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Research article

Trajectories of traumatic stress reactions in children exposed to intimate partner violence

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ABSTRACT

Background: Understanding different longitudinal patterns of traumatic stress reactions in children exposed to intimate partner violence (IPV) can promote early identification of at-risk children.
Objective: Our study aims to explore trajectories of traumatic stress reactions following childhood IPV exposure, and their relation with parental traumatic stress and child emotional security in the interparental subsystem.
Participants and Setting: The sample comprised 303 children (age 3–10, $M = 6.20$) from families referred to institutions for IPV. Data were collected at home.
Methods: Three waves of parent-reported questionnaire data were analyzed using latent class growth analysis and linear regression.
Results: Five trajectories were identified: 'resilient', 'moderate stable', 'struggling', 'improving', and 'elevated adjusting'. Only the 'struggling' trajectory had dysfunctional symptom levels at the final wave. Higher parental traumatic stress predicted 'improving' trajectory membership ($\beta = 0.17$, $p = .033$), whereas lower parental traumatic stress ($\beta = -0.20$, $p = .003$) and child emotional insecurity ($\beta = -0.45$, $p = < .001$) predicted 'resilient' trajectory membership. Higher child emotional insecurity predicted membership in trajectories with higher initial traumatic stress (improving: $\beta = 0.26$, $p < .001$; struggling: $\beta = 0.31$, $p < .001$; elevated adjusting: $\beta = 0.27$, $p < .001$). Child emotional security did not buffer the effect of parental traumatic stress on likelihood of dysfunctional trajectory membership ($\beta = 0.04$, $p = .380$).
Conclusions: Children exposed to IPV show different trajectories of traumatic stress reactions, partly corresponding to trajectories identified in other populations. Child emotional security and parental traumatic stress predict trajectory membership.

1. Introduction

The family environment is not a safe haven for all children. An estimated 1.2% of Dutch children per year get exposed to intimate

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partner violence (IPV) between their parents (Euser, Alink, IJzendoorn, & Bakermans-Kranenburg, 2013). IPV is any form of physical, emotional and/or sexual abuse between romantic (ex-) partners (Rodriguez, Bauer, McLoughlin, & Grumbach, 1999). For a long time, children were seen as silent witnesses to IPV, disconnected from the violence between their parents (Holt, Buckley, & Whelan, 2008). Today, however, we know IPV exposure harms children. In fact, there is evidence that IPV exposure is equally detrimental to children's psychological, social and academic development as experiencing abuse first-hand (Kitzmann, Gaylord, Holt, & Kenny, 2003). Damage can be direct, as children may witness the abuse or its aftermath (Carpenter & Stacks, 2009), or indirect, as parents involved in IPV more often experience increased parenting stress (Owen, Thompson, & Kaslow, 2006) and exhibit negative parenting practices (Ehrensaft, Knous-Westfall, & Cohen, 2017). IPV exposure can therefore cause traumatic stress reactions in children (e.g., Vu, Jouriles, McDonald, & Rosenfield, 2016). Understanding the development of traumatic stress reactions and its precursors in children exposed to IPV is essential to prevent enduring problems. However, current knowledge of different trajectories of traumatic stress reactions in children following IPV is limited (Galatzer-Levy, Huang, & Bonanno, 2018). With this study, we aim to expand this knowledge by exploring trajectories of traumatic stress reactions in children exposed to IPV. Additionally, we investigate how contextual (i.e., parental traumatic stress) and child factors (i.e., child emotional security) affect these trajectories.

1.1. A trajectory-based approach to traumatic stress reactions

Numerous studies have followed people's adjustment over time after stressful and/or potentially traumatic events, using an approach in which reactions to such events are modeled longitudinally as patterns or trajectories. A comprehensive review of studies using such a trajectory-based approach describes four trajectories of functioning commonly identified after potential trauma: resilience, with low and stable levels of dysfunction; recovery, with decreasing levels of dysfunction; chronic dysfunction, with high and stable levels of dysfunction; and delayed onset, with initially moderate, yet increasing levels of dysfunction (Galatzer-Levy et al., 2018). The latter may also follow a pattern of initial stability, followed by increasing dysfunction. These findings correspond with what Bonanno (2004) theorized to be the prototypical trajectories of functioning following potentially traumatic events.

The study of trajectories of functioning is an alternative approach to diagnostic categorizations (Galatzer-Levy et al., 2018). This does not imply a rejection of clinical diagnostics; clinical categorizations of reactions to potential trauma, such as Posttraumatic Stress Disorder (PTSD), are useful tools for assessment which aid delivery of appropriate and effective treatment. However, these categorizations do not capture the heterogeneity of development after potential trauma – that is, not everyone reacts to potential trauma identically, and neither dysfunction nor resilience are necessarily permanent. This heterogeneity is better represented by a trajectory-based approach, which can provide insight into different longitudinal patterns of adjustment (Bonanno, 2004).

Trajectories of adjustment can be identified for numerous outcomes relevant to functioning after potential trauma, such as symptoms of clinical disorders (e.g., depression), as well as more general indicators of functioning (e.g., psychological well-being; Galatzer-Levy et al., 2018). Several trajectory-based studies of children's adjustment after potential trauma have used PTSD symptoms as an outcome (e.g., Le Brocque, Hendrikz, & Kenardy, 2010; Miller-Graff & Howell, 2015; Punamäki, Palosaari, Diab, Peltonen, & Qouta, 2015). However, children's responses to potential trauma are typically diverse and characterized by patterns of comorbidity with both internalizing and externalizing psychopathology (McCloskey & Walker, 2000). Some scholars have argued that psychological responses to childhood maltreatment may be best conceptualized as elements of a single psychopathology factor, rather than a number of separate disorders (Caspi et al., 2014), and that the PTSD diagnosis does not accurately capture the multifaceted presentation and developmental effects of childhood trauma within the caregiving system (Van der Kolk, 2017). In this study, we therefore take a comprehensive approach to children's traumatic stress reactions following IPV exposure by not only considering PTSD symptoms, but also the broader range of internalizing (anxiety, depression), externalizing (anger, aggression) and other (dissociation, sexual preoccupation) reactions to potential trauma.

