

Treatment of Posttraumatic Stress Related Disorders in Children and Adolescents

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Diversity of Symptoms Occurring in Response to Trauma Exposure

The most prominent disorder related to traumatic experiences is the diagnosis of Posttraumatic Stress Disorder (PTSD). Among those exposed to trauma, 25% to 30% develop PTSD (Cohen, Berliner, & Mannarino, 2010) although these rates likely depend on the trauma type experienced (e.g., 11% in refugees compared to 30% in sexual abused youth). And Kolko (1996) reported that 60% of children with maltreatment experience met criteria for a mental disorder, however only 4% fulfilled the criteria for PTSD. Children and adolescents may thus show a range of reactions in response to trauma exposure, which also meet criteria for other diagnostic categories than PTSD (Perrin, Smith, & Yule, 2000), e.g. other anxiety disorders, including specific phobias, generalized anxiety disorder, or depression and oppositional-defiant or conduct disorders. Suicidality has also been observed as a frequent symptom in response to trauma (Högberg & Hällström, 2008).

Symptoms as a Mirror of Nature and Number of Traumas Experienced

This diversity in reactions may be a result of the type of trauma experienced (Kilpatrick et al., 2003), e.g., child maltreatment versus experiencing a motor vehicle accident. In addition, many children and adolescents who are exposed to one form of maltreatment are also exposed to other forms (e.g., emotional, physical or sexual abuse or neglect) and this exposure to multiple forms of maltreatment was more strongly related to mental health outcome measures than exposure to any single maltreatment form (e.g., Teicher et al., 2006). This points to a greater significance of the number than the type of traumatic events experienced (dose-response relationship between traumatic events and symptoms of PTSD). This has also been reported for other forms of traumas, such as experiencing war or political conflict (which often includes children who were also exposed to domestic violence; Ehnholt & Yule, 2006), natural disaster (e.g. hurricanes, earthquakes) or terrorism. Frequently, the life circumstances followed by such events set the stage for subsequent traumatic experiences. For example, after the earthquake on Haiti, many children had lost their parents, and were by themselves, which makes them vulnerable for sexual and physical exploitation by adults. In sum, it is likely that both, the number of traumatic experiences as well as the nature of a trauma contribute to likelihood of PTSD-related disorders (Catani et al., 2010). A recent meta-analysis of risk factors for developing PTSD following a traumatic experience in children and adolescents reviewed 25 potential risk factors across 64 studies (Trickey et al., 2012). Peri- and post-traumatic variables (e.g. peri-trauma fear, perceived life threat or social support after the trauma, including level of family functioning) showed moderate to large effect sizes (ES) in predicting a posttraumatic response. In contrast, pre-trauma variables (e.g. age, gender or pre-trauma self-esteem) yielded only small to medium ES. These factors may help develop effective primary and secondary prevention programs (e.g., by educating parents about the importance of family functioning and social support in the aftermath of a trauma). They also point to potential mediators and moderators of treatment outcome. For example, the type of trauma has been identified as a moderator of trauma response in children and adolescents in this meta-analysis. Authors suggested that children attribute a different meaning to what happened to them when the traumatic experience was intentionally caused (instead of accidentally; e.g., natural disaster or car accident versus war or abuse). Similarly, depressive symptoms in neglected children are more likely to occur if children are more shame-prone (than guilt-prone; Bennett et al., 2010). These results point at the specific importance of certain cognitions for children: changing these cognitions during treatment may be at least a moderator if not a mediator of treatment response.

PART 1: The evidence base

There are various types of interventions described in the literature to treat PTSD symptoms in children and adolescents. These were developed to specifically change their posttraumatic stress response. In line with the diversity in symptoms occurring in children and adolescents as a consequence of trauma, there are a number of other interventions available to address

child behavior problems and their risk factors in the context of trauma. These include interventions solely with parents to reduce child maltreatment, such as Project Support or Pathways Triple P (Jouriles et al., 2010; Wiggins, Sofronoff, & Sanders, 2009) or interventions working with both, parent and child (usually the non-offending parent), such as Parent-Child Interaction Therapy (PCIT; Chaffin et al., 2011; Chaffin, et al., 2004). Furthermore, Nurse-Family Partnership and Early Start are examples of two home-visiting programs to reduce or prevent child maltreatment. These interventions are usually embedded in the context of domestic and family violence and many are rather preventive in nature than treatment-oriented. As such, they more often target risk factors of maltreatment (such as parenting skills) instead of the phenomenon itself or its consequences on mental health. In fact, there might be no further evidence-based treatments available developed to specifically change affective, cognitive and somatic consequences of trauma experiences, which are not subsumed under PTSD treatment. Conduct problems for example may also be a result of trauma (and at the same time make traumatic experiences, such as child maltreatment also more likely to occur), and they are often targeted through parent interventions but independent of their etiology (i.e., trauma exposure). More recently, PTSD-specific treatments have been extended to also meet the treatment needs of children and adolescents with comorbid disorders (Cohen et al., 2003; 2010).

