment response in this study. It should also be noted that the significant finding of the gender effect on treatment response may be vulnerable to Type I error due to the small sample size of the nonresponse group and few boys in the study.

GMM is a well-suited analytic statistical approach when the aim is to identify variations in growth trajectories within the data. However, the fact that the three-class model resulted in a class with only 6 observations indicate that the present sample size made it difficult to identify more than two distinct trajectories. Lastly, the high rate of missing data through treatment and follow-up is a limitation with this study. Even though GMM is considered an approach well suited to handle missing data, and attrition analyses showed that drop-out was not associated with treatment response, the results should be interpreted with this limitation in mind.

This study highlights evidence of subgroups of children and adolescents who differ in pretreatment symptom level and how much reduction in PTSS they experience when receiving TF-CBT and in the aftermath of therapy. Even though the vast majority of youth experienced a significant reduction of PTSS, one in five patients did not benefit from TF-CBT. The findings indicate that clinicians need to be aware that girls and youth with high levels of PTSS pretreatment may be at risk of nonresponse. Systematic monitoring of symptoms during the treatment may help clinicians identify potential nonresponders and modify their treatment plan accordingly. Future studies should investigate if longer or more intense treatment (e.g., more frequent sessions to enhance the exposure effect) may prove helpful in cases with high pretreatment symptom levels. Moreover, there is a need for more studies examining why girls may respond more poorly to treatment and how TF-CBT can be altered to better accommodate their specific needs in order to improve response rates. No evidence was found to support that age, trauma type, comorbidity, or posttraumatic cognitions predict treatment nonresponse. These findings may indicate that TF-CBT is helpful for a range of trauma-exposed youth, many with serious interpersonal trauma experiences and posttraumatic cognitions who experience co-occurring symptoms of PTSS, depression and anxiety. However, the many nonsignificant findings underscore the need to continue to examine why some youth do not respond optimally to trauma treatment in order to expand our understanding of nonresponse in TF-CBT.

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