In a trajectory-based perspective, trajectories represent subsamples within the full sample. From this perspective, dysfunction is most accurately operationalized as symptom levels which are statistically elevated in some individuals compared to those of other individuals who have endured the same event (Bonanno & Mancini, 2012). Therefore, in the current study a statistical cutoff for dysfunction based on the individual's functioning relative to the full sample is preferable to a clinical cutoff. This means findings of the current study need to be interpreted in the context of this specific sample of children exposed to IPV; children are classified as showing (emerging) dysfunction when their symptom levels are very high compared to those of other children exposed to IPV from the same sample.

A trajectory-based approach can yield important insights in the development of traumatic stress reactions in children exposed to IPV. For instance, understanding of trajectories of traumatic stress can improve identification of at-risk children, facilitating early intervention. However, trajectory-based studies focusing on children are relatively scarce (Galatzer-Levy et al., 2018). The few existing studies indicate that after potential trauma, children show trajectories of functioning that are somewhat similar to prototypical trajectories (e.g., resilience, recovery and chronic dysfunction after severe childhood injury; Le Brocque et al., 2010, and child abuse; Miller-Graff & Howell, 2015; and resilience, recovery and delayed onset in child victims of the Gaza war; Punamäki et al., 2015). These studies suggest that although most children show successful adjustment after potential trauma, there is also a smaller but consistently identifiable group that struggles.

1.2. Contextual and child factors affecting trajectories of traumatic stress reactions

Understanding how contextual and child factors affect children's trajectories of traumatic stress reactions following IPV exposure can advance recognition of contexts in which dysfunction as well as successful adjustment emerge. Furthermore, it can contribute to

identification of at-risk children, which may in turn guide intervention efforts. We explore contextual (i.e., parental trauma) and child (i.e., emotional insecurity) factors that may affect children's trajectories of traumatic stress reactions.

1.2.1. Spillover of parental traumatic stress

Adults involved in IPV commonly experience traumatic stress, which can undermine parenting practices, for instance through reduced parental availability and increased parenting stress (e.g, Telman et al., 2016; Visser, Schoemaker, Schipper, Lamers-Winkelman, & Finkenauer, 2016). Because of impaired parenting practices, children may not receive the parental support they need to cope with IPV. Parental support is a protective factor against child traumatic stress (Thabet, Ibraheem, Shivram, Winter, & Vostanis, 2009). Conversely, insufficient parental support is a risk factor that may exacerbate child traumatic stress (Bokszczanin, 2008). Thus, parental traumatic stress may adversely affect the child through a spillover effect: parental traumatic stress disrupts parental functioning, which in turn impairs child adjustment.

1.2.2. Child emotional security in the interparental subsystem

Emotional security theory is a conceptual model to explain children's adjustment to parental conflict (Davies & Cummings, 1994). Children's emotional security in the interparental subsystem is formed on the basis of the child's interpretation of the quality, stability, and functioning of the interparental and parent-child relationships. Thus, emotional security is not a characteristic of the interparental subsystem as such, but an internal state, constructed and internalized by the child through their experiences with the interparental subsystem (Davies & Cummings, 1994). This does not mean that negative experiences, such as IPV exposure, inevitably cause child emotional insecurity. Rather, a multitude of subsystem interactions contribute to child emotional security. Through successful conflict resolution or other positive interactions despite IPV, children can still develop emotional security (McCoy, Cummings, & Davies, 2009).

Child emotional security promotes self-regulation and coping, thereby facilitating healthy development in the face of family conflict (Cummings & Miller-Graff, 2015). Therefore, child emotional security in the interparental subsystem could prevent or mitigate traumatic stress reactions in children exposed to IPV. Child emotional security may not only protect against the traumatic impact of IPV itself, but also against the spillover effect of parental traumatic stress. Emotionally secure children might be less vulnerable to impaired parenting practices and/or negative parenting behavior, because their interpretation of the parent-child relationship as safe and stable would make them less likely to perceive such behaviors as threatening.

1.3. Aims of the current study

The first aim of the current study was to investigate whether trajectories of traumatic stress reactions following IPV exposure could be identified in children, using a trajectory-based theoretical and methodological framework (Bonanno, 2004). A second aim was to explore the role of contextual and child factors by investigating whether trajectory membership was predicted by parental traumatic stress and child emotional security at baseline. We also explored the idea that child emotional security might buffer the effect of parental traumatic stress on (emerging) dysfunction trajectories (Bonanno & Mancini, 2012) by examining their interaction effect on the likelihood of dysfunctional trajectory membership.

2. Method

2.1. Participants and procedure

Data for this study were collected by the independent Dutch research institute Verwey-Jonker, as part of a study about professional help and intergenerational processes in the context of domestic violence. The medical-ethical reviewing committee of the Vrije Universiteit Amsterdam granted ethical approval. The sample consisted of families from the four largest Dutch cities (Amsterdam, The Hague, Utrecht and Rotterdam) who were reported for IPV to domestic violence institutions in 2010. Within each family, data were collected for one parent and up to six children between 3 and 18 years old. Only children aged 3–10 were included in our study, because convergent validity between the measures used for traumatic stress assessment in children between 3 and 10 years old and those used for children older than 10 years is inadequate (Lanktree et al., 2008), and only 9.5% of the sample was older than 10 years. The sample of our study therefore comprised 303 children (50.8% female) from 173 parents (92.0% female). At T1, the mean age of the children was 6.20 (SD = 2.37). 56.4% of children had the Dutch nationality. Parental age was measured categorically ($<$ 55 years old or $\geq$ 55 years old), and 97.4% of the parents were younger than 55 years at T1. 64.4% of parents were born in the Netherlands, but all parents had good command of the Dutch language, which was a prerequisite for participation. The average socioeconomic status of the sample was relatively low; a majority of parents (57.1%) had no paid employment for more than 12 h a week and 71.8% of the families had a net monthly income of less than €1,500,-. The majority of participating parents were referred to domestic violence institutions as victims of IPV (Tierolf, Lünnemann, & Steketee, 2014), but almost none were exclusively victims; although all parents reported victimization (psychological aggression: 100.0%, physical aggression: 94.0%), 99.5% also reported perpetration (psychological aggression: 97.6%, physical aggression: 88.3%).