Reviewing the Evidence-Base for Psychological Treatments for Children with Traumatic Experiences is Difficult Because a Nosology Addressing the Diversity of Child Reactions is Lacking

There have been several reviews on psychological interventions for posttraumatic reactions in children. These are quite different with some addressing RCTs only (e.g., Stallard, 2006), some addressing assessment and treatment for practitioners (e.g., Perrin et al., 2000), and again others focus on specific methods (e.g., Robjant & Fazel, 2010; Cohen et al., 2010; Rodenburg et al., 2009), settings (e.g., interventions delivered in schools: Rolfsnes & Idsoe, 2011) or trauma type (e.g., interventions related to family violence/child maltreatment; MacMillan, et al., 2009).

Type of Interventions Currently Available for Treating Child PTSD-Symptoms

Cognitive-Behavioral Treatment (CBT)

Trauma-focused (Individual) Cognitive-Behavioral Treatment (TF-CBT). TF-CBT combines parent and child skills-based components within a framework of a trauma model. These components include psychoeducation (information about trauma and trauma reactions), parenting skills (i.e. behavior management skills), relaxation skills (to manage physiological reactions to trauma), affective modulation skills (to manage affective responses to trauma), cognitive coping skills (to explore and discuss connections between thoughts, feelings, and behaviors), trauma narrative and processing (to correct cognitive distortions related to trauma, to reorganize memories), in vivo mastery of trauma reminders (to overcome generalized fear related to trauma), and safety planning for the future. These components are taught in parallel parent and child sessions as well as in conjoint child-parent sessions. The number of sessions varies between 12 and 16. In addition to this specific treatment protocol, there are a number of other CBT approaches. These usually include some form of psychoeducation, relaxation techniques, recounting the trauma in some detail, exposure, and homeworks.

In a recent meta-analysis (Wethington et al., 2008; Cave: EMDR studies included as CBT studies in this review) with 11 individual and 10 group CBT studies the most common index trauma for individual and group CBT was sexual and physical abuse. Hedges g for individual CBT was 0.34 (for PTSD symptoms), and 0.56 for group CBT. Both interventions were less effective for sexual abuse, and group CBT was also less effective for “suicide of a family member” than other index traumas (although these could not be specified in more detail). Effects were larger when a no treatment control instead of an alternative treatment group was employed. Furthermore, Rolfsnes and Idsoe (2011) investigated the efficacy of interventions delivered in school settings only. The included 19 studies (16 of which employed CBT) showed a mean ES of $d = 0.68$ ($SD = 0.41$). However, due to the exclusion criteria many children exposed to child maltreatment or those with complex symptoms were not included, and

therefore this medium ES must likely be viewed in light of less severe initial PTSD symptom severity. A more recent RCT of a classroom-based intervention (compared to waitlist) with children affected by war and conflict in Nepal reported similar results (mean ES between 0.41 and 0.58; Jordans, et al., 2010). However, the review also included quasi-experimental trials and even though the more recent trials were randomized, randomization was often not fully successful resulting in pre-intervention differences on some variables between groups. Finally, Kowalik, Weller, Venter, and Drachman (2011) located 21 studies comparing CBT to an active control group and reviewed the immediate outcome. Their primary outcome measure was the (non-trauma-specific) Child Behavior Checklist, which was most consistently used across studies. However, it was still only used in 10 of these studies, and only 8 of those were both randomized and providing pre-post data. Therefore, the final number of studies included in this analysis was quite small. Results demonstrated small to medium ES for the total and the internalizing problem scale ($d = -0.33$ and $d = -0.31$, respectively) favoring CBT over other interventions, among them supportive, unstructured psychotherapy, nondirective supportive treatment and child-centered psychotherapy. The ES for externalizing problem behavior was small but significant with $d = -0.19$. Therefore, trauma-focused CBT is not only (more) efficacious for PTSD-related symptoms but also for non-PTSD related symptoms although the amount of change in these broader symptom classes seemed to be lower than in the specific PTSD symptom cluster.

More recent RCT studies on CBT not yet included in meta-analyses or reviews support the previous conclusions but also add some important new insights:

Trauma narrative not necessarily needed. Deblinger et al. (2011) report on a trial of TF-CBT with 210 children ($M = 7.7$ yrs.; range: 4-11) with sexual abuse experience and PTSD symptoms. The primary goal was to identify the significance of length of intervention (8 or 16 sessions) and inclusion of a trauma narrative component or not. All treatment arms were effective in the moderate to large ES range (mean d across 56 differences from 14 outcome measures of 0.94; cave: no alternative or waitlist control, post-treatment data available for 75% of the sample only). Treatment arms were mostly comparable indicating that a trauma narrative may not be indispensable. A similar result was recently reported in a RCT by Salloum and Overstreet (2012): they compared a trauma intervention (coping skills training) without a trauma narrative with an intervention including a trauma narrative in 72 children (6-12 yrs.) four years after hurricane Katrina. They found no evidence that the trauma narrative resulted in better outcome for PTSD-related symptoms although only with the narrative comorbid aggressive symptoms significantly declined at 12 months follow-up.

TF-CBT also works with preschool children and other trauma types than sexual abuse. Scheeringa et al. (2011) reported about the efficacy of TF-CBT for very young children (3-6 yrs.). Sixty-four children who had experienced acute injury, domestic violence or a hurricane were randomly assigned to either 12 session TF-CBT ($N=40$) or a 12 weeks wait list ($N=24$). Only 31 children completed treatment. Results demonstrated substantial improvement in PTSD-related symptoms in TF-CBT but not in WL ($d = 1.3$) and smaller changes in comorbid symptoms (such as separation anxiety, depressive or oppositional-defiant).

Additional support for CBT and time-limited psychodynamic therapy (PT) recently with relatively better outcome for CBT than PT. Gilboa-Schechtman and colleagues (2010) compared prolonged exposure therapy for adolescents (a CBT approach well-researched with adults adapted for adolescents) to an active control group, namely time-limited dynamic therapy. They included 38 adolescents ($M = 14$ yrs, range: 12-18) with PTSD, mostly as a result of motor vehicle accident, nonsexual assault, sexual assault or terrorist attacks (single-incident traumas only). These authors also assessed satisfaction with treatment, treatment expectancy, therapeutic alliance, and reported no differences between both intervention types in these variables. Results demonstrated improvements for both treatment types, however, CBT resulted in significantly larger changes than PT: 68% no longer met criteria for PTSD in CBT compared to 37% in dynamic treatment with an increasing gap between the treatments at 6 months follow-up (63% vs. 26%) and at 17-months follow-up (self-report only).

Cognitive-behavioral and cognitive therapy may be equally effective in children and adolescents with single-incident trauma (Nixon, Sterk, & Pearce, 2012). Both intervention types were effective for elementary school children and adolescents (65% and 56% remission rates at post-treatment, respectively). Unfortunately, the lack of a waitlist prevents assessment of the extent of natural remission.

Eye Movement Desensitization and Reprocessing (EMDR). EMDR is an approach relying on bilateral stimulation while reprocessing traumatic experiences: The focus is on one traumatic memory (“index trauma”) for which an associated negative (i.e., dysfunctional) cognition is identified and a positive (i.e., functional) cognition is created. Similarly, associated emotions and bodily sensations are identified. The core of EMDR is to focus on the traumatic memory and associated sensations while being bilaterally stimulated. The bilateral stimulation was originally saccadic eye movement, however, research has shown that other kinds of bilateral stimulation also work (e.g., tapping the hands of the therapist). This procedure is continued until desensitization occurred. The number of sessions required varies according to the type of traumatic event and the severity of the traumatic response. “With EMDR unprocessed memories of traumatic experiences, stored in neutral networks, become linked with the adaptively processed memories of positive experiences, which are referred to as reprocessing” (Rodenburg et al., 2009, p. 600). The number of sessions varies between 3 and 8 in the studies investigating EMDR in children and adolescents. A meta-analysis on EMDR studies in children identified seven RCT comparing EMDR to wait-list (3 studies), services as usual (2 studies) or CBT (2 studies, Rodenburg et al., 2009). The authors report a mean ES of $d = 0.56$. The two studies comparing EMDR to CBT resulted in a small advantage for EMDR ($d = 0.25$) although the CBT conditions did not include TF-CBT. In a recent RCT of EMDR for children suffering from PTSD symptoms following motor vehicle accidents (Kemp, Drummond, & McDermott, 2010), results demonstrated again significant effects on primary outcome measures (specific PTSD-related measures) in favor of EMDR and non-significant results on secondary, non-trauma symptoms (such as depression, child behavior problems or general functioning). Therefore, EMDR has very specific trauma-related symptom effects, which do not seem to generalize to non-PTSD symptoms.