The study was set up longitudinally with three data collections (T1-T3). The first measurement took place as soon as possible after referral to a domestic violence institution. There was a 12-month interval between the T1 and T2 data collections, and a six-month interval between the T2 and T3 data collections. All data were collected using parent-reported questionnaires, completed during home visits in the presence of trained research assistants. Participants were informed about the goal and procedure of the study and

provided written informed consent before starting. Participants received €20,- compensation per wave.

2.2. Materials

2.2.1. Child traumatic stress

Child traumatic stress was assessed at each wave by parent-report on a Dutch translation of the Trauma Symptom Checklist for Young Children (TSCYC; Tierolf, Schuengel, & Lamers-Winkelman, 2017). The TSCYC is a 90-item questionnaire for traumatic stress assessment in children from 3 to 12 years old. It includes eight subscales concerning posttraumatic stress symptoms (intrusions, avoidance and arousal) and symptoms that commonly occur with childhood trauma (depression, anxiety, anger, dissociation, and sexual preoccupation). Questions about the child's behavior in the past month were answered on a four-point Likert scale ranging from *never* to *very often*. A sample item is 'my child is startled easily'. Following conceptualizations of children's reactions to trauma within the caregiving system as diffuse and multi-faceted patterns including different types of psychopathology (Caspi et al., 2014; Van der Kolk, 2017), we combined the TSCYC subscales into one total score of traumatic stress reactions encompassing the broad range of reactions that may occur in response to IPV exposure. Existing research has confirmed the psychometric quality of the Dutch TSCYC (Tierolf et al., 2017). In our study, internal consistency of the TSCYC was excellent across waves (α = .95–.96).

2.2.2. Parental traumatic stress

Participants reported traumatic stress at T1 on a Dutch translation of the Trauma Symptoms Inventory (TSI; Briere, 1995), a 100-item questionnaire with 10 subscales concerning posttraumatic stress and related symptoms, such as tension-reduction behavior. Participants reported about the past six months on a four-point Likert scale ranging from *never* to *very often*. A sample item is 'I get sudden flashbacks of something bad that happened in the past'. Existing research has confirmed the psychometric quality of the TSI (Briere, Elliott, Harris, & Cotman, 1995; McDevitt-Murphy, Weathers, & Adkins, 2005). In our study, TSI scores at T1 had excellent internal consistency (α = .97).

2.2.3. Child emotional security in the interparental subsystem

Child emotional security was assessed at T1 with a Dutch translation of the Security in the Marital Subsystem Parent-Report (SIMS-PR) scale (Davies, Forman, Rasi, & Stevens, 2002), a 28-item scale assessing children's reactions to parental conflict. Participants compared the items to their child's reactions in the past year on a five-point Likert scale, ranging from *not at all like him/her* to *a whole lot like him/her*. A sample item is 'my child tells us to stop arguing'. Because items reflect attempts to preserve emotional security when it is threatened, higher scores indicate lower child emotional security. Existing research has confirmed the psychometric quality of the SIMS-PR (Cummings, Schermerhorn, Davies, Goeke-Morey, & Cummings, 2006; Davies et al., 2002). In our study, SIMS-PR scores at T1 had excellent internal consistency (α = .92).

2.2.4. IPV frequency

IPV frequency was assessed at T1 with a Dutch translation of the Revised Conflict Tactics Scales (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Although the CTS2 has five subscales (injury, sexual coercion, negotiation, physical aggression, and psychological aggression), only the latter three were included in the original study. Negotiation (settling of disagreements through positive tactics; Straus et al., 1996) is not a dimension of IPV in itself and was therefore not included in the operationalization of IPV frequency. The physical and psychological aggression subscales together contain 40 items about past-year abuse, both as a victim and as a perpetrator, with an eight-point Likert scale ranging from *never* to *more than 20 times*. A sample item is 'My (ex-) partner beat me up'. Note that, although we use the term IPV, our IPV measure was in fact incomplete because it did not include injury and sexual coercion. Since only one parent from each family participated, participants' reports of victimization and perpetration were combined into one score indicating the total frequency of IPV between both parents. Existing research has confirmed the psychometric quality of the physical and psychological aggression subscales (Straus & Mickey, 2012; Straus et al., 1996; Vega & O'Leary, 2007). Furthermore, the CTS2 is resistant to social desirability (Sugarman & Hotaling, 1996). In our study, CTS2 scores at T1 had good internal consistency (α = .87).

2.3. Statistical analysis

2.3.1. Missing data analysis

Sample attrition was 45.5%, with 165 of the initial 303 children remaining in the study at T3. Children whose parent completed all waves did not differ significantly at T1 from children whose parent dropped out on age ($t(190) = 0.44$, $p = .662$), parental education (χ^2 (3) = 1.56, $p = .669$), parental gender ($\chi^2(1) = 1.37$, $p = .242$), IPV frequency ($t(272.68) = -0.90$, $p = .370$), child traumatic stress ($t(159.50) = -0.32$, $p = .750$), parental traumatic stress ($t(276) = 1.00$, $p = .317$), or child emotional security ($t(185) = 0.63$, $p = .528$). However, parents of girls were more likely to drop out than parents of boys ($\chi^2(1) = 7.13$, $p = .008$).