Narrative Exposure Therapy for Children and Adolescents (KID-NET). NET has its origins in testimonial therapy, and its goal is to consider the trauma within the socio-political context in which it occurred (Robjant & Fazel, 2010). It focuses on constructing a narrative of traumatic experiences with the aim to embed the traumatic memories within the autobiographical context. Compared to other intervention forms, KID-NET does not require identifying an index trauma. Instead, all traumatic events will be put into the respective autobiographical context when constructing the narration. Furthermore, this intervention may be delivered by lay counselor and in insecure and unsafe environments (i.e., where political conflict and war is ongoing). Finally, the narratives are also used to document the atrocities, which have occurred and these are made available to human rights organizations and those defending immigrants. As such, this intervention type is going beyond delivering clinical services to vulnerable populations. The typical length of intervention was between 6-10 sessions (each session between 60-90 minutes) and the typical age ranges from 8 to 18 years.

Robjant and Fazel (2010) reported in their review three KID-NET studies with ES in two out of three studies of $d = 1.8$ (and 1.9, respectively). However, when including an active control group, KID-NET was not better than a relaxation intervention (Catani et al., 2009). They further refer to three unpublished studies of which at least two have been published by now (Hermenau, et al., 2011; Ruf, et al., 2010). In this recent study from Ruf and colleagues, 26 children traumatized by organized violence were randomly assigned to KID-NET or a waitlist group and assessed 4 weeks (only KID-NET group) after intervention ended, 6- and 12-months later. Little attrition occurred and results demonstrated clear favorable effects for KID-NET on PTSD-related symptom measures. ES were large with some within group changes also occurring in the waitlist. While these studies are promising, the methodological quality of most trials was rather low and only two RCT are currently available, both with small sample sizes and with no indication that KID-NET might be better than another active treatment. Thus,

while KID-NET might be more helpful than waiting, it has yet to be established that it is better than another intervention. Furthermore, more studies would be helpful to make sound conclusions about KID-NET as an effective treatment for comorbid symptoms in children and adolescents, which have not been assessed in existing RCT studies (although the recent intervention delivery study from Hermenau et al., 2011 assessed it but established no significant changes in comorbid symptoms). Furthermore, most studies focus on trauma experienced in the context of war, or natural disaster.

Other Interventions

Other interventions for PTSD symptoms occasionally investigated are *psychodynamic therapy* (explore unconscious thoughts and emotions; integrate the traumatic experience in the own concept of life and self), *play therapy* (non-directive approach relying on play as the principal mean for processing traumatic events) and *art therapy* (processing a traumatic event by expressing the experience in art with the basic assumption that the trauma is stored in memory as an image). Finally, there is *psychological debriefing*, usually a group meeting with victims of traumas shortly after the experience (24-72 hours). In this meeting, the traumatic event is discussed; reactions of victims normalized and education provided how reactions to the trauma may be controlled. Play therapy was evaluated as having insufficient evidence for treatment of PTSD symptoms after traumatic experiences (Wethington et al., 2008): two studies investigating play therapy resulted in Hedges g of 0.81 (for aggression). For psychodynamic therapy, one study yielded an ES of $g = 0.87$ (for PTSD symptoms; Wethington et al., 2008). Although promising, the evidence was deemed insufficient to evaluate psychodynamic treatment as evidence-based for treating PTSD symptoms in children (cave: more recent trial demonstrated again positive effects of PT albeit less than CBT). Finally, art therapy resulted in non-significant results and again, the evidence was evaluated as insufficient. Interestingly, psychological debriefing yielded non-significant results and was the only intervention type published with effects in an undesirable direction indicating potential harm of this intervention in treating children with traumatic experiences. A similar (but older) review conducted by Ramchandani and Jones (2003) included 12 studies of interventions targeting sexual abused children only. They incrementally concluded that the strongest evidence is available for CBT with *symptomatic* children. These authors also emphasized that only 5 (out of 12) studies described method of randomization, and one (out of 12) reported masking of assessors.

Summary of Evidence Related to PTSD-Interventions

In sum, most evidence from meta-analyses and reviews is available for CBT approaches to treat PTSD, and specifically for TF-CBT, followed by EMDR, followed by KID-NET, psychodynamic and play therapy. Art therapy might be ineffective in reducing PTSD symptoms although this refers to only one study, and psychological debriefing may even do harm to children, although again, more studies would be necessary to replicate the negative (and currently non-significant) ES. Group CBT and delivery in school settings is quite effective, however, trauma severity might be lower than in clinic-based services. Finally, the relative efficacy was rarely investigated and we must currently assume that a number of interventions (and maybe not even purposeful ones) may be associated with change. Solely CBT and EMDR have demonstrated a small advantage over other interventions, but the incremental ES is somewhat disappointing. There are a number of limitations to the primary studies included in the reviews, which will be outlined in a separate section below.

Moderators and Mediators of Change in PTSD Treatment Studies

There are only very few studies specifically designed to assess moderators or mediators of change in treatment studies. From reviews (Rodenburg, et al., 2009; Stallard, 2006) and primary studies (Nixon, et al., 2012), a number of potential moderators and mediators have been identified, among them the type of control group (trials with active control groups, lower ES), the type of informant (parental report higher ES than child report), publication year (more recent studies, lower ES), study completers, length of intervention (fewer sessions, higher ES in EMDR; no impact in CBT), initial problem severity (more severe symptoms, higher ES),

trauma type (sexual abuse lower ES than other trauma types, at least in CBT), parental functioning (for younger children: lower parental functioning, lower ES for children), and dysfunctional trauma beliefs/cognitions. However, due to the limitations of interventions studies and the lack of theoretical underpinnings sound conclusions about these factors are difficult. In fact, it seems they are not consistently found within and across treatment types.

Type of Interventions Currently Available for Treating Non-PTSD Symptoms Related to Trauma Or to Prevent Maltreatment Experiences in Children and Adolescents

Nurse Family Partnership

The primary goal is to enhance a trusting relationship between a nurse and the primary caretaker of a child (mostly the mother) to support their caretaking skills (being warm, sensitive, and empathic towards the newborn). The nurses also help mothers to review their own childrearing histories and set goals for their own parental role. The nurse is entering the family context already prior to birth (6-9 visits) supporting mothers in improving prenatal (and later postnatal) health (21 to 26 visits after birth, until the child's second birthday). The visits follow a protocol and each visit takes about 75-90 minutes.

Early Start

This program also includes home visiting services for families. Components are assessment of family needs and resources, enhancement of problem-solving skills, support provision and advice (usually by a social worker or a nurse). Families are on average visited 50 times in the first year. Services can be provided up to 5 years.

Triple P – Positive Parenting Program (see Sanders paper)

Parent-Child Interaction Therapy (PCIT)

PCIT aims at increasing parental skills and motivation and to improve parent-child interactions. This is accomplished by direct coaching of parents. Furthermore, there is a large amount of direct practice of skills in dyadic parent-child sessions. For maltreatment, there is an additional module (six motivational sessions) followed by standard PCIT including a child-directed intervention (play therapy to enhance positive reciprocity between parent and child) and a parent-directed intervention (parent training in which parents learn to set limits and use time out effectively). The preliminary evidence points to the significance of the motivational sessions when working with parents in child welfare.

Other Interventions

In addition to these interventions, there are a number of other psychosocial interventions for child maltreatment, among them other home visitation programs, battered treatment programs to work with the batterer of intimate partner violence (IPV) or infant/child-parent psychotherapy for families at risk for maltreatment (Cicchetti, Rogosch, & Toth, 2006).

In a recent review by MacMillan et al. (2009), it was concluded that the Nurse-Family Partnership and Early Start programs are both effective interventions, however, other home-visiting programs were not sufficiently effective in reducing child physical abuse, neglect or injuries. Furthermore, they concluded that Triple P is promising but needs further replication to provide comprehensive evidence for reducing child maltreatment (they refer to one trial with an ecological design and a small sample size; Prinz, Sanders, Shapiro, Whitaker, & Lutzker, 2009). For all other interventions to prevent exposure to child maltreatment they stated insufficient evidence: this includes enhanced pediatric care for families at risk (e.g. by enhancing physician's ability to identify and support families decreasing risk factors for child maltreatment), educational programs to improve children's knowledge and protective behaviors to prevent sexual abuse (even with some adverse effects in systematic reviews), attachment-based interventions to improve insensitive parenting to prevent psychological abuse and no evidence of any interventions that really prevents intimate partner violence. When considering secondary prevention (i.e. prevention of re-exposure to maltreatment), they conclude that parenting programs show limited evidence in reducing the recurrence of physical