Little's MCAR-test suggested missingness was not completely at random ($\chi^2(93) = 121.54$, $p = .025$). We explored the possibility of missing not at random by investigating whether missingness on study variables was related to earlier and later scores on the same variable. For child traumatic stress, Pearson's correlations showed no significant association between T1 missingness and scores at T2 ($r(82) = .07$, $p = .523$) or T3 ($r(70) = -.18$, $p = .138$). T2 missingness was not significantly associated with T1 ($r(174) = .14$, $p = .058$) or T3 child traumatic stress ($r(70) = -.06$, $p = .593$). Finally, T3 missingness was not significantly associated with scores at T1 ($r(174) = .05$, $p = .551$) or T2 ($r(82) = -.17$, $p = .125$). All predictors were assessed at T1, and thus their missingness correlations

were only calculated for this wave. Pearson's correlations showed no significant associations between missingness on parental traumatic stress at T1 and scores at T2 ($r(171) = 0.02$, $p = .784$) or T3 ($r(151) = 0.08$, $p = .639$). For child emotional security, there was no significant association between T1 missingness and scores at T2 ($r(84) = -0.15$, $p = .175$) or T3 ($r(68) = -0.08$, $p = .500$). For age, there was no significant association between T1 missingness and T2 age ($r(113) = 0.15$, $p = .109$), but T1 missingness was significantly negatively correlated with T3 age ($r(83) = -0.26$, $p = .016$). This is explained by the fact that children who were previously too young to participate were included at T3 (and thus missing at T1; Tierolf et al., 2014). Finally, IPV frequency did not have missing data at T1. Because there were only associations between gender and dropout and T1 missingness and T3 age, we concluded missingness most resembled missing at random. Missing data were therefore handled with Full Information Maximum Likelihood.

2.3.2. Analytic strategy

Latent class growth analysis (LCGA) empirically tests the presence of subsamples with unique growth parameters within a sample. It bases trajectory identification on the data instead of one's own expectations and is thus the most appropriate method for exploratory research (Bonanno & Diminich, 2013). Mplus version 8.2 (Muthén & Muthén, 2019) was used for preliminary analyses, LCGA and subsequent regression analyses, and IBM SPSS version 24 (IBM Corp, 2016) for data preparation and missing data analysis. Standard errors of parameter estimates were corrected for nonindependence of family members with the 'complex' option in Mplus.

For LCGA, a series of six models with an increasing number of classes was estimated. The optimal number of classes was determined by five criteria. First, the information criteria must decrease by adding an extra class. We used the Bayesian Information Criterion (BIC) and sample size-adjusted Bayesian Information Criterion (SSA-BIC), as these are considered the most accurate (Nylund, Asparouhov, & Muthén, 2007). Second, the adjusted Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT) must be significant. These two criteria indicate model fit improves by adding an extra class. Third, entropy must approach 1 to indicate accurate classification of all individuals. Fourth, each class must contain a considerable portion of the sample. We used the commonly recommended minimum of five percent (Andruff, Carraro, Thompson, Gaudreau, & Louvet, 2009), because with our small sample a lower minimum would yield very small classes. Fifth, trajectories must not be too similar to each other (Jung & Wickrama, 2008).

After identification of the optimal number of classes, individual posterior probabilities of membership to each class were saved. We used class probabilities instead of most likely class membership, because class probabilities account for imperfect classification (Lanza, Collins, Lemmon, & Schafer, 2007). Linear regression was used to regress class probabilities onto the covariates. Child emotional security and parental traumatic stress were grand mean centered to facilitate interpretation and avoid multicollinearity with their interaction effect. Child age and IPV frequency were added as control variables to assess whether the hypothesized predictors had predictive power beyond the well-documented effects of age and IPV frequency (Graham-Bermann, Gruber, Howell, & Girz, 2009). To avoid convergence problems due to scale differences between dependent and independent variables, IPV frequency and the interaction effect of child emotional security and parental traumatic stress were divided by 100, and class probabilities were multiplied by 100. As the cutoff for dysfunction was based on comparison of each trajectory's final symptom level relative to the full sample (Bonanno & Mancini, 2012), trajectories were classified as dysfunctional if they were above the 95th percentile of the full sample at T3.

3. Results

3.1. Preliminary analyses

3.1.1. Associations between background characteristics and traumatic stress

Table 1 displays means and standard deviations of all study variables across waves; Table 2 displays Pearson's correlations between all study and background variables across waves. The correlation matrix shows age at T1 was not significantly associated with child traumatic stress at T1 ($r(301) = .101$, $p = .119$) or T2 ($r(301) = -.044$, $p = .783$). However, there was a significant positive correlation between age and child traumatic stress at T3 ($r(301) = .317$, $p = .008$). Gender was not significantly associated with child traumatic stress at T1 ($r(301) = .086$, $p = .314$), T2 ($r(301) = .090$, $p = .403$) or T3 ($r(301) = -.019$, $p = .900$). Furthermore, nationality (Dutch or non-Dutch) was not significantly associated with child traumatic stress at T1 ($r(301) = -.101$, $p = .433$), T2 ($r(301) = -.221$, $p = .366$) or T3 ($r(301) = -.229$, $p = .456$). There was no significant association between receiving professional help and child traumatic stress at T1 ($r(301) = -.052$, $p = .760$) or T2 ($r(301) = .119$, $p = .511$). However, at T3, receiving professional help was significantly correlated with higher child traumatic stress ($r(301) = .420$, $p = .009$).

Table 1
Means and Standard Deviations of all Study Variables across Waves.

	Wave 1		Wave 2		Wave 3	
	M	*SD*	*M*	*SD*	*M*	*SD*
Child traumatic stress	431.37	78.43	418.51	57.73	416.25	61.58
Parental traumatic stress	646.31	70.84	590.29	59.70	586.69	63.94
Emotional insecurity	56.32	19.94	48.37	18.69	50.88	20.48
IPV frequency	91.83	73.04	105.55	122.03	90.94	97.84
Child age	6.20	2.37	7.02	3.01	6.71	2.53

Table 2
Correlations between all Study and Background Variables across Waves.