abuse, PCIT is among the few programs who recently demonstrated that participation results in reduced recurrence of child protection services reports of physical abuse (but not neglect). If outcome is defined broader (e.g., outcomes associated with physically abusive parenting), the Incredible Years program and Triple P also demonstrate significant effects. Similarly, PCIT has recently been investigated in its relative efficacy for children with conduct problems who have been exposed to IPV compared to those not exposed to IPV and there was no significant difference in outcome for both samples (Timmer et al., 2010).

Home visitation programs were not effective in preventing the recurrence of abuse. Similarly, if neglect is the primary outcome, there is little evidence for any effective intervention. MacMillan et al. (2009) point at some small studies showing that child-focused interventions and multi-systemic therapy improve child outcomes but little evidence for true prevention of recurrence exists. Similarly, exposure to intimate partner violence is difficult to effectively address: child and women mental health outcome may be improved with interventions, however, the actual reduction of (re-) exposure to IPV has not been shown, and working with the abusive partner psychologically (e.g. by batterer treatment programs) resulted in very mixed outcomes, including generally negative results.

More recently, two randomized controlled trials examined effects of Project Support (Jouriles et al., 2010; Jouriles et al., 2009). Project Support is a family intervention to teach mothers child management skills and provide instrumental and emotional support to mothers. It was originally developed to reduce conduct problems in children from families from domestic violence shelters. However, the more recent study also aimed at reducing the recurrence of physical abuse and neglect. In extension of previous results, the re-referral to Child Protection Services was larger in traditional services (28%) compared to Project Support Families (6%), but this difference was statistically not significant. Therefore, it cannot be concluded that this intervention does indeed better prevent the reoccurrence of child maltreatment than any of the other interventions included in the review by MacMillan and colleagues (2009). Finally, a recent review of universal parenting programs criticized that none of the available and recommended evidence-based programs teach parents about all types of psychological abuse (Baker, Brassard, Schneiderman, Donnelly, & Bahl, 2011).

Major Limitations of Intervention Studies Investigating the Treatment or Prevention of PTSD and Other Psychopathology

Dearth of conceptual models adopting a developmentally sensitive perspective. Most theoretical work has been taken over from adult research. Stallard (2006) emphasized that conditioning theory is among the most widely used theories but he criticized that it ignores inter-individual variability in post-traumatic reactions. In a recent meta-analysis (Alisic et al., 2011), it was shown that theory use in 40 longitudinal studies was only found in a minority of these studies. Theoretical grounding of child PTSD, not to speak of child PTSD treatment, is therefore basically missing. It might be a very challenging task to construct one common model for younger and older children because the sense of the world, the knowledge about death in general, and the own death specifically, varies considerably in different developmental stages and these insights will likely impact the processing of a traumatic event. Meiser-Stedman (2002) discussed the application of two adult-driven cognitive models of PTSD to children. However, children show some different reactions to trauma and even though they demonstrate re-experiencing, this rather occurs in nightmares and through reenactment in play than in intrusive, sensory based memories of the traumatic event. Similarly, the younger the child, the less likely will a memory be encoded verbally. As such, strategies derived from models relying on verbal encoding of memories may be less relevant to children and more experimental research on the nature and type of symptoms caused by traumatic experiences might be helpful to derive a developmentally sensitive model. In addition, it is likely that the trauma type and the onset of trauma (before or after age 5) might be highly relevant for development of attachment as well as stress responses (e.g., catecholamine alterations). These factors may lead to permanent changes in brain development (although evidence is indirect and needs to be further studied; De Bellis, 2001). Childhood PTSD models as well as models of treatment response should include these considerations.