Measure	IPV1	IPV2	IPV3	TRP1	TRP2	TRP3	TRC1	TRC2	TRC3	EmIn1	EmIn2	EmIn3	Age1	Age2	Age3	Gen	Nat	PrH
Study variables																		
IPV1	–																	
IPV2	.547**	–																
IPV3	.428**	.566**	–															
TRP1	.262**	.099	−.020	–														
TRP2	.156*	.014	.025	.672**	–													
TRP3	.127	.014	−.040	.598**		–												
TRC1	.231*	−.004	.091	.487**	.437**	.393**	–											
TRC2	.207**	.089	.186*	.206**	.287**	.121	.531**	–										
TRC3	−.042	.065	.019	.183	.306**	.457**	.367**	.674**	–									
EmIn1	.082	−.004	.082	.425**	.199	.182	.610**	.296**	.464**	–								
EmIn2	−.171	.089	−.171	.045	−.022	.000	.233*	.180**	.250*	.515**	–							
EmIn3	−.119	.065	−.119	.104	.311*	.399**	.225	.112	.446**	.476**	.515**	–						
Age1	−.001	−.117	.065	−.014	.136	.170	.101	−.044	.317**	.173**	.047	.085	–					
Age2	−.056	−.114	.000	−.017	.183	.220*	.261*	−.039	.393**	.246*	.230*	.217	.944**	–				
Age3	−.075	−.107	.031	−.022	.067	.197*	.261	−.039	.393**	.407**	.384**	.338**	.903**	.934**	–			
Background variables																		
Gen	−.094	.010	.058	.110	−.116	−.108	.086	.090	−.019	.148	.218	.025	−.013	−.135	−.071	–		
Nat	.407	.384	.338	−.190	−.024	−.755**	−.101	−.221	−.229	.022	−.067	−.043	.086	.025	.205	−.048	–	
PrH	−.170	−.079	.258	−.124	.022	.091	−.052	.119	.420	.076	.197	.534	.249*	.177	.329*	−.153	.039	–

Note: IPV = Frequency of intimate partner violence; TRP = Parental traumatic stress; TRC = Child traumatic stress; EmIn = Emotional insecurity; Age = Child age; Gen = Child gender (0 = male, 1 = female); Nat = Child nationality (0 = Dutch, 1 = non-Dutch); PrH = Received professional help during study (0 = no, 1 = yes). * = $p < .05$. ** = $p < .01$.

Table 3
Model Fit Statistics for LCGA Models of Child Trajectories of Traumatic Stress Reactions.

Number of classes	BIC	SSA-BIC	Adjusted LMR-LRT	Entropy	Class proportions					
					1	2	3	4	5	6
1	3731.08	3705.73			1.00					
2	3700.13	3674.79	86.00 $p = .001$	.89	.89	.11				
3	3700.14	3665.29	14.84 $p = .698$	.69	.09	.28	.63			
4	3682.46	3638.11	30.03 $p = .476$	.78	.27	.04	.63	.06		
5	3675.83	3621.98	21.08 $p = .220$	.76	.05	.55	.09	.26	.05	
6	3680.15	3616.79	31.50 $p = .133$	.81	.05	.54	.06	.01	.27	.08

3.2. Trajectories of traumatic stress reactions

We first tested whether different trajectories of traumatic stress reactions could be identified using LCGA ($n = 193$; because of missing data, the LCGA sample was smaller than the full study sample, $N = 303$). Because there were only three time points in our data, quadratic growth could not be modeled. We therefore tested a series of linear growth models (see Table 3 for an overview of fit statistics). Each model was rerun twice with increased start values, each time resulting in successful loglikelihood replication, indicating solutions were not local maxima. A five-class solution had the lowest BIC and SSA-BIC in combination with acceptable class sizes and entropy. The four-class model was inferior in terms of information criteria and class sizes, as well as theoretical mismatch to the prototypical trajectories model. The six-class model contained classes as small as $n = 1$. Furthermore, all trajectories in the five-class model were clearly interpretable. These considerations led us to elect the five-class model as the best solution (see Table 4 for growth parameters and Fig. 1 for a graphical representation). It must be noted, however, that the adjusted LMR-LRT was non-significant for all models except the two-class model.

The most common trajectory (55%, $n = 106$) had low and stable levels of traumatic stress. We named this trajectory 'resilient'. The second largest trajectory (27%, $n = 52$) was also stable, but at a moderate level, therefore named 'moderate stable'. The third trajectory (9%, $n = 17$) showed high initial traumatic stress which steadily decreased to the same level as the 'resilient' trajectory, together presenting the lowest mean levels at T3. We therefore named this trajectory 'improving'. The fourth trajectory (5%, $n = 10$) had moderate initial traumatic stress, which increased to the highest level of all trajectories, and was therefore named 'struggling'. The fifth and final trajectory (5%, $n = 9$), named 'elevated adjusting', started with very high traumatic stress which decreased at a rate similar to the 'improving' group. However, this trajectory eventually still had the second highest mean levels. At T3, the 95th percentile of traumatic stress lay at 559.80. The 'struggling' trajectory, with a mean of 608.20 at T3, was thereby the only trajectory to be classified as dysfunctional.

3.3. Influence of parental traumatic stress and child emotional security on trajectories

3.3.1. Main effects

We tested whether parental traumatic stress and child emotional security predicted the likelihood of membership in each trajectory, while controlling for age and IPV frequency. Table 5 displays the regression coefficients for these tests. Children who were more emotionally secure and whose parents had less severe traumatic stress symptoms, were significantly more likely to belong to the 'resilient' trajectory. For the 'moderate stable' trajectory, no significant association between any of the covariates and membership probability emerged. Membership probability for the 'improving' trajectory was predicted by lower child emotional security and higher parental traumatic stress. Furthermore, a significant effect of the control variable age emerged, indicating younger children were more likely to belong to this trajectory. Because a significant interaction effect between parental traumatic stress and child emotional insecurity was present for this trajectory, these main effects must be interpreted as conditional main effects. Membership in both the 'struggling' and 'elevated adjusting' trajectory was significantly predicted by lower child emotional security.

Table 4
Growth Parameters of Child Trajectories of Traumatic Stress Reactions in the Final Model.