Lack of randomization or unsuccessful randomization makes causal inferences

difficult. The empirical evidence for PTSD treatments is reduced to few trials if inferences that the actual intervention *caused* the reduction in PTSD symptoms are the prerequisite. This is often due to a lack of randomization, and even if randomization occurred, the method of randomization is not disclosed and/or the randomization failed and baseline differences between treatment and control groups occurred. Furthermore, there are many trials without an adequate control group. For example, an overview of internal validity of research designs in child maltreatment prevention studies indicated that only about one-fourth to half of all studies used randomized controlled designs (not considered if randomization was successful; Mikton & Butchart, 2009). Studies with poorer methodological quality usually yield larger ES potentially leading to an overestimation due to false attribution of change to the intervention. Studies comparing interventions with a no-treatment control group and non-controlled studies do not allow testing incremental efficacy (or treatment as usual or waitlist). Finally, a lack of independent assessors as well as a lack of blinding of assessors may contribute even further to the blurred interpretation of intervention trial results.

No (psycho-)biological indicator of stress used as an outcome measure in treatment

trials. It is well researched that traumatic exposure is associated with a number of mental and physical health consequences, and it also increases the likelihood of academic underachievement and employment attainment. However, none of these long-term consequences have been embraced as a primary outcome measure in treatment of posttraumatic stress symptoms. The primary outcome measure are usually child-related symptoms, either assessed via self-report from children and adolescents or via parental report. However, assessing the biological stress reaction repeatedly before and after treatment and in long-term follow-ups to evaluate if changes caused by trauma experiences normalize with successful treatment is a highly relevant question. Cicchetti, Rogosch, Gunnar, and Toth (2010) demonstrated that children experiencing early physical and sexual abuse and reporting depressive or internalizing symptoms suffer from neuroendocrine dysregulation. Children who experienced this type of abuse later in their lives (after the first 5 years) or who experienced different types of abuse (such as neglect or emotional abuse) did not show this attenuated decrease in cortisol. It is important to explore if these children are in need of different treatments and beforehand, if currently available treatments do impact the HPA axis functioning in children with traumatic experiences. A similar standpoint is taken by Beauchaine and colleagues (2008): they vote for using biomarkers as treatment outcome measures on a regular basis because this would – among other reasons - help identifying services for those most in need, tailor treatments based on different (homotypic or heterotypic) continuity, and identify certain biomarkers as potential moderators of treatment efficacy. None of the published studies has assessed the increased activation of the noradrenergic system. Butcher and Mikton (2009) summarized that only 28% of all maltreatment intervention studies used direct outcome measures, 4% employed proxy measures and almost 65% assessed risk factors.

Assessment and/or reporting of side effects is neglected. With few exceptions, side effects are not assessed, reported or even mentioned. Wethington and colleagues (2008) are among the few authors who included possible side effects in their analytical framework. They are pointing to unresolved trauma, secondary victimization and vicarious traumatization as possible side effects. Sexual abuse prevention programs also sometimes refer to disadvantages, such as increased anxiety in children following participation in the prevention program (MacMillan et al., 2009). For both, prevention and treatment trials, assessing adverse effects during and after treatment is essential for further our knowledge about best evidence practice.

Little knowledge about stable and consistent (i.e., robust) predictors of transient, enduring or delayed symptom onset after trauma. It is currently quite difficult to identify those children most in need of services, and to determine the best point in time to intervene.

There is usually a steep decline in PTSD symptoms in the first year after a traumatic event, specifically in single-incident traumas. Therefore, we need to find the fine balance between treating those who need it and avoid treating those who recover on their own or whom we would do harm with treating them prematurely. As a result, it remains unclear if prevention of PTSD symptom onset after a trauma is possible, wanted (it might be necessary for a natural remission to occur) or necessary.

How to prevent emotional abuse, neglect or exposure to intimate partner violence is unclear, although these are among the most frequent experiences in children and adolescents. Parent trainings are likely efficacious in reducing and preventing the recurrence of physical abuse but not IPV, neglect or emotional abuse.

Services provided for PTSD in children and adolescents in clinical practice are likely widely ineffective. More than three fourth of clinicians in the US report as their first line treatment, an approach that either has not been tested or tested and deemed ineffective.