Trajectory	Proportion	Intercept			Slope		
		M	*SE*	*p*	*M*	*SE*	*p*
Resilient	.55	381.30	3.94	< .001	3.30	4.85	.496
Moderate stable	.26	447.99	17.49	< .001	−7.34	15.67	.640
Improving	.09	546.78	39.41	< .001	−108.18	35.25	.002
Struggling	.05	487.15	22.03	< .001	80.69	15.15	< .001
Elevated adjusting	.05	650.88	24.29	< .001	−104.07	19.15	< .001

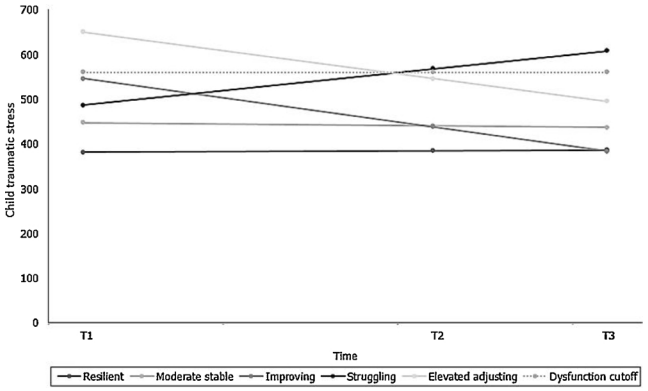

Fig. 1. Growth curves of child traumatic stress for the five trajectories.

3.3.2. Moderation effects

We also tested whether child emotional security buffered the effect of parental traumatic stress on children's development of dysfunctional traumatic stress reactions. This was not the case for the 'struggling' trajectory. A significant moderation effect did occur for the 'improving' trajectory: the positive effect of higher parental traumatic stress on membership probability was amplified by child emotional insecurity (see Fig. 2). However, probing of this effect showed nonsignificant slopes of parental trauma on likelihood of 'improving' trajectory membership at low emotional insecurity (- 1 *SD*; $B = 0.05$, $SE = 2.33$, $p = .782$); mean emotional insecurity ($B = 0.05$, $SE = 0.03$, $p = .088$) and high emotional insecurity (+ 1 *SD*; $B = 0.74$, $SE = 2.34$, $p = .753$). Given this finding and the small effect size of the moderation effect ($\beta = 0.14$), future studies are needed to replicate this finding and examine its robustness.

4. Discussion

In this study, we used a trajectory-based approach to explore trajectories of traumatic stress reactions and their relation to parental traumatic stress and child emotional security in children exposed to IPV. Our findings revealed traumatic stress reactions in children exposed to IPV can follow different trajectories. Five linear trajectories were found, with 'resilient' being the most common. Other trajectories, in order of prevalence, were 'moderate stable', 'improving', 'struggling', and 'elevated adjusting'. Higher parental traumatic stress predicted membership in the 'improving' trajectory. Higher child emotional security and lower parental traumatic stress predicted membership in the 'resilient' trajectory, whereas lower child emotional security predicted membership in the 'struggling', 'improving' and 'elevated adjusting' trajectories. Finally, child emotional security did not buffer the effect of parental traumatic stress on likelihood of dysfunctional trajectory membership.

4.1. Interpreting trajectories of traumatic stress reactions

Our first aim was to explore whether trajectories of traumatic stress reactions could be identified in children exposed to IPV. This was indeed the case, and it is notable that these trajectories largely correspond to the prototypical trajectories both theorized (Bonanno, 2004) and empirically found (Galatzer-Levy et al., 2018) to describe longitudinal development of a range of indicators of functioning following potential trauma. A parallel is evident between the 'resilient' trajectory we found and the prototypical 'resilient' trajectory. The fact that the 'resilient' trajectory was the most common aligns with Bonanno and Mancini (2012) observation that "… the ability to maintain normative or baseline levels of functioning is not rare but often the most common response to potential trauma." (p. 77). It also corresponds to research identifying low and stable trajectories as the most prevalent, reporting similar prevalence rates for resilient trajectories following potential childhood trauma as the ones found in this study (Galatzer-Levy et al., 2018). The finding that most children appear to cope relatively well with IPV exposure underscores children's resilience to adversity.

Two decreasing trajectories were identified: 'improving' and 'elevated adjusting'. The prototypical definition of 'recovery' entails temporarily elevated dysfunction, returning to pre-event levels within two years maximum (Bonanno & Mancini, 2012). Pre-IPV symptom levels are unknown in this study, making it difficult to determine whether the decreasing trajectories meet this definition. However, as T3 symptom levels of the 'improving' trajectory are comparable to the resilient group, recovery is most likely achieved in this trajectory.

The 'struggling' trajectory starts at moderate levels of traumatic stress, but increases to dysfunctional levels. This indicates some children who initially appear to cope relatively well, may be at risk in the long term. This trajectory follows a similar pattern as the prototypical 'delayed onset' trajectory. Delayed onset trajectories may also show initial stability, followed by increasing symptoms (Bonanno & Mancini, 2012). However, because we could not model quadratic growth, such a pattern could not be investigated.

The absence of the prototypical 'chronic dysfunction' trajectory contrasts with findings of a small subsample displaying high and stable symptoms in existing studies on child traumatic stress trajectories (Le Brocque et al., 2010; Miller-Graff & Howell, 2015). Possibly, symptom levels begin to increase in early childhood (reflected in the 'struggling' trajectory), but do not stabilize into chronic dysfunction until after prolonged exposure. Indeed, children in the aforementioned studies were older ($M_{age} = 10.7$ and 12,

Table 5
Linear Regression Coefficients of Class Probabilities on Study Variables: Main-effects Only and Conditional Effects Model.

	Model I: Main and interaction effects					Model II: Main effects only				
	B	*SE B*	95% CI *B*	*β*	*p* (*β*)	*B*	*SE B*	95% CI *B*	*β*	*p* (*β*)
Resilient										
Constant	58.65	5.52	7.82, 69.47	1.38	< .001	63.33	8.29	47.08, 6.97	1.45	< .001
Age	0.31	0.14	0.04, 0.58	0.19	.034	−0.38	1.18	−2.70, 1.95	−0.02	.751
IPV	−10.32	4.29	−8.72, -1.92	−0.18	.018	−7.35	3.86	−14.92, 0.22	−0.13	.060
TRP	−0.04	0.02	−0.08, 0.00	−0.19	.063	−0.12	0.04	−0.20, -0.04	−0.20	.003
EmIn	−0.26	0.09	−0.43, -0.09	−0.32	.003	−0.98	0.14	−1.26, -0.70	−0.45	< .001
TRP*EmIn	−0.02	0.02	−0.05, 0.02	−0.08	.314					
	AIC	BIC	Loglikelihood	MLR $\chi2(0)$		AIC	BIC	Loglikelihood	MLR $\chi2(1)$	Δ S-B adj. χ^2
	1631.90	1653.56	−808.95	0.00		1630.55	1649.12	−809.28	0.91	0.91, p = .341
Moderate stable										
Constant	22.42	5.03	12.57, 32.27	0.98	< .001	27.12	7.80	11.82, 42.41	0.82	< .001
Age	0.03	0.10	−0.22, 0.20	0.03	.728	−0.57	1.13	−2.77, 1.64	−0.04	.613
IPV	4.61	4.18	−3.58, 12.79	0.11	.270	2.86	4.13	−5.23, 10.94	0.07	.487
TRP	0.00	0.01	−0.03, 0.03	0.02	.836	0.05	0.04	−0.03, 0.13	0.11	.200
EmIn	−0.00	0.06	−0.13, 0.12	−0.01	.965	0.07	0.15	−0.22, 0.36	0.04	.637
TRP*EmIn	−0.01	0.01	−0.03, 0.01	−0.04	.501					
	AIC	BIC	Loglikelihood	MLR $\chi2(0)$		AIC	BIC	Loglikelihood	MLR $\chi2(1)$	Δ S-B adj. χ^2
	1610.31	1631.97	−798.15	0.00		1611.64	1630.20	−799.82	3.66	3.66, p = .056
Improving										
Constant	6.56	3.31	0.07, 13.06	0.30	.029	2.90	5.93	−8.73, 12.65	0.12	.622
Age	−0.15	0.04	−0.23, -0.08	−0.18	.001	0.31	0.79	−1.24, 1.86	0.03	.698
IPV	4.68	2.94	−1.09, 10.45	0.16	.113	4.39	3.02	−1.53, 10.31	0.14	.148
TRP	0.02	0.01	0.00, 0.03	0.17	.033	0.04	0.03	−0.03, 0.10	0.12	.259
EmIn	0.11	0.04	0.04, 0.18	0.26	< .001	0.38	0.11	0.16, 0.60	0.33	< .001
TRP*EmIn	0.02	0.01	0.00, 0.03	0.14	.045					
	AIC	BIC	Loglikelihood	MLR $\chi2(0)$		AIC	BIC	Loglikelihood	MLR $\chi2(1)$	Δ S-B adj. χ^2
	1468.73	1490.39	−727.36	0.00		1466.81	1485.38	−727.41	0.08	0.08, p = .783
Struggling										
Constant	4.73	2.01	0.80, 8.03	0.30	.001	0.41	3.28	−6.02, 6.84	0.03	.900
Age	−0.03	0.03	−0.09, 0.03	−0.05	.252	0.62	0.43	−0.23, 1.47	0.09	.154
IPV	1.89	1.30	−0.66, 4.44	0.09	.187	1.55	1.06	−0.53, 3.63	0.07	.180
TRP	0.00	0.00	−0.01, 0.01	0.02	.722	−0.00	0.02	−0.04, 0.03	−0.02	.824
EmIn	0.07	0.03	0.02, 0.11	0.23	.001	0.25	0.09	0.08, 0.43	0.31	< .001
TRP*EmIn	0.00	0.00	−0.00, 0.01	0.04	.380					
	AIC	BIC	Loglikelihood	MLR $\chi2(0)$		AIC	BIC	Loglikelihood	MLR $\chi2(1)$	Δ S-B adj. χ^2
	1371.70	1393.36	−678.85	0.00		1370.45	1389.01	−679.22	1.95	1.95, p = .163
Elevated adjusting										
Constant	7.64	2.44	2.86, 12.41	0.38	< .001	6.23	4.40	−2.39, 14.85	0.30	.150
Age	−0.16	0.08	−0.33, 0.00	−0.21	.040	0.01	0.69	−1.34, 1.37	0.00	.984
IPV	−0.85	1.21	−3.23, 1.53	−0.03	.476	−1.45	1.16	−3.73, 0.83	−0.05	.198
TRP	0.02	0.01	0.00, 0.03	0.18	.008	0.04	0.03	−0.01, 0.09	0.13	.134
EmIn	0.09	0.03	0.02, 0.15	0.23	.001	0.27	0.09	0.10, 0.45	0.27	< .001
TRP*EmIn	0.01	0.01	−0.02, 0.03	0.05	.655					
	AIC	BIC	Loglikelihood	MLR $\chi2(0)$		AIC	BIC	Loglikelihood	MLR $\chi2(1)$	Δ S-B adj. χ^2
	1439.64	1461.29	−712.82	0.00		1441.68	1460.24	−714.84	1.63	1.63, p = .202

Note: IPV = Frequency of intimate partner violence; TRP = Parental traumatic stress; EmIn = Emotional insecurity; Age = Child age. Parental traumatic stress and emotional insecurity were grand mean centered.

respectively) than those in our study. Furthermore, Galatzer-Levy et al. (2018) find stable trajectories (resilience and chronic dysfunction) to be more common in adults than in children.

Finally, the emergence of a 'moderate stable' trajectory diverges from the prototypical trajectories (Bonanno, 2004), but corresponds to findings regarding PTSD (Miller-Graff & Howell, 2015) and anxiety/depression trajectories (Lauterbach & Armour, 2016) in children who were victims of or at risk for maltreatment. As the 'moderate stable' trajectory was unrelated to our predictors, it is difficult to interpret. Perhaps factors related to child maltreatment, but outside the reach of our study characterize this trajectory (e.g., neglect; Miller-Graff & Howell, 2015). Further exploration in future research of this trajectory and its predictors in maltreated children is needed.