Finally, there are a number of further limitations often associated with treatment outcome research that also apply to PTSD treatments: **small sample sizes (often 25 per arm or less) lead to largely underpowered treatment trials.** Only very few publications reported power analyses and it is likely that many trials were massively underpowered; **few studies report long-term follow-up:** many trials only report on immediate outcome, and although more recent trials focus on long-term outcome, follow-ups that include more than one year are rare; however, there is some evidence that treatment effects may not unfold until one year has passed. Thus, many studies may erroneously make conclusion about the (lack of) effects. **High attrition rates complicate interpretation of findings, particularly in the long-term.** Completion rates are about 60-70% (Celano et al., 1996; Cohen & Mannarino, 1998) immediately after treatment and further diminish when considering follow-up assessment participation (Cohen & Mannarino, 1997; Cohen et al., 2005). This complicates the clear interpretation of intervention outcome in the long run. **Exclusion criteria from (well-) controlled trials limit the applicability in clinical care.** Children with severe developmental delays, psychotic symptoms, substance abuse, children not fluent in English, taking medication, too disruptive or suicidal, or children without a long-term caretaker or a caretaker who is abusing substances (Stallard, 2006) are often excluded from trials. However, many of these criteria apply to children seeking treatment in routine clinical care. So far, evidence was mostly established for children without complex co-morbid conditions and within a supportive family environment with few exceptions (Cohen, Mannarino, et al., 2003). **General therapy process variables are rarely controlled.** It is unclear if all participating children really received the same intended intervention and if aside of treatment adherence, fidelity, therapist allegiance and attention effects play a role in PTSD treatments for children. **Heterogeneity between trials complicates accumulation of knowledge.** There is marked heterogeneity between and within studies, which make accumulating knowledge difficult: there is usually a wide age range of children and adolescents participating in a trial; a wide range of intervention length between studies (from 5 hours to more than 50 hours, distributed over a day versus over many months). The amount needed to reach clinical significant change is unclear as all published trials report some positive effects although a very recent trial did not support much better outcome with more sessions; finally, a wide range of inclusion criteria and outcome measures across trials impairs cross-study result comparison.

Part 2: Implications and recommendations for prevention and intervention research

Screen for emotional distress following traumatic experiences. Lack of pretreatment symptomatology in child behavior or parenting skills challenges outcome research but also questions the necessity of intervention. Deblinger et al. (2001) for example attributed a lack of intervention effects in general child and parent behavior to this floor effect. Research should not neglect those most in need of services, children displaying severe (post-traumatic) symptoms with co-morbid symptoms even if these populations are very difficult to study.

However, it is also very important to distinguish between symptoms and psychosocial functioning: many children may not meet full diagnostic criteria for PTSD but may still be similarly functionally impaired than those meeting all DSM-IV criteria (e.g., Carrion, Weems, Ray, & Reiss, 2002).

Identify appropriate points of access. Families might be more accepting to take the “burden” that comes along with seeking services if they are at a certain “sensitive” point in their (family) life. Offering interventions at the right time might be a crucial factor for participation and attrition rates. Similarly, using a stepped care approach with a school-based universal intervention at first, followed by individual treatment delivery might be more cost-effective. Access and completion rates were found to be significantly higher when intervention was delivered in school setting (91% of those offered the intervention) compared to clinic-based interventions (15% of those offered the intervention; Jaycox, et al., 2010).

Develop theoretical underpinnings for PTSD (treatment) responses. We need to develop theoretical models of trauma impact and intervention delivery in younger children and include in these considerations the heterogeneity of type and time course of symptoms. Making use of sound experimental paradigms may help in deriving theories specifically focusing on children. Including developmental psychology expertise in these models is essential and preferred to an overtaking of adult models.

Make more use of indicators of stress response. Aside of self-reports and / or behavior observation, psychophysiological indicators of stress responses and neurobiological changes caused by successful treatment are crucial to assess. A core assessment battery used in future trials is necessary which would help to accumulate knowledge across trials instead of having to deal with a large heterogeneity in outcome measures.

Find out what specific treatment strategies are helpful. Dismantling strategies are needed to identify the most relevant strategies. Stallard (2006) outlines nicely the wide variety of techniques employed within the overall frame of “cognitive-behavioral treatments” and it is very unclear which of those are necessary for change. We may potentially just offer relaxation and reach the same amount of change which much less effort.

Find out what extent of parental involvement is necessary when and how. Scheeringa and Zeanah (2001) pointed out that child and parental functioning are significantly associated after trauma. However, a causal relation has not been established and it is unclear if parental involvement is incrementally helpful (or vice versa in maltreatment: if child involvement is incrementally helpful). Children’s perception of the world and the traumatic event are influenced by the reactions of others around them. Younger children may more heavily rely on this type of “social referencing” than older children (Cohen, 2003) and therefore, parental involvement may be more beneficial for younger than older children.

Investigate treatment seeking behaviors. Investigate treatment seeking behavior in youth exposed to trauma might also help to examine the impact of self-selection effects. Furthermore, it might help identify those in need of treatment.

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