4.2. Interpreting the influence of contextual and child factors

4.2.1. Parental traumatic stress

We found little support for the suggestion for a spillover of parental traumatic stress to explain the effect of parental traumatic

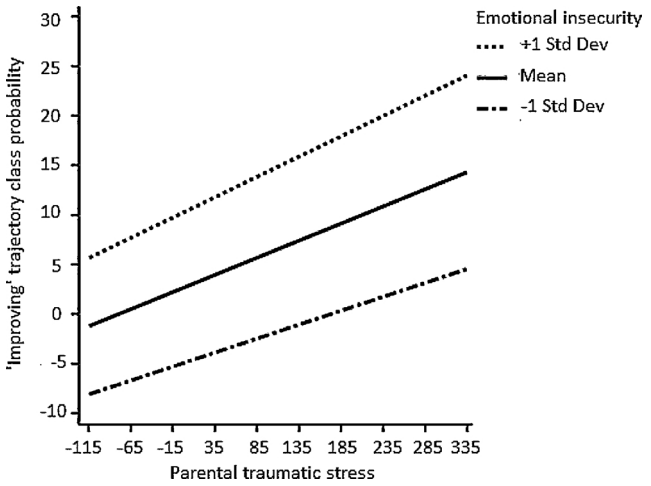

Fig. 2. Interaction graph of the effect of parental traumatic stress * emotional insecurity on probability of 'improving' trajectory membership.

stress on children's trajectory membership. The only trajectory resulting in dysfunction ('struggling') was unrelated to parental traumatic stress. 'Resilient' trajectory membership, however, was predicted by lower parental traumatic stress. Strikingly, higher parental traumatic stress predicted membership in the 'improving' trajectory. A possible explanation is the concept of collective coping, introduced by Pennebaker and Harber (1993): healing fostered by disclosure between victims of a shared traumatic event. Thus, through collective coping, parent-child disclosure about their shared trauma may help both put their thoughts and feelings into words, understand its causes, and find meaning. This in turn may promote recovery. Collective coping between parents and children involved in IPV has not been empirically investigated yet, but could be a promising topic for future research.

4.2.2. Child emotional security

Higher child emotional security was found to predict 'resilient' trajectory membership, implying children's sense of security in the interparental subsystem can promote healthy development in the face of IPV exposure. Because the three trajectories with the highest intercepts were predicted by child emotional insecurity, despite differing development after T1, it is likely that emotional security only predicts higher initial symptoms. However, as current evidence for relations between emotional security and psychopathology is exclusively cross-sectional (Davies & Cummings, 1994; El-Sheikh, Cummings, Kouros, Elmore-Staton, & Buckhalt, 2008), the idea that emotional security only predicts traumatic stress in the short term has not been tested.

Lastly, we tested if child emotional security buffered the effect of parental traumatic stress on likelihood of dysfunctional trajectory membership. Such a moderation effect did not emerge for the 'struggling' trajectory, which was the only to result in dysfunctional levels of traumatic stress. A significant moderation effect did emerge for the 'improving' trajectory. This finding is somewhat puzzling: the already unexpected positive effect of parental traumatic stress on likelihood of 'improving' trajectory membership is amplified by lower child emotional security. Due to its small effect size and nonsignificant simple slopes, meaningful interpretation of this effect first requires replication in future research.

4.3. Limitations and strengths

Some limitations of this study must be acknowledged, the first being its high attrition rate. Although common in studies including people involved in domestic abuse (Stover, 2005), high attrition can be problematic when it results in too small a sample. In this study, attrition resulted in a sample of $n = 193$ for LCGA, which is considered low and may cause too few trajectories to be identified (Nagin, 2005, as cited in Andruff et al., 2009). However, as five clearly interpretable trajectories could be identified, our sample size seemingly did not cause serious problems in this regard. A second limitation is the exclusion of the CTS2^{-2} 'sexual coercion' and 'injury subscales. Both are highly relevant to IPV; exclusion of the 'sexual coercion' subscale also means one out of three main facets of IPV was omitted. This may paint an incomplete picture of the effects of IPV. Furthermore, this study relied on parent-report, which is associated with problems with common source variance (although partly compensated by the longitudinal design; Vu et al., 2016). A final limitation is the absence of information about duration of IPV exposure before participation in the study. This obscures the true starting point of the trajectories, making comparison to trajectories observed after isolated events ambiguous.

Despite these limitations, this study also has a number of strengths. To our knowledge, it is among the first to address trajectories of traumatic stress reactions in children exposed to IPV. This trajectory-based approach, operationalized with validated measures and progressive statistical methods (Bonanno & Mancini, 2012), opens up new avenues for theory and research by distinguishing between initial vulnerability and long-term risk and resilience. Furthermore, this study is the first to assess effects of child emotional security and parental traumatic stress in a trajectory-based framework. Insight into these theoretically relevant concepts can help advance the field of child trauma studies and promote understanding of the role of the family in child traumatic stress reactions.

4.4. Conclusions and implications

Our findings illustrate that children's traumatic stress reactions following IPV exposure can be assessed using a trajectory-based framework. The trajectories that were found largely resemble prototypical trajectories, except for chronic dysfunction. The effect of parental traumatic stress seems to be more complex than a simple parent-child spillover effect and may better be explained by processes of collective coping between parent and child. Child emotional security served as a protective factor and emotional insecurity as a risk factor, but appeared to explain initial symptom levels rather than long-term development. Lastly, child emotional security did not moderate the effect of parental traumatic stress on likelihood of dysfunctional trajectory membership.

This study could lead the way for future research in several ways. First, our findings demonstrate that a trajectory-based perspective can provide unique and useful insights into children's adjustment following IPV exposure. This study also shows that parent and child factors have distinct effects on trajectories of traumatic stress reactions. Future research on child traumatic stress reactions in IPV or other domestic abuse contexts may consider the interplay of parent and child factors, such as interrelation and bidirectionality of parent and child traumatic stress trajectories, and the role of other family factors related to IPV, such as poverty and alcohol abuse (Holt et al., 2008).

To conclude, this study underlines the importance of examining individual children's traumatic stress reactions. There is no single pattern of traumatic stress reactions all children follow when exposed to IPV, and thus no silver bullet intervention. Recognizing different trajectories of traumatic stress reactions and resilience, both in research and practice, is essential to represent these children's experiences and effectively address their needs.

Declarations of interest

None.

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